Appendix A.7.5

Construction Environmental Management Plan

A.7.5

Galway County Council

N6 Galway City Ring Road

Construction Environmental Management Plan

GCOB-4-04-021.003

Issue 3 | 26 July 2018

Job number 233985

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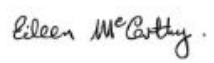
		Signature			
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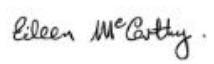
		Signature			
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Contents

Appendices

1 Introduction

1.1 Introduction

This Construction Environmental Management Plan (CEMP) summarises the overall environmental management strategy that will be adopted and implemented during the construction phase of the proposed N6 Galway City Ring Road, hereafter referred to as the proposed road development. The purpose of the CEMP is to demonstrate how the proposed construction works can be delivered in a logical, sensible and safe sequence with the incorporation of specific environmental control measures relevant to construction works of this nature. The CEMP sets out the mechanism by which environmental protection is to be achieved during the construction phase of the proposed road development. Implementation of the CEMP will ensure disruption and nuisance are kept to a minimum.

The CEMP has been prepared in accordance with industry best practice guidance including:

- TII's Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan
- Construction Industry Research and Information Association (CIRIA) in the UK, Environmental Good Practice on Site Guide, 4th Edition (CIRIA 2015).

The CEMP has been prepared in conjunction with the Environmental Impact Assessment (EIA) Report (EIAR) and Natura Impact Statement (NIS), having regard to consultations with a range of specialists and environmental organisations, in particular, the National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI). It is noted that this CEMP must be read in conjunction with the construction details already provided in the EIAR and NIS. Further details on the information included in the CEMP are presented below:

- General Project Details
- Contact Sheets
- Reference Documents
- Organisational Structure/Duties and Responsibilities
- Environmental Commitments and Environmental Control Measures
- Site Specific Method Statements/Management Plans
    - Construction and Demolition Waste Management Plan
    - Sediment, Erosion and Pollution Control Plan
    - Non-native Invasive Species Management Plan
    - Incident Response Plan
    - Construction Traffic Management Plan
- Environmental Awareness Training Strategy

- Communications Strategy
- Inspections, Auditing and Monitoring Compliance Strategy
- Final Handover

The CEMP is a working document and will be finalised by the Contractor following appointment and prior to commencing works on site. As stated previously, this CEMP must be read in conjunction with the construction details already provided in the EIAR and NIS. All of the content provided in this CEMP will be implemented in full by the Contractor and the finalisation of the CEMP by the Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and NIS.

Some information (such as project details) has already been provided in the EIAR and NIS and is not repeated in this version of the CEMP. However it will be included in the CEMP which is finalised by the Contractor.

In addition to the items listed above, the following information will also be provided by the Contractor when finalising the CEMP:

- Planning Consent - If planning approval is granted for the proposed road development, the entire contents of the planning consent will be included in the CEMP
- Comprehensively incorporate all Environmental Commitments set out in the Contract documents (in particular the Works Requirements), those presented in the EIAR and NIS and any additional commitments which may arise as part of the EIA process up to and including the Oral Hearing. The CEMP will include the complete suite of Environmental Commitments together with the relative specification, evidence and responsibilities of how each commitment will be met. The Environmental Commitments are included within Chapter 21 of the EIAR
- Relevant Environmental Performance Criteria prescribed in environmental legislation and in Contract documents
- Register of all applicable legislation, including relevant standards, Codes of Practice and Guidelines
- Description of the Environmental Management System of the proposed road development, which shall be devised according to the criteria of ISO 14001:2004 – Environmental Management Systems. The CEMP will be complemented by General Procedures, Work Procedures and Operations Instructions. These documents will be in place within the site administration offices and appropriate site locations during works

The CEMP is a dynamic document and the Contractor will ensure that it remains up to date for the duration of the construction period. The CEMP may need to be altered during the lifecycle of the construction period to take account of monitoring results, legislative changes, outcomes of third-party consultations etc. Additional appendices may be added to the CEMP to accommodate monitoring results, permits etc. All of the content provided in this CEMP will be delivered in full by the

Contractor and the finalisation of the CEMP by the Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and NIS.

In order to help ensure the successful development, implementation and maintenance of the CEMP, the Contractor will be obliged to appoint a Site Environmental Manager (SEM). The SEM will possess sufficient training, experience and knowledge appropriate to the nature of the task to be undertaken, a Level Eight qualification recognised by the Higher Education and Training Awards Council (HETAC), or a University equivalent, or other qualifications acceptable to the Employer, in Environmental Science or Environmental Management, or other subjects acceptable to the Employer. Further details on the roles and responsibilities of the SEM are provided throughout this document. A Project Ecologist and Project Archaeologist will form part of the Employers team for the duration of the construction phase of this proposed development.

Contract documents generally require the main Contractor to submit the CEMP to the Engineer within 28 days after receiving notice of Commencement of Works from the Engineer and at defined intervals thereafter. In order to help fulfil his/her duties under the Contract, the Engineer will carry out an audit of the CEMP at sufficient intervals to ensure that the main Contractor is complying with the environmental provisions of the Contract.

If a Project Extranet is being established, an electronic version of the CEMP will be placed on this site to allow members of staff of the Contractor, the Engineer, the Employer and TII monitor and view the CEMP.

1.2 Contract Procurement

A decision on the exact contractual arrangements for the construction of the proposed road development has not yet been made, but the proposed road development is suitable for development as a Design and Build (D&B) Scheme.

At the heart of the D&B approach is the concept that better value for money can be achieved through the utilisation of private sector enterprise due to the enhanced scope for innovation and by allocating the risk to the party best able to manage it. This type of contract places a responsibility on the appointed Contractor to design and construct the proposed road development in accordance with the obligations of the EIAR and NIS.

Regardless of the form of contract, the Contractor for the works will be contractually bound within the contract by any conditions arising from the site constraints, the commitments and mitigation measures set out in the EIAR, NIS, the employers requirements for the proposed road development, any modifications that may be imposed on the proposed road development by An Bord Pleanála and any conditions imposed by An Bord Pleanála and or other Statutory Regulations. Prior to construction the CEMP will be finalised by the Contractor and approved by the Employer. This may incorporate alternative details provided it can be demonstrated that it provides the same performance criteria (or higher) than those outlined in this CEMP and provided that all relevant necessary consultations is undertaken and approvals have been obtained subject to the satisfaction of the Employer.

2 General Project Details

Information on the proposed road development will be included in this section. This information will assist those without detailed knowledge of the proposed road development in quickly familiarising themselves with the key elements of the proposed road development and will also assist those who have a need to examine, review or audit the CEMP.

Details will include a description of the key elements of the proposed road development, the location of construction compounds, construction phasing, duration and drawings of the proposed road development. This information has already been provided in the EIAR and NIS and is not repeated in this version of the CEMP but it will be included in the CEMP which is finalised by the Contractor.

3 Contact Sheets

Contact sheets of relevant personnel are required primarily in order to ensure the efficient reporting of environmental incidents. It is important that these contact details are frequently reviewed to ensure that they are up to date. Contact details may be broken down into three categories: Contractor contacts, Employer contacts and third party contacts. Contact details will include the organisation, position title, name, mobile phone number and email address of relevant personnel.

The contact sheets will be included in the CEMP finalised by the Contractor.

4 Reference Documents

This section is included in the CEMP to provide an overview of the reference documents used in its development. Reference documents are divided into two categories: Project Specific Reference documentation and General Reference and Guidance documentation.

Project Specific Reference documents have been written specifically with the proposed road development in mind and will be referenced in determining the Environmental Commitments and Requirements which must be adhered to during construction. These documents include the EIAR and NIS. Other project specific reference documents will be included in this section when the Contractor finalises the CEMP. These will include reference to documents such as the Contract Documents, ABP's Order, Inspectors Report, the Schedule of Commitments, Health and Safety Plan, Quality Plan and any other relevant project specific reference documentation.

General Reference and Guidance documentation of relevance indicate best practice approaches to addressing significant environmental impacts during the construction of road schemes. Cognisance of these documents will be taken in finalising the methods documented in this CEMP by which construction will be managed to prevent, reduce or compensate for potential adverse significant impacts on the environment. The list provided below is non-exhaustive and will be finalised by the

Contractor as some of the standards/documents may be revised in in the interim or additional new documents added at that stage.

One of the main guidelines used in preparing the CEMP are:

- Environmental Protection Agency (EPA) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2017)
- Environmental Protection Agency (EPA) Draft Revised Guidelines on Information to be contained in Environmental Impact Statements (EPA, 2015)
- Environmental Protection Agency (EPA) Draft Advice Notes for Preparing Environmental Impact Statements (EPA, 2015)
- Environmental Protection Agency (EPA) Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002)
- Environmental Protection Agency (EPA) Advice Notes on current practice in the preparation of EISs (EPA 2003)
- Transport Infrastructure Ireland (TII) guidelines on procedures for assessment and treatment of geology, hydrology and hydrogeology for National Road Schemes (TII, 2009)
- TII Environmental Impact Assessment of National Road Schemes – A Practical Guide (TII, 2008)

Box 1 – General Reference and Guidance Documentation

Waste Related

- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (Department of Environment, Heritage and Local Government, July 2006)
- Guidelines for The Management of Waste from National Road Projects (Transport Infrastructure Ireland (TII), 2014)
- Notes for Guidance on TII's Series NG600 including NG601 Classification, Definition and Uses of Earthworks Materials and Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements

Silt and Pollution Control Related

- CIRIA (C793) The SUDS Manual
- CIRIA (C624) Development and flood risk – guidance for the construction industry
- CIRIA (C648) Control of water pollution from linear construction projects, technical guidance (2006)
- CIRIA (C649) Control of water pollution from linear construction projects, site guide (2006)
- CIRIA (C532) Control of water pollution from construction sites, guidance for consultants and contractors (2001)
- CIRIA (C741) Environmental good practice on site guide (fourth edition) (2015)

Box 2 – General Reference and Guidance Documentation continued

TIIs Environmental Assessment and Construction Guidelines

- Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (National Roads Authority, 2005)
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (National Roads Authority, 2005)
- Guidelines of the Treatment of Bats During the Construction of National Road Schemes (National Roads Authority, 2005)
- Guidelines for the Treatment of Otters prior to the Construction of Nationals Road Schemes (National Roads Authority, 2006)
- Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub, Post, Prior and During the Construction of National Road Schemes (National Roads Authority, 2006)
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (Rev 1, National Roads Authority, 2006)
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes (Revision 1, National Roads Authority, October 2004)
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority, 2006)
- Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (National Roads Authority, 2005)
- Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes (National Roads Authority, 2005)
- Guidelines for the Testing and Mitigation of the Wetland Archaeological Heritage for National Road Schemes (National Roads Authority, 2005)
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2005)
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (National Roads Authority, 2005)
- A Guide to Landscape Treatments for National Road Schemes in Ireland (National Roads Authority, 2006)
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes in Ireland (National Roads Authority, 2009)
- "Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Road Schemes, 2010)

5 Organisational Structure/Duties and Responsibilities

Information on the Contractor organisational structure/duties and responsibilities will be provided by the Contractor in this section. The Contractor's organogram will illustrate the Contractor's reporting and hierarchal structure. The Contractor will update the CEMP to include this organogram and it will be referred to in devising the duties and responsibilities of Contractor personnel under the CEMP. The inclusion of the organogram will also allow those auditing and reviewing the CEMP to quickly assess the extent and shape of the Contractor's project organisation and the duties and responsibilities of the various personnel.

The Contractor will update the CEMP to include the duties and responsibilities of the Contractor's personnel. The assignment and communication of duties and responsibilities to individual named members will help ensure the successful implementation of the CEMP. The Project Team, including the Project Manager, Construction Manager and Site Environmental Manager (SEM) will liaise during the finalisation of the CEMP to assign individual duties and responsibilities bearing in mind the overall organisational structure, the nature of the Environmental Commitments and Requirements and the proposed road development specific characteristics.

The role of SEM is vital in ensuring that the CEMP is finalised, implemented and maintained. The Contractor will appoint the SEM. As detailed previously in **Section 1**, the SEM will possess sufficient training, experience, qualifications and knowledge appropriate to the nature of the task to be undertaken. The SEM will be responsible for co-ordinating the day to day management of environmental impacts during the construction phase and for assisting and advising the Contractor's Project Team when programming construction activities and devising methodologies, taking cognisance of EIA/AA requirements. In particular the construction of the River Corrib Bridge, the Menlough Viaduct, Lackagh Tunnel and Galway Racecourse Tunnel will be built in accordance with the construction methods outlined in the EIAR and NIS. The SEM will ensure that works are constructed in accordance with the relevant Environmental Commitments and Requirements and that such compliance is adequately recorded and documented.

The SEM will be involved in third-party consultations and in public and internal communications on environmental issues. The SEM will also be responsible for performing site inspections. In addition, the SEM will deal with licensing and permit issues, keep up to date with relevant environmental best practice and legislative changes, engage in staff training, manage responses to environmental incidents and engage environmental Contractors as and when required.

The SEM will procure the advice and services of specialised qualified and accredited environmental professionals as and when required in order to help fulfil the SEM's duties and responsibilities under the CEMP. The SEM will require suitably qualified ecological experts to oversee ecologically sensitive elements of the construction works, ecological derogation licensing requirements and ecological monitoring. As noted previously, a Project Ecologist and Project

Archaeologist will form part of the Employers team for the duration of the construction phase of this proposed development.

Some construction activities will require inspection by a qualified hydrogeologist (such as excavations for structures in the Visean Undifferentiated Limestone, construction of infiltration basins, and encountering karst features). Refer to Chapter 10, Hydrogeology of the EIAR and Appendix G Hydrogeology of the NIS for further details.

6 Environmental Commitments

The CEMP is a working document and will be finalised by the Contractor following appointment and prior to commencing works on site. As stated previously, this CEMP must be read in conjunction with the construction details already provided in the EIAR and NIS. Some information has already been provided in the EIAR and NIS and is not repeated in this version of the CEMP. However, it will be included in the CEMP which is finalised by the Contractor. The Environmental Commitments are included within Chapter 21 of the EIAR.

The Contractor will update this section to include the comprehensive suite of Environmental Commitments. As discussed previously, these Environmental Commitments may emanate from, inter alia:

- The Contract documents (in particular, the Works Requirements (WR)
- Environmental Commitments presented in Chapter 21 of the EIAR including those required for the NIS
- Any additional commitments which may arise as part of the EIA process up to and including the Oral Hearing
- The conditions or modifications imposed by An Bord Pleanála (ABP) in their consent for the proposed road development
- Legally or contractually prescribed third party consultation (e.g. “Consult and comply” provisions contained within the contract

The Site Environmental Manager (SEM) will create a summary table in which each Environmental Commitment is noted. In order to understand the rationale for such commitment, the relevant document, legislation etc. will be referenced. Once the Environmental Commitments have been entered, the SEM will input the method by which it is proposed to ensure that the Environmental Commitment is met (e.g. a reference to the relevant site-specific method statement or environmental control measure)

As noted previously, the CEMP is a working document and Environmental Commitments may alter, whilst still achieving the same level of environmental protection, over the course of construction. Therefore, the SEM will update the Environmental Commitments listing as appropriate. In addition, the methods by which it is proposed to ensure that the Environmental Commitments are met may alter during the course of construction for example due to a result of changes in relevant environmental legislation. Therefore, the SEM will update the method

statements as appropriate. The updated method statements will deliver the Environmental Commitments and will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and NIS.

Environmental Commitments table will be regularly updated during construction to indicate a reference to the documentary proof that the Environmental Commitment has been met. This may be in the form of a signed off site-specific Method Statement, consultation certificate, results of monitoring, etc., as appropriate. The documentary proof will be attached to the CEMP.

Environmental control measures are discrete actions or procedures that will assist in meeting the Environmental Commitments. They are typically set out in discrete sheets according to environmental impact type (e.g. impacts on Bats, Badgers etc). The Environmental Control Measure Sheets will include the specific information already documented in the EIAR or NIS and will also list any requirements such as pre-construction site walkover, compliance with relevant licenses, approvals and legislation. It will also list the responsibilities of the individual Contractor personnel and will indicate the relevant reference documentation. It will be the responsibility of the SEM to ensure that all Environmental Control Measure Sheets are sufficient to meet the Environmental Commitments. The SEM will be responsible for bringing the Environmental Control Measure Sheets to the attention of the Site Agent and Foreperson. The Foreperson will be responsible for bringing the relevant Environmental Control Measure Sheet to the attention of all site personnel for review and sign-off. The contactor will formalise the Environmental Control Measure Sheets and will include in the CEMP.

For some Environmental Commitments such as construction & demolition waste management, construction traffic management, non-native invasive species management and sediment, erosion and pollution management, it is necessary to incorporate them into a site-specific method statements/plans. The following method statements/plans are detailed in this CEMP:

- Construction and Demolition Waste Management Plan
- Sediment, Erosion and Pollution Control Plan
- Non-native Invasive Species Management Plan
- Incident Response Plan
- Construction Traffic Management Plan

7 Construction and Demolition Waste Management Plan

7.1 Introduction

A Construction & Demolition (C&D) Waste Management Plan (WMP) has been prepared to ensure that waste arising during the construction and demolition phase of the proposed road development on site will be managed and disposed of in a way that ensures compliance with the provisions of the Waste Management Acts, 1996-2011 and associated Regulations (1996-2011) to ensure that optimum levels of reduction, re-use and recycling are achieved.

The plan provided below is consistent with mitigation measures as contained within the EIAR and NIS and the current schedule of environmental commitments. This C&D Waste Management Plan is a working document and will be finalised by the Contractor following appointment and prior to commencing works on site. All of the content provided in this Plan will be delivered in full by the Contractor and its finalisation by the Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and NIS.

The C&D WMP has been prepared in accordance with the following documents:

- *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (Department of Environment, Heritage and Local Government, July 2006)
- *Guidelines for The Management of Waste from National Road Projects* (Transport Infrastructure Ireland, 2014)
- *Notes for Guidance on Transport Infrastructure Ireland Series NG600* including *NG601 Classification, Definition and Uses of Earthworks Materials* and *Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements*

The *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* note that Project C&D WMP should be prepared for Civil Engineering projects producing in excess of 500m^3 of waste, excluding site materials used for development works on the site. At planning stage, it is estimated that the proposed road development project will produce in excess of 500m^3 therefore to comply with the guidelines a C&D WMP has been prepared.

This document is based on a high-level estimate of waste generation and management from the proposed road development at planning stage.

The principal objective of sustainable resource and waste management is to use material resources more efficiently, to re-use, recycle and recover material and reduce the amount of waste requiring final disposal. To achieve resource efficiency there is a need to move from a traditional linear economy to a circular economy (see **Figure 1**).

However, where residual waste is generated, it should be dealt with in a way that follows the waste hierarchy (see **Figure 2**) and actively contributes to the economic, social and environmental goals of sustainable development.

Figure 1: Circular Economy

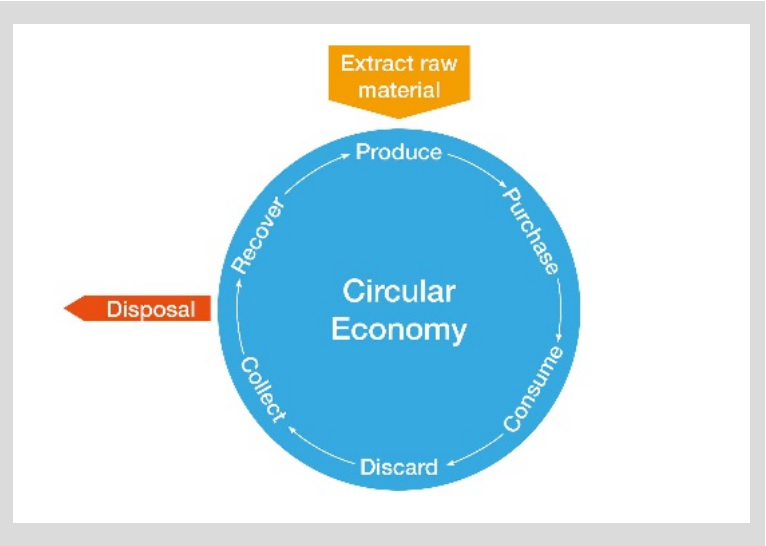
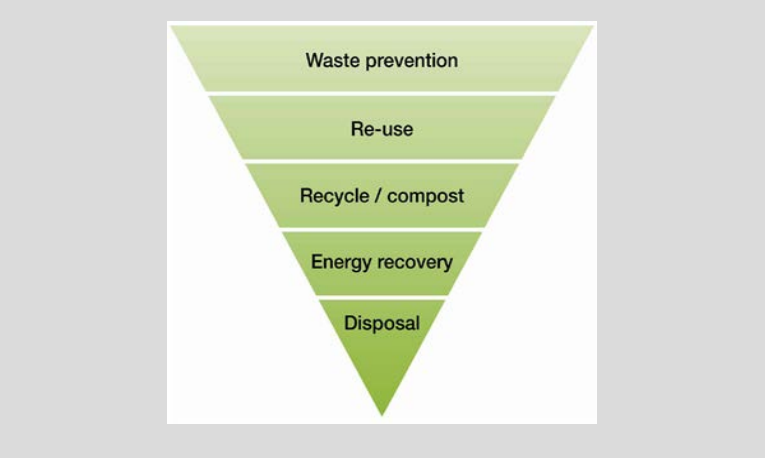


Figure 2: Waste Hierarchy



The Contractor will finalise the C&D WMP for the proposed road development following appointment which will meet the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* (Department of Environment, Heritage & Local Government. 2006) and implement this C&D WMP.

Liquid waste such as wastewater from dewatering is outside of the scope of this report and is covered in **Section 8** of this CEMP.

7.2 Sources of C&D Waste

7.2.1 Phasing

An east to west build sequence is likely to be adopted and construction may be completed in two concurrent phases or a single overall contract:

Phase 1 – N6 Coolagh to N59 Letteragh Junction – 9.9km (Including the N59 Link Road North and South)

Phase 2 – N59 Letteragh Junction – R336 West of Bearna 7.5km

Surplus materials generated during the following phases are addressed in this report:

- The demolition phase
- The excavation phase
- The construction phase

Likely surplus materials which will be generated during each of these phases are described in the sections below.

In line with the principles of sustainable development, the proposed road development will seek to minimise the amount of materials brought into the construction site.

The Contractor will endeavour to re-use as much of the surplus materials and wastes generated during demolition, excavation and construction as feasible within the proposed development boundary subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use.

7.2.2 Demolition Waste Generation

Demolition materials will be generated as a result of site clearance works and from the demolition of buildings and other structures currently in existence along the route of the proposed road development. This includes the demolition of residential properties, agricultural structures, commercial and industrial buildings and disused plant buildings in Lackagh Quarry. Refer to Chapter 14, Material Assets Agriculture and Chapter 15, Material Assets Non-Agriculture of the EIAR for further details

An estimated 47,400 tonnes surplus demolition materials will be generated as a result of the proposed road development.

A large portion of demolition waste is expected to be inert waste such as concrete, brick and glass. Metals and timber waste would also be generated from demolition. Where separation of plastics, steel, cabling etc. from inert waste is not possible this is classified as non-hazardous waste.

An asbestos audit will be carried out on buildings prior to demolition. Any asbestos encountered will be removed in accordance with the relevant legislation and disposed by specialist Contractors to an appropriately licensed facility.

7.2.3 Excavation Waste Generation

Over 99% of excavated material generated by the proposed road development will be used to satisfy the necessary engineering, landscape and safety quantities and environmental mitigation required on the proposed road development.

The anticipated material which will be encountered along the proposed road development are provided below in line with Transport Infrastructure Ireland's (TII) Specification for Road Works Series 600 – Earthworks (including Erratum No.1, dated June 2013) including Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements.

- **Acceptable Earthwork Material:** These can be categorised in accordance with TII Series 600 Table 6/1 Classes 1, 2, 6 and 8. They comprise the greater part of materials likely to be encountered, with their prescribed use provided in Table 6/1
- **Marginal Material:** Requires treatment such as addition of lime or air drying in order to meet acceptability requirements of TII Series 600. In terms of material being incorporated into the Works, the Contractor shall ensure, in advance, that the material is tested to ensure suitability for its proposed end use and that all pertinent legislation and guidelines are complied with. In addition use of this material must be discussed with the Employers Representative in advance of any works
- **Topsoil:** Topsoil shall comply with requirements for Class 5 material as outlined in TII Series 600 Table 6/1
- **Peat:** In accordance with TII Series 600 Cl 601.2, non-hazardous peat shall be categorised as Unacceptable U1 material
- **U1 Soil:** Non-hazardous soil which does not comply with the requirements outlined in TII Series 600 Cl 601.1, shall be categorised as Unacceptable U1 material
- **U1 Rock:** Non-hazardous rock which does not comply with the requirements outlined in TII Series 600 Cl. 601.1, shall be categorised as Unacceptable U1 material
- **Hazardous Material:** Hazardous material, as defined in TII Series 600 Cl 601.3 shall be categorised as Unacceptable U2 material

A summary of the estimated quantities associated with the material requiring placement on-site and removal off-site are provided in **Table 1**. In addition to the material described in **Table 1** some services and utilities will be removed during excavation works including disused sewers, drains, cables, ducts, pipelines and gullies.

Table 1: Estimated Excavation Material Volumes generated by Tunnelling and Road Construction

	Category (note 1)	Estimated excavated material (m^3)	Estimated re-use within the proposed road development (m^3)	Estimated surplus excavated material requiring recovery/ disposal off site (m^3)
Acceptable Earthworks Material	Classes 1, 2, 6 and 8	2,602,350	2,602,350	0
Marginal Material	Requires treatment in order to meet acceptability requirements	168,500	168,500	0
Topsoil	Class 5	151,450	151,450	0
Peat	Unacceptable category U1	76,000	76,000	
U1 Soil: Non-peat	Unacceptable Category U1	147,500	191,300	0
U1 Rock: Non-peat	Unacceptable Category U1	43,800		0
Landscaping and habitat creation	Class 4 (Note 2)	0		
Hazardous Material	Unacceptable Category U2	7,600	0	7,600
Total		3.197,200	3,189,600	7,600

Note 1: TII Series 600 including Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements.

Note 2: Landscape Fill in accordance with Class 4 of TII Series 600 including Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements.

7.2.4 Construction Waste Generation

Construction and demolition waste is defined as waste which arises from construction, renovation and demolition activities, together with all waste categories mentioned in Chapter 17 of the EPA List of Wastes (LOW) (See **Appendix A**).

Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities.

Construction waste can vary significantly from site to site but typically would include the following non-hazardous fractions:

- Soil and stone
- Concrete, brick, tiles and ceramics
- Asphalt
- Metals
- Wood
- Other

The hazardous waste streams which could arise from construction activities may include the following:

- Waste electrical and electronic components
- Batteries
- Asbestos
- Wood preservatives
- Liquid fuels
- Contaminated soil

The construction phase of the proposed road development is expected to commence in 2021. Surplus excavation material and construction waste arising from tunnel excavation is assumed to start from commencement of the construction phase. In the case of the proposed road development the most likely type of waste materials will be soil and stone, surplus asphalt and surplus concrete.

An indicative breakdown of the composition of typical construction and demolition waste is set out in **Table 2** below. These figures should be considered as a guide only as construction and demolition waste can vary significantly from one project to another, depending on the nature of the development and the waste management practices employed on-site.

Table 2: Composition of Construction and Demolition Waste (Non-Hazardous)[1]

Category	Composition
Soil and Stone	45%
Concrete, brick, tiles and ceramics	31%
Asphalt / Tar	1%
Metals	6%
Wood	7%

The Building Research Establishment has published benchmark waste generation data from new build construction projects completed in the UK. Up to November 2009 a rate of 26.07m^3 waste /£100k was recorded in relation to civil engineering projects. Therefore, based on the estimated construction cost for the proposed road development an estimated 25,328tonnes of construction waste will be generated.

7.3 Proposals for Construction and Demolition Waste Management

7.3.1 Circular Economy, The Waste Hierarchy and the N6 Galway City Ring Road

Galway County Council are committed to implementing the principles of sustainable waste management. Waste from the proposed road development will be managed in accordance with the principles of circular economy and the waste hierarchy.

The waste hierarchy sets out the most desirable approaches to waste management in the European Union. It became obligatory in Ireland in 2011 through the European Communities (Waste Directive) Regulations 2011. The waste hierarchy i.e. prevention, re-use, recycling, energy recovery and disposal applies in priority order with waste prevention being the most preferable option and waste disposal the least desirable.

7.3.2 General Construction and Demolition Waste Management

The following general measures will be implemented throughout the proposed road development:

- The Contractor will ensure that waste generation on site is minimised
- Possibilities for re-use of clean non-hazardous excavation material as fill on the site, landscaping works and habitat creation will be considered following appropriate testing to ensure material is suitable for its proposed end use

[1] FAS & Construction Industry Federation. 2002. Construction & Demolition Waste Management – A handbook for Contractors & Site Managers. FAS Environmental Unit, Upper Baggot Street, Dublin 4.

- Where excavation material may not be re-used within the proposed works the Contractor will endeavour to send material for recovery or recycling so far as is reasonably practicable and ensure that disposal is minimised
- Where re-use of surplus material within the proposed road development is not feasible the Contractor will ensure that waste generated will be delivered to authorised waste facilities in accordance with the Waste Management Acts 1996 -2011
- The Contractor will ensure that any interim storage facilities for excavated material have the appropriate waste licences or waste facility permits in place
- Waste and surplus excavation material from the proposed road development will be delivered only to facilities which have a granted waste licence or waste permit in place. By only using facilities with the appropriate waste licence/permits, Galway County Council will be satisfied that the Contractor will comply with the objectives of the Waste Management Act and that any environmental emissions (noise, dust, water) are managed at the destination site and therefore are legally the responsibility of the owner/operator of the destination site. In this manner Galway County Council can be satisfied that the off- site spoil management aspect of the proposed road development is legally compliant with environmental and waste management legislation
- Demolition works shall be undertaken in a manner which maximises the potential for recycling, including source segregating waste where appropriate
- **Source Segregation:** Waste produced will be segregated. Where possible metal, timber, glass and other recyclable material will be segregated during demolition works and removed off site to a permitted/licensed facility for recycling. Waste stream colour coding and photographs will be used to facilitate segregation
- **Material Management:** The Contractor will ensure that materials are ordered so that the quantity delivered, the timing of the delivery and the storage is not conducive to the creating of unnecessary waste. 'Just-in-time' delivery will be used so far as is reasonably practicable to minimise material wastage
- **Supply Chain Partners:** The Contractor will engage with the supply chain to supply products and materials that use minimal packaging, and segregate packaging for re-use
- **Waste Auditing:** The Contractor will record the quantity in tonnes and types of waste and materials leaving the proposed road development during the construction phase. The name, address and authorisation details of all facilities and locations to which waste and materials from the proposed road development are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material which is recovered and which is disposed
- Hazardous wastes will be identified, removed and kept separate from other C&D waste materials in order to avoid further contamination

7.3.3 Waste Prevention

- The most environmentally sustainable means of managing excavated material is its prevention and minimisation. Prevention and minimisation is inherent in the design of the proposed road development
- An estimated 2,706,250m^3 of material is required for road construction. This material will be sourced from the excavation activities within the proposed development boundary comprising of all of the acceptable material and a proportion of the marginal material

7.3.4 Environmental mitigation

- An estimated 483,250m³ material from the proposed road development will be required for re-use within the proposed road development in the following locations:
  - Construction within the grade separated junctions, where the ground level of the junction is much higher than the surrounding landscape it is proposed to construct embankments for health and safety purposes in the area of the junction
  - Landscaping and attenuation pond construction
  - Slope stabilisation at Lackagh Quarry in areas where the exposed quarry has significant blast damage
  - Landscaping and habitat creation in other areas
- A review of sites was undertaken where re-use will take place in the context of environmental impacts to ensure there are no environmental constraints which would prevent placement of material in these locations
- Re-use of surplus excavation material and wastes from the proposed road development in construction, while desirable, is subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use. The criteria set out in *TII Series 600 including Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements* shall be used in this regard

7.3.5 Recycling and Energy Recovery

Excavated material generated during the works will be reused within the project area where feasible. Off-site options for surplus clean and inert excavated material include reuse as a by-product on other sites subject to Article 27 notification to the EPA, or recovery at suitable waste permit facilities or licenced soil recovery facilities in accordance with relevant waste legislation.

Recycling/ recovery activities also include:

- Processing of stone to produce construction aggregate
- Infilling of quarries
- Raising land for site improvement or development

In addition to waste licensed and permitted facilities some IE licenced facilities have a requirement to import soil and stones in accordance with the terms of their Closure, Restoration and Aftercare Management Plans (CRAMP) which have the potential to accept material from the proposed road development

7.3.6 Disposal

The option of delivery of inert uncontaminated material for disposal to landfill is the least desirable destination for surplus material generated by the proposed road development. It will only be considered where sufficient void capacity cannot be secured at appropriately licensed/permitted facilities for recovery purposes.

It is unavoidable that a small percentage of excavation material will have to be disposed of at landfill. This is material having hazardous chemical or physical properties requiring special measures for its excavation, handling, storing, transportation, deposition and disposal. All material presented for disposal will have to meet the receiving sites waste acceptance criteria.

7.3.7 Construction Compounds and Material Storage

There are 13 sites identified as potential construction compounds across the proposed road development. Refer to Figures 7.001 and 7.002 of the EIAR and Figures 8.3.1 and 8.3.2 of the NIS. They have been identified at strategic locations across the proposed road development to minimise the distance for site construction traffic and personnel to travel. Sites identified have been chosen taking cognisance of proximity to major structures, excavations and embankments, proximity to residential properties, environmental constraints and current land use and ownership. Larger area compounds have the potential for material stockpiling, crushing, regrading and delivery in tandem with site offices.

Certificate of Registration, Waste Permits or EPA Licences will be obtained for storage and crushing and re-use of surplus materials within the proposed road development by the Contractor, as appropriate.

Following completion of construction, these areas will be cleared and reinstated. Temporary buildings and containers, parking areas, and waste material such as rubble, aggregates and unused construction materials will not be permitted to remain exposed on these sites and will be removed and disposed of appropriately.

7.3.8 Waste Transportation

7.3.8.1 General

Waste from the proposed road development will be transported by authorised waste collectors in accordance with the Waste Management (Collection Permit) Regulations, 2007 and the Waste Management (Collection Permit) (Amendment) Regulations, 2008.

7.3.8.2 Hazardous Wastes

The following steps must be taken where hazardous waste is being transported from the proposed road development to a hazardous waste recovery or disposal facility within the State:

- Waste transfer forms shall be obtained by the waste producer from Dublin City Council's web site, and completed on-line before the waste is collected
- A copy shall be downloaded, printed and signed, accompanying the consignment of hazardous waste when it is in transit
- On the load's arrival, the operator of the recipient disposal or recovery facility shall log-in and complete the relevant details documenting the receipt of the waste

Export of hazardous waste from the proposed road development outside of the State is subject to a Europe-wide control system founded on EU Regulation 1013/2006 on the Shipments of Waste (known as the Transfrontier Shipment Regulations). This legislation is supplemented by the Waste Management (Shipments of Waste) Regulations 2007, which makes Dublin City Council responsible for the enforcement of this regulatory system throughout Ireland. Export of hazardous waste from site outside the state should comply with the procedures set out in this legislation.

7.4 Roles and Responsibilities

7.4.1 C&D Waste Co-Ordinator

At the time of preparation of this report (February 2018) the proposed road development is at the planning phase. Following Contractor appointment, the Contractor will appoint a C&D Waste Co-Ordinator.

The C&D Waste Co-Ordinator will be responsible for detailing and maintaining the C&D Waste Management Plan for the project and updating it as appropriate.

Following each update or revision of the C&D WMP a copy of the new plan will be provided by the C&D Waste Co-Ordinator to the Employer, the SEM, the site subcontractors and all relevant staff.

The C&D Waste Co-Ordinator will have responsibility for implementation of the C&D WMP throughout the demolition, excavation and construction phases of the proposed road development.

The Contractor will ensure the C&D Waste Co-Ordinator will be appropriately trained and experienced on all aspects of waste management.

In addition the C&D Waste Co-Ordinator and all site staff handling wastes must be in a position to:

- Distinguish reusable materials from material suitable for recycling
- Ensure maximum segregation of waste and recyclables at source
- Co-operate with site manager on best locations for stockpiling reusable material
- Separate material for recovery
- Identify and liaise with operators of recovery outlets as appropriate

In the event of the C&D Waste Co-Ordinator leaving the project team the Contractor will nominate a suitable replacement.

7.4.2 Training

The C&D Waste Co-Ordinator will have responsibility for ensuring copies of the C&D WMP are made available to all personnel on site. The C&D Waste Co-Ordinator will also have responsibility for ensuring that all site personnel and sub-contractors are instructed about the objectives of the C&D WMP and informed of the responsibilities which fall upon them as a consequence of its provision. This may be carried out during the induction process for new staff members.

The C&D Waste Co-Ordinator will also have responsibility for communicating the requirements of the plan using for example, toolbox talks, prominently displayed site notices and audits as relevant.

7.4.3 Record Keeping and Auditing Procedures

The C&D Waste Co-Ordinator shall arrange for full details of all arisings, movements and treatment of construction and demolition waste to be recorded during the excavation, demolition and construction phases of the proposed road development.

When establishing the system for managing the details of all arisings, movement and treatment of C&D waste in the C&D WMP, the use of electronic tools should be considered to provide for convenient recording of information in a useful format such as “SMART waste”.

The Contractor will be required to arrange for full details of all arisings, movements and construction and demolition waste to be recorded during all stages of the proposed road development.

Each consignment of C&D waste removed from the site will be documented in the form of a Waste Movement Record form which will ensure full traceability of the material to its final destination. Separate record forms will be completed in respect to each waste transfer that takes place.

The Contractor will also receive documents/records from waste collection companies employed during quantifying the exact amount of waste material removed from site. The documents/records from the waste collection companies will also identify how much material went to landfill and how much went for recycling.

All producers of hazardous waste are required by law to keep a chronological record of the quantity, nature and origin of any hazardous waste produced, as well as its destination, frequency of collection, mode of transport and treatment method. This obligation is a requirement of the European Communities (Waste Directive) Regulations 2011, which also mandate that this information be held for at least three years.

All the above records will be retained in a designated location and made available for auditing of the C&D WMP.

7.4.4 Waste Auditing Protocols

The C&D Waste Co-Ordinator will arrange for a waste audit of the proposed road development once construction has fully commenced on site and of any facilities to which waste from the proposed road development is delivered as required.

The Employer will receive summaries of any audit reports which will be completed within three months of the end of each calendar year. The effectiveness and accuracy of the documentation will be monitored on a regular basis via routine site visits.

8 Sediment, Erosion and Pollution Control Plan

8.1 Introduction

This Sediment, Erosion and Pollution Control Plan (SEPCP) summarises the procedures and technical practices for implementing effective sediment, erosion and pollution control through a variety of delivery methods for the construction phase of the proposed road development. The purpose of this SEPCP is to demonstrate at this stage, how the proposed construction works can be delivered in a logical, sensible and safe sequence with the incorporation of specific sediment, erosion and pollution control measures relevant to construction works of this nature.

The SEPCP provided below is consistent with mitigation measures as contained within the EIAR and NIS. This SEPCP is a working document and will be finalised by the Contractor following appointment and prior to commencing works on site to include any additional requirements stipulated by An Bord Pleanála should the proposed road development be approved. The finalised SEPCP will include all of the site specific requirements, control, monitoring, and emergency measures and mitigation measures that are already described in this SEPCP, the EIAR and NIS. All of the content provided in this Plan will be delivered in full by the Contractor and its finalisation by the Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and NIS.

8.1.1 General

The principal objectives of a Sediment, Erosion and Pollution Control Plan include the following:

- Plan sediment, erosion and pollution control at the design stage, as far as practicable, so that requirements can be built into the design and land requirements for the proposed road development
- Minimise erosion and potential for soiled and contaminated water to be generated by minimising construction runoff
- Install drainage and runoff controls before starting site clearance and earthworks
- Minimise the area and duration of exposed ground
- Prevent natural clean runoff entering the works area/ site
- Provide appropriate control and containment measures on site
- Monitor and maintain sediment, erosion and pollution controls throughout the proposed road development
- Establish vegetation as soon as practicable on all areas that have been exposed

This SEPCP has had regard to the guidance published by Construction Industry Research and Information Association (CIRIA) in the UK including the following:

- CIRIA (C793) The SUDS Manual
- CIRIA (C624) Development and flood risk – guidance for the construction industry
- CIRIA (C648) Control of water pollution from linear construction projects, technical guidance (2006)
- CIRIA (C649) Control of water pollution from linear construction projects, site guide (2006)
- CIRIA (C532) Control of water pollution from construction sites, guidance for consultants and contractors (2001)
- CIRIA (C741) Environmental good practice on site guide (fourth edition) (2015)
- Inland Fisheries Ireland – Guidelines on protection of fisheries during construction works in and adjacent to waters (2016)
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (National Roads Authority, 2005)

8.1.2 Contents of Sediment, Erosion and Pollution Control Plan

The Sediment, Erosion and Pollution Control Plan (SEPCP) which will be updated and finalised by the Contractor will contain the following information listed below. As noted previously, this SEPCP produced in this CEMP must be read in conjunction with the EIAR and NIS as some of the data listed below is already provided in those documents:

i. An identification of existing land use, surface water and ground water features, low-lying areas, hydrology, hydrogeology, water quality, soils and geology and analysis of site investigations, (Refer to EIAR and NIS)

ii. An outline of the main construction activities likely to be relevant in relation to sediment, erosion and pollution generation (Refer to **Section 8.2** below)

iii. Identification of the area's most likely to have the potential for runoff (Refer to **Section 8.2** below)

iv. Collection of information on soil types, rainfall data, etc. (Refer to EIAR and NIS)

v. Selection of the best controls to reduce runoff, pollution and erosion (Refer to **Section 8.3** below)

vi. Ensure that control measures are correctly installed and sized - initial runoff controls to be in place before site works begin (Refer to **Section 8.3** below)

vii. An outline of the inspection and maintenance programme throughout construction to ensure the controls are working adequately or whether further measures are required (Refer to **Section 8.3** below)

viii. Emergency Procedures (Refer to **Section 10 Incident Response Plan** of this CEMP)

ix. As mentioned previously in **Section 1.2** Contract Procurement, prior to construction, the CEMP (of which the SEPCP forms part of) will be required to be updated by the Contractor and approval received from Galway County Council. This may incorporate alternative details provided it can be demonstrated that it provides the same performance criteria (or higher) than those outlined in this SEPCP.

8.1.3 Consultations

Consultation has taken place with the NPWS and the IFI and their comments/observations with regard to practical measures for water quality protection have been adopted within the SEPCP.

8.2 Potential Sources of Sediment, Erosion and Pollution Generation

The main activities/areas where sediment, erosion and pollution generation have the potential to arise include the following:

- Earthworks – including excavation and processing, transportation of materials (within and outside of the proposed development boundary), deposition of materials and stockpiling
- Construction of structures and concreting activities
- Watercourse crossings, in-stream works and river bank works
- Construction compound areas and machinery re-fuelling areas

The most significant area of concern regarding sediment and erosion control on any road construction project is the processes where topsoil, subsoil and peat surfaces are disturbed and exposed. Typically, these surfaces are exposed during:

- the initial site clearance works/top soil strip
- tracking of machinery
- construction of haul roads for earthworks operations
- excavation of cuttings
- stockpiling of acceptable and unacceptable earthworks material for re-use or removal off site
- construction of fill slopes with acceptable glacial till material
- excavation and backfilling of soft spots underneath proposed embankments
- the construction of spoil repositories
- processing and transportation of overburden and bedrock materials. The overburden comprises topsoil, subsoils, weathered rock, cobbles and boulders, alluvium, peat and made ground. There are two bedrock types under the proposed road development namely, granite and limestone.

Concrete, grout and other cement-based products which would typically be used in the construction of structures are highly alkaline and corrosive and can have a devastating effect upon water quality. Cement-based products generate very fine, highly alkaline silt (11.5 pH) that can physically damage fish by burning their skin and blocking their gills. This alkaline silt can also smother vegetation and the bed of watercourses and can mobilise pollutants such as heavy metals by changing the water's pH. Cement and lime may also be used in soil improvement techniques and in soil stabilisation.

Particular risks are posed to water quality when construction is taking place over or near surface waters (e.g. bridges, headwalls and wingwalls).

There are numerous watercourse crossings and stream diversions associated with the proposed road development. Crossings, diversion or maintenance of these channels has the potential to generate sediment laden pollution.

The proposed road development traverses groundwater bodies (GWB) that have the potential to be impacted. Some of these groundwater bodies have been assessed as providing significant contribution to receiving surface waters and are considered as providing potential pathways from site to receiving waters where karst is present.

The presence of karst (such as active karst features or palaeokarst) is a potential risk for both receiving groundwaters and surface waters as conduits may provide rapid pathways to groundwater sources and to surface waters.

8.3 Proposed Controls

The following sections summarise the procedures and technical practices for implementing effective sediment, erosion and pollution control through a variety of delivery methods for the construction phase of the proposed road development.

8.3.1 General

The following will be implemented as part of the CEMP:

- An Incident Response Plan (IRP) detailing the procedures to be undertaken in the event of a spill of chemical, fuel or other hazardous wastes, a fire, or non-compliance incident with any permit or license issues. Refer to **Section 10** of this CEMP for details
- Staff will be trained in the implementation of the Incident Response Plan and the use of any spill control equipment as necessary. Training log will be maintained and updated regularly
- Site specific method statements will be prepared for the construction activities at risk (as listed above) at particularly sensitive locations throughout the proposed road development area (also listed above) such as in karst areas, watercourse crossings/diversions, in-stream works etc. These site specific method statements will include as a minimum the details provided in this SEPCP required for the control and treatment of sediment, erosion and pollution generation

- Settlement treatment systems (construction sedimentation ponds/tanks) for construction activities will achieve at least 24-hour residence time for a 100 year 1 hour rainfall event occurring on the associated opened earthworks catchment area plus an additional 300mm freeboard. The quality of surface water discharge from the site will also meet water quality targets specified to protect riparian ecosystems and protected species. Appropriate Environmental Quality Standards, namely the Surface Water Regulations 2009 will be utilised to determine specific water quality targets
- Inform Inland Fisheries Ireland of all in-stream and bank-side construction work scheduled to take place
- Obtain all necessary permits and licences for in-stream construction work and culverting from Galway County Council and the OPW as required
- Prepare a construction site plan showing the location of all surface water drainage lines and proposed discharge points to surface watercourses or to groundwater bodies. This will also include the location of all existing and proposed surface water protection measures, including monitoring points, sediment traps, settling basins, interceptor drains etc. This plan will include as a minimum the details provided in this SEPCP required for the control and treatment of sediment, erosion and pollution generation
- Dewatering and surface water runoff discharges on the site, during construction and prior to completion will be controlled and discharged to the existing surface water network and existing groundwater bodies at agreed rates of flow in consultation with Galway County Council. All necessary facilities will be incorporated (settlement tanks/ponds/oil/grit interceptors) to ensure that only clean surface water is discharged (that meet the relevant standards) to the surface watercourses
- In addition, pollution of aquatic systems during the construction phase will be controlled by the implementation of the following best practice mitigation measures. Due cognisance is paid to the following guidance documents for construction work on, over or near water:
    - Inland Fisheries Ireland – Guidelines on protection of fisheries during construction works in and adjacent to waters (2016)
    - CIRIA (C793) The SUDS Manual
    - CIRIA (C624) Development and flood risk – guidance for the construction industry
    - CIRIA (C648) Control of water pollution from linear construction projects, technical guidance (2006)
    - CIRIA (C649) Control of water pollution from linear construction projects, site guide (2006)
    - CIRIA (C532) Control of water pollution from construction sites, guidance for consultants and contractors (2001)
    - CIRIA (C741) Environmental good practice on site guide (fourth edition) (2015)
    - Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (National Roads Authority, 2005)

8.3.2 Site Environmental Manager (SEM)

As detailed previously in this CEMP, Contractor will appoint a suitably qualified Site Environmental Manager (SEM).

Separate from the on-going and detailed monitoring carried out by the Contractor as part of the CEMP; the SEM shall carry out the inspection/ monitoring regime described below on behalf of the Employer. The results will be stored in the SEM's Monitoring file and will be available for inspection/ audit by the Client, NPWS or IFI and OPW (where relevant). All inspections/ monitoring/ results will be recorded on standard forms. Inspections will include the following:

i. Inspect the Principal Control Measures outlined in the CEMP on a weekly basis. Report findings to the Contractor

ii. Inspect surface water treatment measures (ponds, tanks, mini-dams, sandbags, etc.) on a daily basis and obtain turbidity readings in the outlet receiving water

iii. Inspect all outfalls to watercourses and groundwater bodies on a daily basis and obtain turbidity readings. Where excavation, deposition, pumping out or concreting works are on-going in the vicinity obtain turbidity readings three times per day in the outlet receiving water

iv. Daily visual inspection of watercourses to which there is a discharge from the works and those where there is construction works in the vicinity

v. Wheel wash facilities shall be inspected on a weekly basis

vi. Stockpiles shall be monitored on a daily basis while being filled or emptied and otherwise on a weekly basis

vii. Control measures for works at or near water bodies shall be inspected on a daily basis

viii. Concrete operations at or near watercourses shall be supervised and designated chute washing out facilities shall be inspected on a daily basis

ix. Site compounds and satellite compounds shall be inspected on a weekly basis

x. The Contractor's monitoring results shall be audited by the SEM on a frequent basis (6 times per quarter at a minimum)

xi. The investigatory level for turbidity is defined as a 10ntu difference between the ambient upstream watercourse level and the level downstream of the works

xii. Notwithstanding the stringent prevention measures listed above, in the unlikely event of an accidental release of sediment to a watercourse causing plumes or in the unlikely event of an exceedance of the turbidity investigatory levels arising, the following shall take place:

    (a) It shall be investigated immediately and thoroughly by the SEM and the Contractor

    (b) The Incident Response Plan shall be activated

    (c) The relevant NPWS, IFI and GCC staff will be notified immediately

(d) The Contractor will be required to take immediate action to detect source of release, corrective action to prevent release and to implement measures to ensure that such discharges do not re-occur

(e) Works if stopped shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the SEM following consultation with the NPWS and IFI

(f) Works and/ or discharges from the works shall not recommence until written consent is received from the SEM

xiii. Where the SEM considers that the risk of a sediment release is high for a particular construction activity, he/she shall inform the Contractor and request protective action to be taken before the construction activity commences. The SEM will be delegated powers under the contract sufficient for these instructions to be issued and implemented.

8.3.3 Earthworks

The principal objectives in relation to sediment and erosion control during the earthworks operation will be:

- to keep the area exposed to the elements and duration of exposure to an absolute minimum
- to minimise the amount of runoff from the site
- to organise the work so that it progresses from the low point towards the high point within each outfall catchment
- to organise the work in a karst environment (refer to **Appendix C** for Karst Protocol)

8.3.3.1 Excavation and Processing

The earthworks operation will include excavation and processing of material. The following principal controls will be put in place:

- Earthworks operations will be self-contained within the proposed development boundary having regard to environmental constraints. The importation (if required), transportation and placement of fill will be carried out in an integrated operation such that fill will be placed as soon as practicable after excavation
- The excavation of peat and other soft materials will be carried out in a manner that minimises the amount of water entering the excavation. This will be achieved by placing fill in the excavated area as soon as is practicable (generally the same day)
- The design incudes excavation in both granite and limestone bedrock. For the areas where pumping is required, works will be undertaken using appropriately sized pumps. Excavations associated with Lackagh Tunnel do not permit dewatering of the bedrock aquifer, all construction works shall be undertaken above the groundwater table in this location and during non-flood periods

- A clean stone filled perforated pipe (or similar) will be used as a sump for the pump intake. The pumped out water will be directed to the construction earthworks drainage system and to the settlement pond (or other) treatment system. The outlet from the pump shall be designed so as not to mobilise additional sediment – e.g. shall discharge onto plastic sheeting, rock pile, etc. to reduce water velocity
- The works includes a new all-weather full size 3G GAA pitch and a training pitch at the location of the existing GAA pitches at the NUIG Sport Facility in Dangan. The construction of these pitches will require a large extent of earthworks adjacent to the River Corrib which is part of the Lough Corrib cSAC. In addition part of the pitches lie within the flood zone of the River Corrib. Suitable controls shall be put in place to prevent sediment arising from the earthworks from entering the River Corrib. All runoff during construction will be diverted to a settlement system prior to discharging to the ditch located to the east of the proposed pitches. Silt fencing will be installed adjacent to the River Corrib to minimise the risk of sediments entering the river. No construction activities will take place at this location during periods of high flooding in the River Corrib. For further details on working in the vicinity of watercourses refer to **Section 8.3.5**

8.3.3.2 Deposition of Material

As discussed in **Section 7.3.4** above in relation to the Construction and Demolition Waste Management Plan, excavated material arising from the proposed road development will be required for re-use within the proposed road development in the following locations:

- Construction within the grade separated junctions, where the ground level of the junction is much higher than the surrounding landscape
- Landscaping and attenuation pond construction
- Slope stabilisation at Lackagh Quarry in areas where the exposed quarry has significant blast damage
- Landscaping and habitat creation in other areas

A review of sites was undertaken where re-use will take place in the context of environmental impacts to ensure there are no environmental constraints which would prevent placement of material in these locations

The following control measures will be implemented by the Contractor in these areas where the excavated material is to be re-used (referred to as material deposit areas below) to ensure that the sediment and pollution is controlled:

- Existing vegetation shall be left in place where practical
- Where appropriate, the excavated material to be deposited will be retained either by natural contours of the ground or by bunds constructed from suitable material of adequate engineering properties
- A setback of at least 5m from the drain/watercourse to the excavated material will be maintained for material deposition and a bund constructed to contain the

excavated material. A silt fence shall be installed at least 3m from the drain/watercourse before the excavated material is deposited and shall be maintained in place until vegetation has re-established

- Where appropriate, the material deposit area will be provided with a runoff collection and treatment system. This will consist of a shallow swale around the perimeter. This will be located just behind the bund or where the placed material meets the existing ground contour (approx. 2m wide by 0.25m deep). Check dams may be required to manage velocities and potential erosion within the swales
- The settlement system will be designed to facilitate settlement of suspended solids. It will provide 24 hours settlement time for the 1 in 100 year 1 hour rainfall event plus 300mm freeboard and will include control devices at the discharge from the swale and from the pond, to ensure this is achieved. Extreme weather events will be accommodated within the material deposit areas by the 300mm "freeboard" allowed in the bund design and will discharge via the settlement ponds once the event has subsided
- The final surface of the material deposit areas will be shaped to drain towards the perimeter swale and shallow surface drains will be installed to accommodate this. The perimeter swale will discharge via a settlement pond prior to discharge to the watercourse or groundwater body
- Some of the material deposit areas may be confined by the boundaries of impervious material and therefore the final surface will be shaped to shed surface water runoff to the road surface water collection/ conveyance and treatment system. Such areas will be landscaped immediately upon completion

8.3.3.3 Transportation

Suitable excavated materials will be required to be transported to other areas within the proposed development boundary for re-use for activities such as embankment construction, landscaping and attenuation pond construction, slope stabilisation and environmental mitigation. Other materials will require removal offsite such as hazardous material.

The transportation of materials will be carried out in an efficient manner so as to minimise the number of trips, minimise the length of individual trips, and minimise the escape of material from the trucks. The following principal controls will be put in place:

- The construction operation will be managed so as to minimise journey lengths
- Transportation of the material from the excavation source to the re-use sites will be within the proposed development boundary or if required by public road
- Where any excavated material is soft and presents a risk of spilling over the top of the trucks the capacity of the trucks will be limited in height so that the splash / overtopping opportunity is reduced
- Haulage of peat, soft material and hazardous material will be by means of trucks with water-tight bodies only and will contain a water tight covered top to prevent spillages

- Trucks leaving and entering the site will do so via a stabilised construction entrance
- Emissions to air during earthmoving and construction will occur, although the prevailing weather, the size of the site and its distance from sensitive receptors will assist in facilitating the management of any effects. The focus of the control procedures will therefore be to reduce the generation of airborne material

Mitigation measures such as spraying of exposed earthwork activities and site haul roads during dry weather, provision of wheel washes at exit points, control of vehicle speeds and speed restrictions and sweeping of hard surface roads will all ensure that dust generation will be minimised. Refer to the EIAR and NIS for further mitigation measure details. In particular, in relation minimising dust impacts on the Lough Corrib cSAC, the Contractor will implement the following measures during construction of the proposed road development:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only apart from the contractor's car park which will be hardcore
- Any road that has the potential to give rise to fugitive dust will be regularly watered, during dry and/or windy conditions
- Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road, the speed limit will be 20 km/h, and on hard surfaced roads as site management dictates
- Wheel washing facilities will be provided for any vehicle exiting site in order to ensure that mud and other wastes are not tracked onto public roads, these will be located at least 50m away from Annex I habitat within a European site
- Material handling systems and site stockpiling of materials will be located at least 50m away from Annex I habitat within a European site. Potentially dusty surfaces will be dampened during dry conditions
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to reduce the potential for dust emissions
- These procedures will be strictly monitored and assessed on a daily basis. In the unlikely event that elevated levels of dust are noted to occur outside the site boundary, satisfactory procedures will be implemented to rectify the problem before the resumption of construction operations. Noise barriers in the form of hoarding will be provided around the construction sites. These will also have the effect of reducing off-site dust effects. Furthermore, the addition of a 2m dust screen around construction works at all locations within or adjacent to the Lough Corrib cSAC will minimise dust impacts at the Lough Corrib cSAC
- Proprietary mobile truck wheel wash systems (e.g. Panzer by Smart Group, SunnyWash Mobile by ROTA Contracts, etc.) will be installed at the exit from each material deposit area while it is operational. All trucks leaving the material deposition areas will be required to pass through this facility. The water from the sediment tanks shall be discharged via the site runoff treatment system (i.e.

settlement ponds, etc.) and the sediment portion shall be removed to the material deposit areas

8.3.3.4 Stockpiles

Topsoil and/ or acceptable material will be stockpiled during the course of the proposed road development. The following measures shall apply:

- Topsoil stripping over large areas in advance of main excavation works will not be permitted. It will be restricted to the minimum required for efficient earthworks operations and in any case will only be carried out in the proposed development boundary where earthworks is on-going
- Stockpiles will not be located within 5m of a watercourse or within 25m of a sensitive watercourse (i.e. those with Atlantic Salmon downstream of the crossing and those with local high value, this includes the River Corrib and the Bearna Stream, Trusky Stream, Tonabrocky Stream and Knocknacarragh Stream) or lake and shall be surrounded with continuous silt fence
- No stockpiles will be located within a European site
- No stockpiles to be located within a floodplain area
- Material handling systems and site stockpiling of materials will be located at least 50m away from Annex I habitats in a European site
- Runoff from a stockpile will be collected via a shallow toe drain, located outside the silt fence, which will have check dams at regular intervals and will be designed to have a retention time of at least five hours. Prior to outfall, straw wrapped in geotextile bags shall be inset into the base of the drain by at least 100mm. This is in addition to the provision of a silt fence upstream of the outlet. Sediment build-up will be removed at regular intervals by manual means only and will be disposed of at the environmental mitigation areas
- Stockpiles of non-granular materials shall be limited in height to not more than 2.5m
- The suspended sediment load of runoff in the construction footprint needs to be considered where karst limestone is present. In relation to karst limestone areas and exposed limestone bedrock areas, the base of stockpiles will either be lined with a geotextile or with subsoil such that runoff of sediment will not drain into the limestone bedrock/karst limestone. The stockpiles will be surrounded by a bund and a continuous silt fence to prevent runoff draining to karst features and exposed limestone bedrock

8.3.4 Structures and Concrete

As discussed previously, construction of concrete structures can present particular risks to water quality. Particular risks are posed to water quality when construction is taking place over or near surface waters (e.g. bridges or headwalls). Cement and lime may also be used in soil improvement techniques and in soil stabilisation. As with the construction of structures it is critical that areas, where soil improvement

through lime or cement stabilisation is undertaken, are appropriately cordoned during construction to prevent runoff to surrounding lands and to watercourses.

Concrete will be used in the vicinity of some watercourses as follows:

- Batching plants (see further details below)
- Wash down water locations for concrete trucks will be at all site compounds which include a batching plant

The use and management of concrete in or close to watercourses will need to be carefully controlled to avoid spillage which has a deleterious effect on water chemistry and aquatic habitats and species. Alternate construction methods have been proposed where possible, e.g. use of pre-cast units, use of cofferdams/ diversions/ over pumping (or other) to place concrete in the dry, and permanent formwork will reduce the risks associated with concreting works. Where the use of concrete in or close to watercourses or near lakes cannot be avoided the following control measures will be employed to prevent pollution of watercourses/lakes:

- Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water
- When working in or near the surface water, and the application of in-situ materials cannot be avoided, the use of alternative materials for pre-treatment of the formwork such as biodegradable shutter oils shall be used
- Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters
- Where concrete is to be placed under water it will be designed to provide a cohesive mix to limit segregation and washout of fine material. This will be achieved by having either a higher than normal fines content, a higher cement content or the use of chemical admixtures
- Underwater concrete will be placed within the confines of a cofferdam or caisson. Normally, the forms of the construction works will be provided by pre-cast sections or sheetpiles. In either case, it is essential to seal joints securely and to engage clutches on sheetpiles properly to prevent fine particles polluting the watercourse
- Placing of concrete in or near watercourses will be carried out only under the supervision of the Site Environmental Manager (SEM)
- There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately and runoff prevented from entering the watercourse
- Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses and lakes
- Washout from concrete lorries, with the exception of the chute at designated chute washing areas, will not be permitted on site and will only take place at the batching plant

- Chute washout will be carried out at designated locations only. These locations will be signposted throughout the construction site. The concrete plant and all delivery drivers will be informed of their location with the order information and on arrival on site
- Chute washout locations will be provided with appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's C&D WMP

Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses. The following construction mitigation measures will be utilised to control concrete and cementitious material wash down water interaction with surface water:

- All batching and mixing activities will be located in areas remote from watercourses and drains
- Surface water drainage around the batching plant will be controlled via the provision of perimeter bunding with runoff diverted to appropriate treatment facilities
- There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials
- Washout from mixing plant of concrete lorries will be carried out in a designated, contained impermeable area:

Locations for concrete batching and rock crushing plants within the proposed development boundary have been considered. It is proposed to include a concrete batching and rock crushing plant at Lackagh Quarry (Site Compound SC 11/01). Lackagh Quarry site compound will be one of the principal site compounds across the proposed road development, given its size and location in relation to the overall proposed road development. It is also proposed to include a rock crushing and grading plant at site compounds in close proximity to the major cuttings across the proposed road development in order to minimise the distance for haulage of excavated material. It may also be necessary to utilise a mobile rock crushing unit to minimise haulage of excavated material. See **Table 7.9** of **Chapter 7, Construction Activities** for a summary of potential site compounds and possible locations identified for concrete batching and rock crushing plants. The appropriate authorisation for crushing plants such as waste facility permits will be obtained by the operator prior to commencement of the activity

8.3.5 Watercourse Crossings and In-stream Works

8.3.5.1 Introduction

There are numerous minor watercourse crossings and stream diversions associated with this proposed road development. Diversion or maintenance of these channels has the potential to generate sediment laden pollution.

There are 5 principal surface water drainage catchments and their sub-catchments intercepted/potentially impacted by the proposed road development which are labelled from west to east as follows:

1. Sruthán Na Libeirtí Stream
2. Trusky Stream
3. Bearna Stream
4. Knocknacarra Stream
5. Corrib Catchment
    a. River Corrib
    b. Coolagh Lakes
    c. Terryland River
    d. Ballindooley Lough System

8.3.5.2 Minor watercourses/drains and Discovery Series Watercourses

Minor watercourses/drains are defined as any drainage channel features which are not shown on EPA Envision mapping. Discovery series watercourses are identified on the 1:50,000 Discovery Series Mapping and EPA Envision mapping but are not sensitive watercourses.

The following measures apply to minor watercourses/drains:

- All of these watercourse crossings will be replaced by piped crossings of at least 900mm diameter concrete pipe
- The works will be programmed so that where watercourses are dry for a portion of the year then the crossing will be constructed “in the dry” during that period. In any case the works shall only be undertaken during dry weather flow periods where possible
- The existing watercourse will be over-pumped or temporarily diverted for the duration of the works to allow works to be carried out in the dry

The following measures apply to both the minor watercourses/drains and discovery series watercourses:

- Crossings will be provided with a silt fence and an in-stream sediment control device (e.g. Sedimat or similar) immediately downstream of the crossing point

- The silt fence shall be left in place for at least six weeks following completion of the work and shall be inspected and maintained at least three times per week. This will include replacement of the in-stream sediment control device or silt fences as required
- The area of disturbance of the watercourse bed and bank shall be confined to the absolute minimum required for the installation of the crossing
- Only precast concrete pipes/ culvert units will be used in the installation of these crossings
- The proposed replacement culvert is to be constructed with a minimum embedment of 0.15m for pipe culverts and 0.30m for box culverts. The invert of the culvert is to be in filled with natural locally sourced channel material of a sufficient stone sizing and grade to match the upstream and downstream channel invert levels and sediment grade and dished to promote flow in the centre of the culvert invert

8.3.5.3 Sensitive Watercourses

There are two sensitive watercourse crossings (i.e. those with Atlantic Salmon downstream of the crossing) in relation to salmonids, the River Corrib and to a lesser extent, the Bearna Stream. The principal avoidance and control measures to be adopted at these crossings include:

- There will be works on the western and eastern banks sides of the River Corrib to construct the outfall pipes but there will be no in-stream works in the River Corrib
- No in-stream works on any watercourses will be carried out between 1 October and 1 May
- All works will be carried out under the supervision of the SEM
- In-stream working will be kept to an absolute minimum, and will be carried out in the closed season only. IFI will be informed at least 2 weeks prior to commencement, in-stream works will be allowed on a Permit-to-Work basis that must be signed by the SEM at the commencement of the works and on a weekly basis thereafter
- Where in-stream or bank side works is for the purpose of constructing a structural element that requires the placing of concrete, then a cofferdam shall be constructed and made as water tight as possible. Pumping out from the cofferdam shall be directed to a settlement tank/ pond of sufficient capacity to allow solids to settle prior to discharge
- Sand bags shall be double bagged and filled with use washed sand only. Each bag shall be marked with a reference number and a record of placing and removal shall be maintained in the CEMP
- Where concrete is required for foundations, blinding, and bridge decks the controls outlined in this CEMP document, in EIAR and NIS will be strictly followed in full

- There will be no machinery working in-stream. Where excavation, breaking, etc. is required at the bank, it will be carried out with machinery operating from the bank only
- Machinery operating from the bank will work on temporary access platforms or roads (e.g. “bog mats”) to minimise damage to the vegetated banks
- A silt fence and a double in-stream sediment control device (e.g. Sedimat) shall be placed immediately downstream of the works. The in-stream sediment control devices shall be replaced as per the manufacturer’s recommendations with that mat closest to the works being removed first
- These measures shall be left in place for at least six weeks following completion of the work and shall be inspected and maintained at least three times per week. This will include replacement of the in-stream sediment control devices and silt fences as required
- Precast structural elements shall be used where possible for all structures thus generally minimising the use of fresh concrete to the placement of foundations, bridge cover slabs and such works
- Precast Arch/ beams, abutment extension units and wing wall retaining wall units will be used where possible to minimise the quantity of in-situ concrete pouring required

8.3.5.4 Diversions

Stream diversions/realignments are not proposed on any sensitive watercourses or locally sensitive salmonid streams. The largest proposed diversion/realignment is on a tributary of the Bearna stream and it approximately 525m long. There is also a diversion on the Tonabrocky Stream involving a new channel length of approximately 240m. Other realignments are a 100m length of the Trusky Stream between culverts C02/01a and C02/01b near the Bearna East Roundabout and a 150m drain realignment upstream of culvert C07/02(a and b) at the Letteragh Road L1323 (Ch. 7+350 to 7+200).

Some drains and other minor channels will be diverted or cut-off drains will be constructed to divert water away from the construction site. Small check dams will be constructed in these cut-off drains to trap sediments and reduce flow velocities. In addition, silt fences will be provided immediately before the outfall to existing watercourses.

In addition, minor channel diversions will be required to facilitate the extension and replacement of existing culverts, widening of sections of road embankment and construction of offline sections. In the design, diversions of all large and sensitive watercourse channels have been avoided with the exception of the stream diversions of the Tonabrocky Stream channel. In this case and where over-pumping is impractical for flow reasons, it is proposed to construct the channel diversion in the dry. These construction works will be undertaken during dry weather flow conditions to avoid the possibility of the channel diversion being flooded. The additional principal avoidance and control measures to be adopted at this location include:

- Double silt fencing is to be installed as necessary along the channel banks to protect downstream water quality
- The diversion channel is to be excavated with an adequate buffer and bund at the upstream and downstream ends from the existing channel tie in locations
- The diversion channel alignment is to mimic that of the existing (e.g. sinusoidal, meandering etc.)
- Where the channel diversion is in peaty and/ or glacial till the following measures shall be adopted:
    - The proposed channel banks slopes are to be typically 1:3 (V:H) with channel widths (i.e. bed level) matching that of the existing channel
    - A biodegradable erosion control mesh and a layer of natural material and gravels (sourced locally) are to be installed along the channel bed and side slopes
    - The channel gradient is to match that of the existing channel as far as practical. Weirs and baffles are to be installed to mimic the existing channel in agreement with the ecologist (fisheries requirements etc.) Stone is to be placed at the outside of sharp bends in the channel to prevent bank erosion
- Where the channel diversion is in bedrock the following measures shall be adopted:
    - The proposed channel banks slopes are to be typically 1:1 (V:H) with channel widths (i.e. bed width and bank width) matching that of the existing channel
    - A layer of natural material and gravels (sourced locally) are to be installed along the channel bed
    - The channel gradient is to match that of the existing channel as far as practical. Weirs and baffles are to be installed to mimic the existing channel in agreement with the ecologist (fisheries requirements etc.)
- The diversion channel is to be allowed to re-vegetate / re-establish prior to receiving stream flows
- Bunds (e.g. Aquadam or similar) are to be constructed in the existing channel at the proposed upstream and downstream tie in points to facilitate the removal of the existing banks at the tie-ins
- A silt fence and in-stream sediment control device (e.g. Sedimat) are to be installed immediately downstream of channel works to intercept sediments. These measures shall be left in place for at least six weeks following completion of the work and shall be inspected and maintained at least three times per week. This will include replacement of the in-stream sediment control devices or silt fences as required.
- The bunds are to be removed carefully to avoid contamination of the downstream channel and the channel flows allowed gradually down into the new channel. When a steady flow has been established in the new channel, bunds are to be placed across the existing channel (both upstream and downstream) to divert all channel flow into the new channel

- The silt fencing is to be reconfigured to protect the diversion channel from the bypassed channel works. The bypassed channel is to be in filled with locally sourced stone and soil and top-soiled to allow for re-vegetation. Hydraulically sized stone is to be installed on the dry side of the bunding prior to their removal to act as a scour counter measure / bank erosion control

8.3.5.5 Additional measures

- Where construction works are carried out alongside stream and river channels, and particularly the River Corrib, protection of such watercourses from silt load will be carried out. This will be through the use of grassed buffer areas, timber fencing with silt curtains or earthen berms so as to prevent direct runoff of waters from the construction site to watercourses.
- Use of settlement ponds, silt traps and bunds and minimising construction within watercourses. Where pumping of water is to be carried out, filters will be used at intake points and discharge will be through a sediment trap.

8.3.6 Groundwater

The proposed road development crosses a number of groundwater bodies (GWB) some of which are within a karst region. The presence of karst is a particular potential risk for receiving groundwaters as conduits may provide pathways to receiving surface waters. In the case of active karst features (dolines, conduits and caves) being encountered during excavations then measures will be put in place to prevent runoff from site entering the aquifer as a point input. In these cases the karst feature extent will be identified by a qualified hydrogeologist and backfilled with appropriate materials and then sealed so that surface runoff during construction cannot enter the aquifer by point input.

If palaeokarst (karst filled with sediment) is encountered during excavation then these sediments will be examined by a qualified hydrogeologist and if required be backfilled and replaced with appropriate material in order to prevent the features from reactivating with runoff from the site.

Those construction facilities with a risk to pollute groundwater include:

- Refuelling points
- Vehicle repair and machine workshops
- Fuel and lubricant storage
- Toilet and waste water treatment facilities

These construction facilities will be located only within specific areas where measures are employed to contain and prevent pollution of groundwater. In both the granite and limestone areas, these facilities will have a sealed base so that leaks, accidental spills or spills from vandalism cannot infiltrate to ground. These areas shall be roofed to prevent rainfall runoff washing down pollutants to groundwater. All storage tanks shall be secure, stored under roofed area and in bunds that will contain 110% of the volume capacity of the largest tank.

In emergency situations where vehicle breakdowns occur on the construction site and it is not possible for the works to be undertaken back in the repair depot then before repair works may proceed on site the ground below the vehicle shall be protected to ensure that no leaks or spills to ground can occur. An emergency spill kit shall be brought to the location of a vehicle breakdown to ensure that if a spill occurs, that it is contained and remediated immediately. All vehicles shall be kept in a good state of repair to reduce the number of breakdowns.

The suspended sediment load of runoff in the construction footprint needs to be considered where karst limestone is present. In relation to karst limestone areas and exposed limestone bedrock areas, the base of stockpiles will either be lined with a geotextile or with subsoil such that runoff of sediment will not drain into the limestone bedrock/karst limestone and the stockpiles will be surrounded by a bund and a continuous silt fence to prevent runoff draining to karst features and exposed limestone bedrock.

Access roads crossing areas of soil and subsoil that overly limestone bedrock will be constructed of gravel to reduce erosion and mobilisation of sediment.

8.3.7 Construction Compounds and Machinery Re-fuelling/lubrication

There are 13 sites identified as potential site compounds across the proposed road development. Figures 7.001 and 7.002 of the EIAR and Figures 8.3.1 and 8.3.2 of the NIS. They have been identified at strategic locations across the proposed road development to minimise the distance for site construction traffic and personnel to travel. Sites identified have been chosen taking cognisance of proximity to major structures, excavations and embankments, proximity to residential properties, environmental constraints and current land use and ownership.

Particular considerations in relation to the location of such facilities and their generation of pollution during the construction stage include:

- Welfare and sanitary facilities wastewater treatment
- Hard-standing runoff
- Potential for hydrocarbon pollution to groundwater and surface water

The following outlines the principal mitigation measures that are prescribed for the construction phase to protect all the catchments, watercourses and ecologically protected areas from site compounds:

- All construction compound areas will be required to be located on dry land and set back from river and stream channels and out of floodplain areas
- The storage of oils, fuel, chemicals, hydraulic fluids, etc. will not occur within 100m of the River Corrib. This applies to compound SC 09/01 which is located c.60m east of the River Corrib at its closest point
- Surface water flowing onto the construction zone will be minimised through the provision of berms and diversion channels

- All compounds will have appropriate levels of security to deter vandalism, theft and unauthorised access
- Surface runoff from compounds will be minimised by ensuring that the paved/ impervious area is minimised. All surface water runoff will be intercepted and directed to appropriate treatment systems (settlement facilities and oil trap) for the removal of pollutants prior to discharge
- All site compounds will be fenced off and a silt fence erected and maintained on the site boundary. The fence/ silt fence shall be located at least 5m from the watercourse
- Wastewater drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent water pollution and in accordance with the relevant statutory requirements
- The storage of fuels, other hydrocarbons and other chemicals within the construction compounds shall be in accordance with relevant legislation and with best practice. In particular:
    - All fuel/ Hydrocarbon/ Chemical (fluid) storage areas shall be bunded to 110% of storage capacity
    - Storage of these materials shall not be within 50m of a lake or sensitive watercourse and the storage location within the compound shall be organised so as to be as far away from all water bodies as is practicable. This applies in particular to SC 04/01 which is located adjacent to Bearna Stream
    - All watercourses that occur in areas of land that will be used for site compound/storage facilities will be fenced off at a minimum distance of 5m from its banks. In addition, measures will be implemented to ensure that silt-laden or contaminated surface water runoff from the compound does not discharge directly to the watercourse. Compounds shall not be constructed in lands designated as Flood Zone A or B in accordance with the OPW's The Planning System and Flood Risk Management Guidelines (November 2009)
    - Compounds will not be permitted in a European designated site
- Protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with recognised standards as laid out by the EPA. All chemical and fuel filling locations will be contained within bunded areas
- The quality of surface water discharge from the site will meet water quality targets specified to protect riparian ecosystems and protected species. Appropriate Environmental Quality Standards, namely the Surface Water Regulations 2009 will be utilised to determine specific water quality targets
- Stockpiling of topsoil and/ or acceptable material within construction compound areas shall meet the requirements of **Section 8.3.3.4** (Stockpiles) above respective to sensitive watercourses
- Riparian vegetation will be fenced off to provide a buffer zone for its protection and will be specified in consultation with Inland Fisheries Ireland

- Any surface water abstracted from a river for use during construction shall be through a pump fitted with a filter to prevent intake of fish
- The Incident Response Plan shall include arrangements for dealing with accidental spillage and relevant staff shall be trained in these procedures
- The use and management of concrete in or close to watercourses must be carefully controlled to avoid spillage which as stated earlier has a harmful effect on water chemistry and aquatic habitats and species. Alternate construction methods are encouraged for example, use of pre-cast concrete or permanent formwork will reduce the amount of in-situ concreting required. Where on-site batching is proposed by the Contractor this activity will be carried out well away from watercourses. Washout from such mixing plant will be carried out only in a designated contained impermeable area

8.3.8 Proposed Water Quality Monitoring

Water Quality Monitoring will be required prior to, during and post construction. The monitoring team will report findings to the relevant authorities.

Baseline sampling shall commence a minimum of six months prior to construction and conclude a minimum of three months after full operation has commenced to assess potential residual impact. Turbidity monitoring will be included in sensitive watercourses downstream of the proposed road development crossings. The local authority will make recommendations regarding all the water quality parameters to be assessed, the sampling interval and locations. However, as a minimum requirement there will be monthly water quality analysis from a minimum of one upstream and one downstream sampling point at each construction water outfall and surface water crossing point. Furthermore, as per **Section 8.3.2 (iii)** and **(xi)** above, turbidity monitoring will be carried out on a daily basis

8.4 Emergency Procedures

Prior to commencing works, the Contractor shall update the Incident Response Plan based on a thorough risk assessment. Refer to **Section 10 Incident Response Plan** below.

9 Non-native Invasive Species Management Plan

9.1 Introduction

A Non-native Invasive Species Management Plan (NISMP) has been prepared to outline the strategy that will be adopted during the construction and operation of the proposed road development in order to manage and prevent the spread of the non-native invasive plant species.

The NISMP provided below is consistent with mitigation measures as contained within the EIAR and NIS. This plan is a working document and will be finalised by the Contractor following appointment and prior to commencing works on site. All of the content provided in this Plan will be delivered in full by the Contractor and its finalisation by the Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and NIS.

Non-native invasive plant species have been identified and documented within and in close proximity to the proposed development boundary.

This NISMP is intended to be a working document and will be updated during both the construction and as part of the road maintenance required during the operation phase. During construction, it will be updated by the Contractor. Following construction, the plan will be updated for the operational phase, taking into account the results of the construction non-native invasive species management plan and operational maintenance requirements.

Construction (and potentially operational maintenance works) could potentially disturb stands of non-native invasive plants and/or soils contaminated with non-native invasive plant material. Given that the proposed road development crosses the Lough Corrib candidate Special Area of Conservation (cSAC) and crosses watercourses that drain to the Lough Corrib cSAC, Lough Corrib SPA, Galway Bay Complex cSAC and Inner Galway Bay SPA, there is an identified risk of the plant species in question being spread locally (e.g. during intentional movement of contaminated material, or accidentally where soils/plant material are spread by machinery tracks/tyres) or via wind blow (seeds) or washed downstream to the lower reaches of the River Corrib, affecting habitats there.

Therefore, the implementation of the management measures set out in this Plan is required to avoid any indirect or ex-situ impacts to habitats and species within these designated areas for nature conservation, both during construction and operation, and in the case of the Lough Corrib cSAC and other relevant European sites, to avoid adverse effects on the integrity of a European site.

In addition to sensitive habitats, there is an identified risk of non-native invasive plant species being spread onto neighbouring lands and onto public roads and other locations. Similarly, the implementation of the management measures set out in this Plan is required to avoid impacts on neighbouring lands, public roads and other locations both during construction and operation.

The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000 where it states that '*Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, ['refers only to exotic species thereof'] [...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.'*

Furthermore, the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), as amended, specifically Section 49(2) prohibit the introduction and dispersal of species listed in the Third Schedule whereby *"any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence."*

The implementation of the management measures set out in this plan have also been informed by the above legislation.

This NISMP and the management strategies relating to each non-native invasive plant species have been prepared with regard to the following guidance documents, where relevant:

- *Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (National Roads Authority, 2010)
- *Managing Japanese Knotweed on Development Sites (version 3, amended in 2013): The Knotweed Code of Practice* (Environment Agency, 2013)
- *Managing Invasive Non-native Plants in or near Freshwater* (Environment Agency, 2010)
- *Best Practice Management Guidelines Japanese knotweed Fallopia japonica*, Invasive Species Ireland (2015)

9.2 Survey Results

Habitat surveys were undertaken along the route of the proposed road development during multidisciplinary surveys, and as part of dedicated detailed botanical surveys, carried out for the preparation of an EIAR and NIS between July 2013 and June 2017.

There were three non-native invasive plant species listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 as amended, found to be present within, or in close proximity to, the proposed development boundary:

- Japanese Knotweed (*Fallopia japonica*)
- Himalayan Knotweed (*Persicaria wallichii*)
- Rhododendron – (*Rhododendron ponticum*)

The locations of these non-native invasive species are summarised below in **Table 3** and shown on **Figure 8.15.1** to **8.15.13** of the EIAR and **Figures 9.1** of the NIS.

Table 3: Summary of Non-Native Invasive Species Listed in the Third Schedule of the Birds and Habitats Regulations 2011 Recorded

No	Common Name	Chainage ref. & Figure ref.	Details
1	Japanese knotweed	Ch. 0+010 (mainline) Figure 8.15.1 EIA	Along farm track, south of proposed Bearna West Roundabout, adjacent to the proposed development boundary (approximately 14m outside proposed road development boundary)
2	Rhododendron	Ch. 1+580 (mainline) Figure 8.15.2 EIA	Recorded in woodland along the eastern side of the Troscaigh Road (L5387), north of the proposed road development. Directly adjacent to proposed development boundary (within 3m)
3	Rhododendron	Ch. 1+600 (mainline) Figure 8.15.2 EIA	Recorded in woodland along the eastern side of the Troscaigh Road (L5387), north of the proposed road development. Directly adjacent to proposed development boundary (within 1m)
4	Japanese knotweed	South-east of Ch. 5+275 (mainline) Figure 8.15.4 EIA	In rough grassland field with scrub outside of Sli Geal residential estate, near Ballyburke, approximately 45m outside of the proposed development boundary
5	Japanese knotweed	Ch. 6+840 (mainline) Figure 8.15.5 EIA	South of the mainline for the proposed road development. Located along minor watercourse. This watercourse is downstream of the mainline for the proposed road development but is crossed further downstream by the N59 South Link Road. Adjacent to residential property located east of the proposed drainage outfall at Rahoon. Approximately 85m outside of the proposed development boundary.
6	Rhododendron	Ch. 6+800 (mainline) Figure 8.15.5 EIA	South of mainline. Located along minor watercourse. This watercourse is downstream of the mainline for the proposed road development but is crossed further downstream by the N59 South Link Road. Adjacent to residential property located east of the proposed drainage outfall at Rahoon. Approximately 85m outside of the proposed development boundary.
7	Japanese knotweed	Ch. 8+370 (mainline) Figure 8.15.6 EIA	In area of recolonising bare ground within the proposed development boundary
8	Himalayan knotweed	Ch. 8+330 (mainline) Figure 8.15.6 EIA	South of the proposed road development. 41m from the proposed development boundary
9	Himalayan knotweed	Ch. 8+200 (mainline) Figure 8.15.6 EIA	North of the proposed road development. In excess of 100m from proposed development boundary

No	Common Name	Chainage ref. & Figure ref.	Details
10	Japanese knotweed	Ch. 8+930 (mainline) Figure 8.15.7 EIA Figure 9.1 NIS	In woodland/scrub, between Ch.8+900 and 8+950 at the NUIG Sporting Campus, approximately 25m from the proposed development boundary
11	Japanese knotweed	Ch. 12+225 (mainline) Figure 8.15.9 EIA	In residential garden, within the proposed development boundary the N84 Headford Road Junction.
12	Japanese knotweed	Ch.1+800 (N59 Link Road South) Figure 8.15.13 EIA	Field west of Rosán Glas road. In area of recolonising bare ground, north of Bóthar Diarmuida Junction, along the N59 Link Road South. Within proposed development boundary
13	Japanese knotweed	Ch.1+890 (N59 Link Road South) Link Road) Figure 8.15.13 EIA	Field west of Rosán Glas road. In area of recolonising bare ground, north of Bóthar Diarmuida Junction, along the N59 Link Road South. Within proposed development boundary

Japanese knotweed and Himalayan knotweed dispersal typically occurs through rhizome fragments being transported in soil by humans or to a lesser extent, through passive mechanical means such as in floodwaters. Dispersal is also achieved through vegetative reproduction from plant fragments. The plant typically occurs along roadsides, riverbanks and waste ground in Ireland where it forms dense, monotypic stands. During the winter, the brown stalks remain standing even though the plant dies back to the rootstock. Japanese knotweed causes a range of problems due to its prolific and dense growth habit including blocking sightlines on roads, damage to paving and structures, erosion of riverbanks and flood defence structures, damage to archaeological sites, loss and displacement of native habitats and species. Japanese knotweed is widespread throughout Ireland and is spreading rapidly.

Rhododendron ponticum is invasive in Ireland. It can spread via seed or can also occur by vegetative means where plants sucker or throw up new sprouts from roots as well as branches. It can withstand considerable shade and thrives as an understorey species in woodland, though it also tolerates open conditions in suitable acid soils. Its dense tangle of stems can block pathways, smother watercourses and encroach on roadways thereby impinging on sight-lines. The foliage of rhododendron contains various compounds that appear to have an allelopathic action on other species (inhibiting their growth) which may further inhibit plants from growing within close proximity.

9.3 Management Options

9.3.1 General measures to avoid spreading non-native invasive species during construction or soil movement

Many of the species noted above are highly invasive, and can easily spread to new areas. Most are particularly effective at colonising disturbed ground (e.g. construction sites). Some species spread by the re-growth of cut fragments or root material such as Japanese Knotweed and Himalayan Knotweed, so if they are broken up during site clearance or other earthworks they can readily re-grow in new areas to which soil is moved. In the case of Rhododendron, even if all adult plants are removed, their seeds can remain viable in the soil for a number of years, and these can re-grow in sites of former infestation, or seeds can be carried to other parts of the site during soil movements.

The unintentional spread of non-native invasive plant species during construction works is a significant issue, and if not managed in the correct manner, species like Japanese and Himalayan Knotweed could be spread to uninfested areas, which would increase the future cost and effort required to control the species, and could pose further public health and safety risks (Knotweed species can cause damage to buildings and infrastructure).

The most common ways that these species can be spread are:

- Site and vegetation clearance, mowing, hedge-cutting or other landscaping activities
- Spread of seeds or plant fragments during the movement or transport of soil
- Spread of seeds or plant fragments through the local surface water and drainage network
- Contamination of vehicles or equipment with seeds or plant fragments which are then transported to other areas
- Importation of soil from off-site sources contaminated with non-native invasive species plant material

Depending on the timescale for the construction of the proposed road development it may be possible to contain the spread of some species prior to the onset of construction on the site via an advance treatment contract (refer to **Section 9.4.2** below); this would be preferable. However, it may not be possible to gain access to all of the affected areas within the proposed development boundary in advance of the construction stage. If control programmes have not been achieved before construction begins, then site hygiene measures will need to be put in place to ensure that the further spread of non-native invasive species is avoided during the construction phase. Refer to the **Section 9.4.4** below on site hygiene below for further details on same.

9.3.2 Advance Treatment

As mentioned previously, it may be necessary to implement an advance works contract to commence treatment of some non-native invasive species such as knotweed species before construction starts. By treating in advance, it may be possible to contain the spread of the infestation. In some locations, infestations if left untreated, may spread further by the time construction commences. The implementation of advance treatment will require permission from landowners to access and treat the infested areas. However, it may not be possible to gain permission to access all of the affected areas in sufficient time in advance of the construction stage to carryout treatment. It is expected that the advance treatment for the knotweed species may be in-situ chemical treatment rather than excavation whereas for Rhododendron it may be physical (removal) treatment or indeed chemical treatment. However, the specific treatment method will be decided on a site by site basis.

As part of the advance works contract, the Contractor will be required to update and implement the recommendations of this management plan prior to advance treatment commencing. The purpose of the advance treatment plan will be to:

- Identify the extent of the infestation on the site
- Ensure further growth and spread of the plant on the site does not occur
- Ensure the plant is not spread to other sites either adjacent to the infested site or through transportation of contaminated soil to another site
- Identify the best method for managing and controlling the non-native invasive plant species on the site with regard to the future proposed site works and construction methods
- Communicate the plan to all site operatives to ensure success of the plan
- Document and record the treatment and management methods carried out on site for future reference (for use during main construction contract, future site owners, site users, avoid litigation etc.)

The advance treatment plan shall be completed by a qualified ecologist, made as simple as possible and will include the following:

- Site background including proposed works
- Extent of the current known locations of non-native invasive species infestations (See **Table 3** above) including detailed mapping showing same locations
- Site survey at known locations of infestations
- Following on from site survey and based on recommendations from this outline non-native invasive species management plan, confirm specific advance treatment to be put in place
- Site hygiene protocols during advance treatment (Refer also to **Section 4.4** above)
- Responsible individuals

- Contact details of landowners
- Follow up requirements
- Any other relevant information deemed necessary by the ecologist
- Close out report documenting details of advance treatment carried out and any recommendations to be carried out during main construction phase

9.3.3 Pre-construction Survey

As species may have spread, or their distribution may have changed, between the habitat surveys carried out for the EIAR and NIS, the advance treatment contract, and the commencement of the main construction works, the implementation of this NISMP will require a pre-construction re-survey by a suitably qualified person within the proposed development boundary. In accordance with the TII guidance this survey will produce accurate 1:5,000 scale mapping for the precise location of non-native invasive species. The pre-construction surveys will be undertaken by suitable experts with competence in identifying the species concerned having regard to any seasonal constraint.

9.3.4 Site Hygiene

Maintaining site hygiene at all times in an area where non-native invasive species are present is essential to prevent further spread. It is also necessary on sites where non-native invasive species are not present but where there is risk of contaminated material being brought to site, for example, site machinery being used on multiple sites, construction staff travelling between infested and not infested sites. Preventative measures must be taken. Construction equipment, vehicles and footwear may provide a vector for the spread of non-native invasive species.

The following site hygiene measures shall be taken for each site where applicable:

- In relation to knotweed plant species – to understand the possible extent of the rhizome (root) system underground – up to 7m horizontally and 3 meters vertically
- Fence off the infested areas prior to and during construction works where possible in order to avoid spreading seeds or plant fragments around or off the construction site. In relation to knotweed plant species, allow for a 10m buffer around the area
- Clearly identify and mark out infested areas. Erect signs to inform Contractors of the risk
- Avoid if possible using machinery with tracks in infested areas
- Clearly identify and mark out areas where infested soil is to be stockpiled on site and cannot be within 50m of any watercourse or within a flood zone
- Create designated entry and exit points for operators on foot and for small mobile equipment. A delineated access track to be maintained free of non-native invasive species to be established through the site to avoid the spread of invasive plant species by permitted vehicles accessing the site

- Installation of a dedicated footwear and vehicular wheel wash down facility into a contained area within the site
- Vehicles leaving the site to be inspected for any plant material and washed down into a contained area
- Vehicles used in the transport of infested material will need to be visually checked and washed down into a contained area before being used for any other work, either on the same site or at a different site
- Material gathered in dedicated wash down contained areas will need to be appropriately treated along with other contaminated soil on site. Refer to sections below in relation to treatment methods
- If soil is imported to the site for landscaping, infilling or embankments, the Contractor shall gain documentation from suppliers that it is free from non-native invasive species
- Ensure all site users are aware of measures to be taken and alert them to the presence of the NISMP
- Erection of adequate site hygiene signage in relation to the management of non-native invasive material

9.3.5 Treatment Methods

In addition to the advance treatment works and pre-construction survey, when the site becomes available to the Contractor for fencing and commencement of site clearance, areas identified as requiring specific treatment will be demarcated and the designated control measures implemented at the earliest possible stage to reduce the risk of spread along the proposed road development or beyond the landtake.

There are a number of management options that may be implemented to control and prevent the spread of non-native invasive species. These are presented in the sections below. It is also noted that it may not be possible to completely eradicate the non-native invasive species before or during the construction phase. For example, where structures are proposed at sites that contain Japanese knotweed, root barrier membranes will be installed to protect the structures from the plant. The design of these membranes will form part of the detailed design stage which will be in accordance with the required standards to achieve the necessary environmental protection.

It should be noted that those involved in the application of herbicides/pesticides must be competent to do so and, consequently, must have sufficient training, experience and knowledge in the area of herbicides/pesticides application. It is important that all staff involved in the application of herbicides/pesticides have received appropriate training, which may include achieving competency certification in the safe use of herbicides/pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area.

The type of treatment chosen will depend on site conditions (such as proximity to a watercourse/surrounding habitats/ proximity residential dwellings, health and

safety and traffic concerns) and the type and extent of infestation. For example, chemical stem injection alone is not a feasible treatment method for dealing with large extensive areas of infestations and excavation alone is not a feasible treatment method for dealing with large scale infestations on river banks. Rather a combined method of different treatments will be chosen on a site by site basis and with regard to sensitive receptors in immediate environs.

9.3.5.1 Chemical Treatment

The control of some species will require the use of herbicides (if not buried), which can pose a risk to human health, to non-target plants or to wildlife. In order to ensure the safety of herbicide applicators and of other public users of the site, a qualified and experienced Contractor will be employed to carry out all work.

It is advised that the Contractor refer to the following documents, which provides detailed recommendations for the control of non-native invasive species and noxious weeds:

- Chapter 7 and Appendix 3 of the TII Publication, The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2008)
- Non-native Invasive Species Ireland Best Practice Management Guidelines for Japanese Knotweed (2015)
- The Knotweed Code of Practice: Managing Japanese knotweed on development sites (UK Environment Agency ,2013)

These documents include measures to aid the identification of relevant species, with details for the timing, chemicals and methodology for chemical control, and for measures to avoid environmental damage during the use of herbicides.

Chemical treatment involves the application of a herbicide to non-native invasive species plant such as Japanese and Himalayan Knotweed stands without any excavation or removal of the plant material. The preferred types of herbicides to be used in the treatment of Knotweed are Glyphosate and 2,4-D Amine. Generally, if herbicide is applied as the treatment option, it will need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective, or monitored for a minimum of two years during which no regrowth is recorded.

Glyphosate is non-persistent and can be used near water but it is not selective (i.e. it is a broad spectrum chemical - will impact all plant species) whereas 2-4-Amine, can be persistent for up to one month, can also be used near water but is more selective on certain plants. The selection of chemical will depend on the site conditions, proximity to water, surrounding habitats etc.

The most effective time to apply Glyphosate is from July to September (or before cold weather causes leaves to discolour and fall). The majority of herbicides are not effective during the winter dormant stage because they require living foliage to take up the active ingredient. It is essential that a competent and qualified person carries out the herbicide treatment. Reapplication rates will depend on site specific considerations including the extent of the infestation, its location, and the time of

year treatment commences. Details of the proposed chemical treatment plan will be required in the site-specific NISMP.

Foliar treatment (spraying) is usually applied with a sprayer such as a knapsack sprayer or a larger spray system. It is important to use a treatment dye to identify clearly all areas treated. It is an efficient way to treat large monocultures of non-native invasive plants, or to spot-treat individual plants that are difficult to remove mechanically such as Japanese knotweed.

In the case of knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment will be required usually within ten days, before the internal vascular system is no longer capable of translocating the herbicide to the root system. While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf under surface as knotweed possesses many stomata openings on the leaf under surface. Dead stems should be cut, removed and/or burned on/off site in accordance with the Waste Management Acts 1996-2011 and the Waste Management (Prohibition of Waste disposal by burning) Regulations 2009 (SI 286).

Rhododendron is hard to kill even with herbicides and repeated application at low rates may be required to control it (Esen et al 2005). Due to the scale of infestation typical of rhododendron, foliar spraying with herbicides is not recommended, as considerable quantities of spray will be required which can have effects beyond the target species. However, foliar spray may be an option in areas where there are either young populations or in tall dense, monotypic stands. A variety of herbicides have proven effective for control including 2,4-D, glyphosate, dicamba and triclopyr.

The stem injection method is sometimes used for Japanese knotweed control. This treatment requires a higher concentration of the active ingredient than is used in foliar applications. It involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into each of the canes approximately 20-30cms from the base of each cane (between the first and second nodule). Subsequently approximately 10mls of herbicide mix is injected into each cane at a ratio of 5:1 through the use of a specialist stem injection tool. The application of glyphosate based products, are most effective when applied in the early Autumn (Mid to Late Sept). Regrowth will occur in subsequent years, albeit much less vigorously, which will require follow up treatment at the appropriate time of year. Spot treatment will be required each year until no regrowth is observed.

For Rhododendron, a 25% solution of glyphosate (i.e. 1:3 mixture with water) has been used successfully for complete control of target bushes (ibid). Triclopyr has also been used as a stem injection in an undiluted or 1:1 mixture. Application during March, April or October has been found to be most effective. It should be noted that Plant Protection Products must be used in accordance with the product label and with Good Plant Protection Practice as prescribed in the European Communities (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003).

For deep rooted species, such as Japanese knotweed, regrowth will occur in subsequent years, albeit much less vigorously, which will require follow up

treatment at the appropriate time of year. Spot treatment will be required each year until no regrowth is observed.

In order to ensure that the use of herbicides does not contravene legislation, the Contractor must comply with Circular Letter NPWS 2/08 dealing with the application of herbicide on to non-target areas from the National Parks and Wildlife Service (see **Appendix B**).

9.3.5.2 Excavation and Chemical Treatment

This option employs both physical and chemical methods of treatment. This method is employed in situations where treatment of non-native invasive species in particular knotweed is required to be completed in a shorter timeframe. The Environment Agency suggest that by digging up the rhizomes and recultivating it stimulates plant growth and will result in more successful herbicide application and management.

In summary this management method requires cutting and killing of the surface plant. The cut material must be left on top of plastic sheeting until dried out and subsequently monitored for any sign of regrowth (this is not recommended for a river bank habitat where there is the possibility of flooding occurring or areas within or adjacent to any European sites). They should not be placed in a green waste recycling bin. Once dried out, the material should be burned on site in accordance with the Waste Management Acts 1996 -2011 and the Waste Management (Prohibition of Waste disposal by burning) Regulations 2009 (SI 286). The surface of the affected area should be raked with tines to remove crowns and surface material, and in order to break up the rhizomes, bringing them to the surface, which will stimulate leaf production. This will make the plant more vulnerable to herbicide treatment. The more rhizomes that are brought to the surface, the more growth will occur and allowing for a more successful treatment. An excavator can be used to scrape the surface crowns and rhizomes into a pile and then cultivate the ground to stimulate rhizomes to produce higher density of stems for treatment. Reapplication of herbicide may be required for up to five years after initially application, subject to the site specific management plan.

For Rhododendron, physical control options include uprooting by hand, uprooting by winching (hand-operated or tractor mounted), chainsaw cutting of root-ball, mulch-matting and bud rubbing. Refer to the TII 2008 publication for further details on same.

9.3.5.3 Excavation and Burial

Excavation and burial are physical treatment methods. Excavated material containing knotweed can also be buried on site but not within any European sites. This will require burying the material at a depth of at least five metres. The contaminated material must be covered with a root barrier membrane before being backfilled with topsoil or other suitable fill material. The membrane must stay intact for at least 50 years. A manufacturer’s guarantee is required. Accurate mapping and recording of the location of the burial site to prevent any future accidental disturbance is required and future owners of the site must be informed of its

location. Inform future owners of its position. If soil containing Japanese knotweed is stockpiled, the material must be stored in a manner that will not harm health or the environment. The stockpile must be on an area of the site that will remain undisturbed. The area shall be clearly fenced and signed, and shall be regularly treated with herbicide to prevent any regrowth or reinfestation. As a precaution, the stockpiled material shall be laid on a root barrier membrane and covered to avoid contaminating the site further.

9.3.5.4 Excavation and Root Barrier Cell Method

Excavation and root barrier cell physical treatment methods. Excavated material containing knotweed can also be buried on site within a root barrier membrane cell in a similar procedure to that described above in **Section 9.3.5.3**. This will require burying the material at a depth of at least two metres. The contaminated material must be within a contained cell consisting of a root barrier membrane before being backfilled with topsoil or other suitable fill material. The membrane must stay intact for at least 50 years. A manufacturer's guarantee is required. The methodology of stockpiling will be that described above in **Section 9.3.5.3**.

9.3.5.5 Excavation and Bund Method

Where there is not sufficient depth on a site for deep burial, the EA Guidelines set out another physical treatment option whereby such excavated material is placed in a structured bund. The bund will comprise a raised area above ground level or a shallow excavation, no more than 0.5m deep, and lined with a root barrier membrane. The membrane must stay intact for at least 50 years and a manufacturer's guarantee is required. This method of treatment can also be used where knotweed material needs to be moved from a location and there is another ideal area of the site available to contain it.

The aim of this method is to concentrate the rhizome material into the upper surface of the bund, where it will grow and be controlled by herbicide. If the rhizome is buried deep, it will become dormant when inside the bund and regrow when the apparently clean soil is used for landscaping on the site. The bund location needs to be clearly signed and protected from potential accidental damage.

Reapplication of herbicide may be required for up to five years after the initial application, subject to the site-specific management plan.

9.3.5.6 Excavation and Removal from Site

Where the above treatment options are not possible (site is too small to contain excavated material, two shallow for burial, or where there is lack of space or where the infestation simply cannot be avoided by the construction works) removal of excavated material may be the only option. Where there are small amounts of Knotweed material to be removed it is possible to double bag the material and send to a fully licenced waste facility for disposal (i.e. landfill). Where the amount of material is larger in volume it will be necessary to haul from site to a suitably licenced waste facility. It should also be noted that in the process of excavating the knotweed if it has been treated with a persistent herbicide, the excavated material

will need to be classified as hazardous waste and it will need to be disposed of to a hazardous waste facility.

If any non-native invasive species plant material is collected (e.g. by hand-pulling or mowing), it is important that its disposal will not lead to a risk of further spread. The movement of non-native invasive plant material requires a licence from the National Parks and Wildlife Service (NPWS) under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). Non-native invasive species (particularly roots, flower heads or seeds) will be disposed of at licensed waste facilities or composting sites, appropriately buried, or incinerated having regard to relevant legislation. All disposals will be carried out in accordance with the relevant Waste Management legislation. It should be noted that some non-native invasive species plant material or soil containing residual herbicides may be classified as either 'hazardous waste' or 'non-hazardous waste' under the terms of the Waste Management Acts, and both categories may require special disposal procedures or permissions. Advice will be sought from a suitably qualified waste expert regarding the classification of waste and the suitability of different disposal measures. As noted above, additional specific measures for the management of Japanese Knotweed cuttings or contaminated soil can be found in the UK Environment Agency document *The Knotweed Code of Practice*: *Managing Japanese knotweed on development sites* (UK Environment Agency, 2013).

9.3.6 Site specific non-native invasive plant species control measures

The following treatments methods are suggested for the known infestations as detailed in **Table 4** below. It should be noted that the specific treatment methodology may change, depending on whether the infestation has spread since its original documentation, particular site circumstances and depending on the proposed works in the area. Treatment will be decided on a site by site basis.

Table 4: Summary of Treatment methods for known non-native invasive species infestations

No	Common Name	Chainage ref. & Figure ref.	Details	Suggested treatment
1	Japanese knotweed	Ch. 0+010 (mainline) Figure 8.15.1 EIA	Along farm track, south of proposed Bearna West Roundabout, adjacent to the proposed development boundary (approximately 14m outside proposed development boundary)	Advance treatment, pre-construction survey, fence off infestation, chemical and/or physical treatment during construction
2	Rhododendron	Ch. 1+580 (mainline) Figure 8.15.2 EIA	Recorded in woodland along the eastern side of the Troscaigh Road (L5387), north of the mainline. Directly adjacent to proposed development boundary (within 3m)	Advance treatment, pre-construction survey, fence off infestation, chemical and/or physical treatment during construction
3	Rhododendron	Ch. 1+600 (mainline) Figure 8.15.2 EIA	Recorded in woodland along the eastern side of the Troscaigh Road (L5387), north of the mainline. Directly adjacent to proposed development boundary (within 1m)	Advance treatment, pre-construction survey, fence off infestation, chemical and/or physical treatment during construction
4	Japanese knotweed	South-east of Ch. 5+275 (mainline) Figure 8.15.4 EIA	In rough grassland field with scrub outside of Sli Geal residential estate, near Ballyburke, approximately 45m outside of the proposed development boundary	Advance treatment, pre-construction survey, fence off infestation, chemical and/or physical treatment during construction
5	Japanese knotweed	Ch. 6+840 (mainline) Figure 8.15.5 EIA	South the mainline for the proposed road development. Located along minor watercourse. This watercourse is downstream of the mainline for the proposed road development but is crossed further downstream by the N59 South Link Road. Adjacent to residential property located east of the proposed drainage outfall at Rahoon. Approximately 85m outside of the proposed development boundary	Advance treatment, pre-construction survey, fence off infestation, chemical and/or physical treatment during construction

No	Common Name	Chainage ref. & Figure ref.	Details	Suggested treatment
6	Rhododendron	Ch .6+800 (mainline) Figure 8.15.5 EIA	South of the mainline for the proposed road development. Located along minor watercourse. This watercourse is downstream of the mainline for the proposed road development but is crossed further downstream by the N59 South Link Road. Adjacent to residential property located east of the proposed drainage outfall at Rahoon. Approximately 85m outside of the proposed development boundary.	Advance treatment, pre-construction survey, fence off infestation, chemical and/or physical treatment during construction
7	Japanese knotweed	Ch. Ch.8+370 (mainline) Figure 8.15.6 EIA	In area of recolonising bare ground within the proposed development boundary	Advance treatment, pre-construction survey, infestation is within proposed development boundary so it may not be possible to isolate, avoid and fence off the infestation. Likely that chemical treatment, excavation and removal from site may be required. Alternatively, Contractor may identify an area within proposed development boundary for bund/burial/root barrier methods
8	Himalayan knotweed	Ch. 8+330 (mainline) Fig 8.15.6 EIA	South of the mainline. 41m from the proposed development boundary	Advance treatment, pre-construction survey, fence off infestation, chemical and/or physical treatment during construction
9	Himalayan knotweed	Ch. 8+200 (mainline) Figure 8.15.6 EIA	North of mainline. In excess of 100m from proposed development boundary	Advance treatment, pre-construction survey, fence off infestation, chemical and/or physical treatment during construction
10	Japanese knotweed	Ch, 8+930 (mainline) Fig 8.15.7 EIA Figure 9.1 NIS	In woodland/scrub, between Ch. 8+900 and 8+950 at the NUIG Sporting Campus, approximately 25m from the proposed development boundary	Advance treatment, pre-construction survey, infestation adjacent to but not within proposed development boundary so it may be possible to isolate, avoid and fence off the infestation. Likely that chemical treatment, excavation and removal from site may be required. Alternatively, Contractor may identify an area within

No	Common Name	Chainage ref. & Figure ref.	Details	Suggested treatment
				proposed development boundary for bund/burial/root barrier methods
11	Japanese knotweed	Ch. 12+225 (mainline) Figure 8.15.9 EIA	In residential garden, within the proposed development boundary close to the proposed N84 Headford Road Junction.	Advance treatment, pre-construction survey, infestation is within proposed development boundary so it may not be possible to isolate, avoid and fence off the infestation. Likely that chemical treatment, excavation and removal from site may be required. Alternatively, Contractor may identify an area within proposed development boundary for bund/burial/root barrier methods
12	Japanese knotweed	Ch. 1+800 (N59 Link Road South) Figure 8.15.13 EIA	Field west of Rosán Glas road. In area of recolonising bare ground, north of Bóthar Diarmuida Junction, along the N59 Link Road South. Within proposed development boundary	Advance treatment, pre-construction survey, infestation is within proposed development boundary so it may not be possible to isolate, avoid and fence off the infestation. Likely that chemical treatment, excavation and removal from site may be required. Alternatively, Contractor may identify an area within proposed development boundary for bund/burial/root barrier methods
13	Japanese knotweed	Ch. 1+890 (N59 Link Road South) Link Road) Figure 8.15.13 EIA	Field west of Rosán Glas road. In area of recolonising bare ground, north of Bóthar Diarmuida Junction, along the N59 Link Road South. Within proposed development boundary	Advance treatment, pre-construction survey, infestation is within proposed development boundary so it may not be possible to isolate, avoid and fence off the infestation. Likely that excavation and removal from site may be required. Alternatively, Contractor may identify an area within proposed development boundary for bund/burial/root barrier methods

9.3.7 Management during operational phase

9.3.7.1 Post-construction monitoring

Following construction, the NISMP will be updated for the operational phase, taking into account the results of the detailed construction non-native invasive species management plan and operational maintenance requirements. Follow on treatment methods such as chemical treatment may be employed if specified in the requirements for ongoing control.

9.4 Conclusion

The purpose of this NISMP is to present the strategy that will be adopted during the construction and operation of the proposed road development in order to manage and prevent the spread of the non-native invasive plant species.

This NISMP is intended to be a working document and will be updated by a qualified ecologist during both the construction and operation phases. All of the content provided in this Plan will be delivered in full by the Contractor and its finalisation by the Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and NIS.

Given the nature of the species and the rate of growth, the footprint of the proposed road development will need to be re-surveyed prior to works. Advance treatment is proposed. Site hygiene will be particularly important on sites where non-native invasive species are present but also ‘clean’ sites. Incoming vehicles, and equipment (including footwear worn by contractors) will need to be cleaned and inspected before coming on site to prevent the further spread of the plant. The treatment method will be chosen on a site by site basis and regardless of the method chosen, the spread of non-native invasive alien plant species arising from construction activities will be managed and prevented.

Where possible material will remain on site and be re-used. Any material that must be removed off site to landfill or other suitable facility will require a licence from the NPWS.

The NISMP must be clearly communicated to all site staff and must be adhered to if it is to be implemented successfully.

Following construction, the Plan will be updated for the operational phase, taking into account the results of the construction NISMP and operational maintenance requirements.

10 Incident Response Plan

10.1 Introduction

The focus of including all of the stringent measures in this CEMP is on prevention of the incident arising in the first place. However, an Incident Response Plan has been prepared to ensure that in the unlikely event of an incident, response efforts are prompt, efficient, and suitable for particular circumstances. The ISMP presented below is consistent with mitigation measures as contained within the EIAR and NIS. This plan is a working document and will be finalised by the Contractor following appointment and prior to commencing works on site. All of the content provided in this Plan will be delivered in full by the Contractor and its finalisation by the Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the v.

The Incident (Emergency) Response Plan (IRP) describes the procedures, lines of authority and processes that will be followed to ensure that incident response efforts are prompt, efficient, and suitable for particular circumstances. The IRP details the procedures to be undertaken in the event of the release of any sediment into a watercourse, serious spillage of chemical, fuel or other hazardous wastes (e.g. concrete), non-compliance incident with any permit or license, or other such risks that could lead to a pollution incident, including flood risks.

The objective of this IRP will be to:

- Ensure the health and safety of workers and visitors along the site
- Minimise any impacts to the environment and ensure protection of the water quality and the aquatic species dependent on it
- Minimise any impacts on properties, services etc.
- Establish procedures that enable personnel to respond to incidents with an integrated multi-departmental effort and in a manner that minimises the possibility of loss and reduces the potential for affecting health, property, and the environment

The information provided in this section is based on best practice including the following documentation:

- CIRIA (C648) Control of water pollution from linear construction projects, technical guidance (2006)
- CIRIA (C649) Control of water pollution from linear construction projects, site guide (2006)
- CIRIA (C532) Control of water pollution from construction sites, guidance for consultants and contractors (2001)
- CIRIA (C741) Environmental good practice on site guide (fourth edition) (2015)

10.2 Implementation

The likelihood of an incident or emergency can be minimised by effective planning through development of an IRP. The Plan will be reviewed and updated regularly so that it continues to apply to construction activities. The Plan will identify the on-site risks and appropriate responses.

It will be the responsibility of the SEM to maintain and change the IRP as required. The Incident Response Plan will be reviewed on an on-going basis and immediately amended, as necessary, when applicable regulations are revised or when amendments are required by a regulatory authority.

The IRP in terms of health and safety will also require updating and submissions from the various contractors and suppliers as the proposed road development progresses.

Galway County Council and Galway City Council have a Major Emergency Plan prepared in accordance with the Government's Major Emergency Management Framework. The IRP details the initial contact that should be made in case of an emergency incident as well as those responsible for following up once an emergency event is declared.

The emergency services (particularly fire service) will be consulted to establish safe and appropriate access points to site compounds and other areas where there may be a risk of spillage etc (e.g. outfalls, fuel storage). Haul routes have been identified and are included in both the EIAR and NIS. In an emergency, knowing the relevant people to contact for help can save time and minimise the impacts. To cover the full length of a route, more than one contact may be needed, so the IRP will indicate which contacts apply to which sections of the site.

Numbers will be obtained for the following:

- radio/mobile contacts for site management and trained staff
- out-of-hours contacts
- environmental regulators (hotline or local contact)
- Irish Water (for spills to foul sewer)
- Galway County and City Councils
- Inland Fisheries Ireland and National Parks and Wildlife Service
- Environmental Protection Agency
- spill response and clean-up contractors

10.3 Resources

Relevant staff, including cover staff, shall be trained in the implementation of the IRP and the use of any spill kit/ control equipment as necessary. The Contractor shall provide a list of all such staff to the Employer's Site Representative detailing the name, contact number, and training received, and the date of that training.

The Contractor shall provide a full list, including the exact locations, of all pollution control plant and equipment to the Employer's Site Representative. All such plant and equipment shall be maintained in place and in working order for the duration of the works.

10.4 Environmental Emergency Response Procedures

The best way to manage pollution incidents is to prevent them. Emergency procedures will be developed – either project specific, site specific or activity specific and all on site will be required to know these procedures.

An effective pollution IRP relies on the following elements:

- Identification of all possible emergency scenarios
- Effective planning, e.g. availability of booms, spills kits at appropriate locations
- Identification of receptors/pathways (e.g. surface water drains/river)
- Identification and dissemination of contact numbers
- Definition of site-based staff responsibilities
- Appropriate site-based staff training
- Exercise of incident scenarios – spill drills
- Availability of suitable spill kits at appropriate locations on the site
- Implement lessons learnt from previous incidents
- Ensure that all appropriate site staff are aware of the site emergency procedure(s) (e.g. spillage, leakage, fire, explosion and flooding), that drain covers and spill kits are available, and they know how to use them

In terms of pollution spill response procedures, these will vary depending on the sensitive receptor and nature of construction activities but the following information will be included as a minimum and displayed at appropriate locations on the whole site, at river crossings, near outfalls etc.:

- Instruction to stop work and to switch off sources of ignition
- Contain the spill; location of spill clean-up material
- Name and contact details of responsible staff (these staff should assess the scale of the incident to determine whether the environmental regulator needs to be called)
- Measures particular to that location or activity (for example, close pond outlet valve)

More detailed plans may be project-specific, location-specific or specific to a particular activity depending on the nature of the work. They will include details of site drainage, outfalls and watercourses (as already provided in the EIAR and NIS) to indicate where pollution may end up so that containment measures can be put in place at these locations. Suitable equipment, such as spill kits, oil booms and absorbent material, will be held at appropriate locations on site.

Emergency equipment will be obtained from a reputable supplier and site staff will be trained in its correct use. Material Safety Data Sheets and best practice assessments will be used for advice on appropriate spill measures. The type of equipment required will depend on the activity taking place. The CIRIA document C648 *Control of water pollution from linear construction projects, technical guidance* (2006) provides details on the types and applications of emergency equipment. Refer to Table 15.2 of same document.

Every effort will be made to prevent an environmental incident during the construction and operational phase of the proposed road development. The focus of including all of the stringent measures in this CEMP is on prevention of the incident arising in the first place. Oil/Fuel spillages are one of the main environmental risks that will exist on the proposed 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. An example of the steps to follow in the event of a spillage to ensure that the environmental risk is reduced to as low as reasonably practical. This procedure can be tailored to be site/location/activity specific as required:

- 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
- 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 Site Environmental Manager (SEM) immediately giving information on the location, type and extent of the spill so that they can take appropriate action
- The SEM 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 SEM will notify the appropriate regulatory body such as Galway County Council, NPWS, IFI, Department of Communications, Climate Action and Environment (DCCE) and Department of Housing, Planning, and Local Government (DHPLG), if deemed necessary

Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident will be investigated in accordance with the following steps.

- The SEM must be immediately notified

- If necessary, the SEM 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
- In the very unlikely event of an incident occurring which may impact on a sensitive receptor, the relevant persons/authorities will immediately be informed (such as the Project Archaeologist, Project Ecologist, NPWS, IFI, EPA etc)
- A record of all environmental incidents will be kept on file by the Site Environmental Manager and the Contractor. These records will be made available to the relevant authorities such as Galway County Council, Galway City Council, DCCE and DHPCLG if required
- The SEM 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 Contractor as appropriate
- By carrying out the above steps, a proper system will be in place to investigate, record and report any potential accidents or incidents

10.5 Fire Control Measures

Every effort will be made to prevent the outbreak of a fire during the construction and operational phase of the proposed road development. Fire extinguishers and first aid supplies will be available in the work area. In the event of such an incident, the health and safety of all personnel will be a priority. All relevant legislation and guidance on health and safety of people and in particular fire safety will be complied with.

10.6 Training and Testing

Staff responsible for action in an emergency need to know their responsibilities. An incident at one location on the route may affect other parts of the site downstream, so it is important that someone be responsible for informing them. Staff will be trained to use the necessary equipment such as spill kits or outlet valves.

Emergency arrangements will need to be reviewed and tested periodically (and always after an incident) to ensure that measures are effective and that the workforce is aware of what to do in the event of an incident. Emergency drills will be recorded and improvements noted and actioned accordingly.

10.7 Corrective Action

When an incident happens, it is important to learn from it and ensure that such an incident does not occur again. This may involve changing the method of work for a particular activity, providing containment or treatment materials, or simply

training staff so they are aware of the correct method of work. Similarly, if an audit of planned arrangements indicates that measures are not in place, or those in place need to be improved, action will be taken immediately.

A record of corrective actions and lessons learned will be kept and communicated to all relevant persons, teams, sub-contractors etc. across the proposed road development.

10.8 Summary Checklist

- The focus of including all of the stringent measures in this CEMP is on prevention of the incident arising in the first place.
- The Contractor shall finalise the IRP. This plan is a working document and will be finalised by the Contractor following appointment and prior to commencing works on site. All of the content provided in this Plan will be delivered in full by the Contractor and its finalisation by the Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and NIS.
- Assess the pollution risks and develop emergency and spill response procedures for site specific activities
- Obtain details of key people that may need to contact for help
- Provide equipment for dealing with pollution incidents
- Train staff to follow procedures and use equipment correctly
- Audit the emergency plan
- Take action following an incident to ensure it does not occur again

11 Construction Traffic Management Plan

11.1 Introduction

The Construction Traffic Management (CTMP) will be finalised by the Contractor to ensure that construction traffic will be managed and monitored safely and efficiently throughout the construction phase.

11.1.1 Purpose and Scope

This Construction Traffic Management Plan is a key construction contract document, the implementation of which will reduce possible impacts which may occur during the construction of the proposed road development.

The objectives of this CTMP are to:

- Outline minimum road safety measures to be undertaken at site access/egress locations, during the works and including approaches to such access/egress locations
- Demonstrate to the developer, contractor and supplier the need to adhere to the relevant guidance documentation for such works
- Provide the basis for the preparation of a finalised CTMP by the Contractor appointed to carry out the works

The employer shall be responsible for ensuring that the Contractor manages the construction activities in accordance with this CTMP. The Contractor will finalise the CTMP in accordance with this document.

Objectives and measures are also included for the management, design and construction of the project to control the traffic impacts of construction insofar as it may affect the environment, local residents and the public in the vicinity of the construction works.

In the event An Bord Pleanála (ABP) decides to grant approval for the proposed road development, the CTMP which is finalised by the Contractor will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by ABP. The CTMP will also require approval from the Local Authority and An Garda Síochána.

The objective of this CTMP is to ensure that the residual impacts to the public road network during the construction phase of the proposed road development which have been identified in the application documentation are minimised and that transport related activities are carried out as safely as possible and with the minimum disruption to other road users. The CTMP has also been prepared for the purpose of identifying appropriate and safe methods of access for construction traffic to the proposed road development.

This CTMP describes the traffic management for the transportation of construction materials, equipment and personnel along the public road network to facilitate the

construction of the proposed road development. Light vehicles, such as cars and vans, will be used by site operatives travelling to and from the site. Heavy Construction Vehicles (HCV) will be required to deliver general construction materials, such as concrete, to the site.

This CTMP remains a live document that will be reviewed by the Contractor and expanded upon, where necessary, throughout the construction phase of the project, in order to produce a finalised CTMP. This CTMP should be read in conjunction with Chapter 7, Construction Activities of the EIAR.

11.1.2 Implementation

Key to the implementation of the CTMP is the dedication of an on-site construction manager (nominated by the Contractor) who will regularly liaise with and update the Employer and associated team on all environmental and construction programming issues relating to the site. All site personnel are charged with following good practice and encouraged to provide feedback and suggestions for improvements. All site personnel are also required to ensure compliance with the requirements of the site's CTMP.

11.1.3 Document Revision

This CTMP includes a summary of all the information which will be included by the appointed Contractor with the approval of the employer and which will, in addition, include any conditions attached to any planning approval granted for the proposed road development.

The CTMP will be subject to on-going review (throughout the construction phase of the proposed road development), through regular auditing and site inspections. This will ensure that the performance of construction activities, including the implementation of mitigation measures, is subject to continuous improvement and ensure that objectives are met.

All of the information required for the finalised CTMP will be highlighted in the specification for the Civil Engineering Works contract. The Contractor will be required to include further details and/or confirmation under the following headings:

- Site Access & Egress
- Traffic Management Signage
- Routing of Construction Traffic/Road Closures
- Timings of Material Deliveries to Site
- Traffic Management Speed Limits
- Road Cleaning
- Road Condition
- Road Closures
- Implementation of Traffic Management Plan

- Details of Working Hours and Days
- Details of Emergency Plan
- Communication
- Construction Methodologies
- Particular Construction Impacts

11.2 Proposed Construction Traffic Generation

11.2.1 Overview

The earthworks operations will be a major activity on site and will include excavation, stockpiling, processing, deposition, blasting, disposal, import and haulage. The construction of the proposed road development will require considerable movements of materials to, from and around the site. Most of the materials leaving the site will consist of spoil from the excavation works. Refer to Chapter 7, Construction Activities of the EIAR and Section 6 of the NIS.

11.2.2 Traffic Generation from Proposed Road Development

Refer to Table 7.10 of Chapter 7, Construction Activities of the EIAR for the estimated HGV and LV movements required to transport the materials extracted and delivered to site.

11.2.3 Envisaged Construction Equipment

Construction equipment and vehicles required for each construction element/operation will be delivered to site by appropriate vehicles. Details of typical construction equipment and vehicles are detailed in **Table 5**. Specific equipment and vehicles which are deemed to be required for the proposed road development by the principal contactor, suppliers and staff are to be confirmed and outlined in the Contractors finalised CTMP.

Table 5: Proposed Typical Construction Vehicles

Category / Stage	Advance Works / Site Preparation / Main Works / Reinstatement
Construction Vehicle	• Tractor & Low Loader (For Delivery of Excavator and Dumper) • Excavator • Dumper Truck (38 Tonne) • Bull Dozer • Wheeled Dumper / Tracked Dumper • 360º Tracked Excavator (13 tonne – 75 tonne) • Rock breakers • All Terrain Mobile Crane • Teleporter • Road Sweeper
Delivery Vehicle	• Stone Delivery Truck • Bituminous Material Truck • Concrete Truck • Hiab Lorry
Staff / Site Vehicle	• 4 X 4 Vehicle • Commercial Van / Jeep

11.3 Construction Traffic Management Plan Contents

The Contractor will be contractually required to ensure that the elements of this CTMP shall be incorporated by the Contractor into the CTMP. The Contractor shall also agree and implement monitoring measures to confirm the effectiveness of the mitigation measures outlined in the CTMP. On finalisation of the CTMP, the Contractor shall adopt the plan and associated monitoring measures. The finalised CTMP shall address the following issues (including all aspects identified in this CTMP):

- Site Access & Egress
- Traffic Management Signage
- Timings of Material Deliveries to Site
- Traffic Management Speed Limits
- Road Cleaning
- Vehicle Cleaning
- Road Condition
- Road Closures
- Enforcement of Traffic Management Plan
- Emergency Procedures during construction

- Communication

These items are explained in detail in the remainder of this section of the report.

11.3.1 Site Access & Egress

The proposed site access locations are detailed in Chapter 7, Construction Activities of the EIAR. The Contractor shall provide advanced warning signs, in accordance with Chapter 8 of the Department of Transport, Tourism and Sport Traffic Signs Manual 2010, on the approach to proposed site access locations a minimum of one week prior to construction works commencing at the site.

11.3.1.1 National Road Network

The following national primary and national secondary roads will be utilised as haul routes during the construction period:

- National Roads
  - N6 Bóthar na dTreabh
  - N59 Moycullen Road
  - N84 Headford Road
  - N83 Tuam Road

Refer to Chapter 7, Construction Activities and Figures 7.101 to 123 of the EIAR and Figures 8.3.1 and 8.3.2 of the NIS for haul route locations.

11.3.1.2 Regional and Local Road Network

The following regional and local roads will be utilised as haul routes during the construction period:

- Regional Road Network
  - R339 – Monivea Road
  - R338 – Seamus Quirke Road
  - R337 – Kingston Road
  - R336 – Bearna Road
- Local Road Network
  - L-1321 Bearna to Moycullen Road
  - Cappagh Road
  - Coolough Road / Bothar Nua
  - Sean Bothair
  - Briarhill Business Park Road
  - Ballybrit Crescent & Racecourse Avenue (Delivery Only)

Refer to Chapter 7, Construction Activities and Figures 7.101-123 of the EIAR and Figures 8.3.1 and 8.3.2 of the NIS for haul route locations.

11.3.1.3 Site Compounds

There are thirteen sites identified as potential site compounds across the proposed road development. Refer to Chapter 7 Construction Activities, Table 7.9 and Figures 7.101 to 123 of the EIAR and Figures 8.3.1 and 8.3.2 of the NIS for potential site compound locations.

11.3.2 Traffic Management Signage

The Contractor shall undertake consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements. Such signage shall be installed prior to works commencing on site.

Proposed signage may include warning signs to provide warning to road users of the works access/egress locations and the presence of construction traffic. All signage shall be provided in accordance with the Department of Transport's Traffic Signs Manual, November 2010 -Chapter 8 – Temporary Traffic Measures and Signs for Roadworks.

In summary, the Contractor will be required to ensure that the following elements are implemented:

- Consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements
- Provision of temporary signage indicating site access route and locations for Contractors and associated suppliers
- Provision of general information signage to inform road users and local communities of the nature and locations of the works, including project contact details

11.3.3 Timings of Material Deliveries to Site

In order to reduce impacts on local communities and residents adjacent to the proposed sites, it is proposed that:

- The Contractor will be required to liaise with the management of other construction projects and the local authorities to co-ordinate deliveries
- The Contractor will be required to schedule deliveries in such a way that construction activities and deliveries activities do not run concurrently e.g. avoiding pouring of concrete on the same day as material deliveries in order to reduce the possibility of numbers of construction delivery vehicles arriving at each site location simultaneously, resulting in build-up of traffic on road network
- The Contractor will be required to schedule deliveries to and from the proposed temporary construction materials storage yard such that traffic volumes on the surrounding road network is kept to a minimum
- A construction phase programme of works shall be developed by the Contractor in liaison with the relevant local authorities, specifically taking into account

potential road repair works that are included in the local authority's road works schedule. In particular, works should be programmed where possible such that any road works are carried out following the presence of construction traffic for the proposed road development

- HGV deliveries to specific areas of the site will be suspended on the days of any major agricultural shows, sports events, etc. that have the potential to cause larger than normal traffic volumes in the overlap areas
- The Contractor will be required to interact with members of the local community to ensure that construction related traffic will not conflict with sensitive events such as funerals
- HGV deliveries will avoid passing schools at opening and closing times where it is reasonably practicable
- Construction activities will be undertaken during daylight hours for all construction stages. It is anticipated that at critical certain stages of the construction works night time and weekend work will be required

11.3.4 Traffic Management Speed Limits

Adherence to posted / legal speed limits will be emphasised to all staff / suppliers and contractors during induction training. Drivers of construction vehicles / HGVs will be advised that vehicular movements in sensitive locations, such as local community areas, shall be restricted to 60km/h. Special speed limits of 30km/h shall be implemented for construction traffic in sensitive areas such as school locations. Such recommended speed limits will only apply to construction traffic and shall not apply to general traffic. It is not proposed to signpost such speed limits in the interest of clarity for local road users.

11.3.5 Road Cleaning

It shall be a requirement of the works contract that the Contractor will be required to carry out road sweeping operations to remove any scheme related dirt and material deposited on the road network by construction / delivery vehicles. Road Sweepers will dispose of material following sweeping of road network, to licensed waste facility.

11.3.6 Vehicle Cleaning

It shall be a requirement of the works contract that the Contractor will be required to provide wheel washing facilities, and any other necessary measures to remove mud and organic material from vehicles exiting sites. In addition, the cleaning of delivery trucks (with the exception of concrete delivery trucks) shall be carried out at the material storage yard and shall not be undertaken at the site locations. As noted in **Section 8.3.4** above, washout from concrete lorries, with the exception of the chute at designated chute washing areas, will not be permitted on site and will only take place at the batching plant.

Chute washout will be carried out at designated locations only. These locations will be signposted throughout the construction site. The concrete plant and all delivery

drivers will be informed of their location with the order information and on arrival on site. Chute washout locations will be provided with appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's C&D WMP.

11.3.7 Road Condition

The extent of the heavy vehicle traffic movements and the nature of the payload may create problems of:

- Fugitive losses from wheels, trailers or tailgates
- Localised areas of subgrade and wearing surface failure

The Contractor shall ensure that:

- Loads of materials leaving each site will be evaluated and covered if considered necessary to minimise potential dust impacts during transportation
- The transportation contractor shall take all reasonable measures while transporting waste or any other materials likely to cause fugitive losses from a vehicle during transportation to and from site, including but not limited to:
  - Covering of all waste or material with suitably secured tarpaulin/ covers to prevent loss
  - Utilisation of enclosed units to prevent loss
- The roads forming part of the haul routes will be monitored visually throughout the construction period and a truck mounted vacuum mechanical sweeper will be assigned to roads along the haul routes as required
- In addition, the Contractor shall, in conjunction with the local authority:
  - Undertake additional inspections and reviews of the roads forming the haul routes one month prior to the construction phase to record the condition of these roads at that particular time
  - Such surveys shall comprise, as a minimum, a review of video footage taken at that time, which shall confirm the condition of the road corridor immediately prior to commencement of construction. This shall include video footage of the road wearing course, the appearance and condition of boundary treatments and the condition of any overhead services that will be crossed. Visual inspections and photographic surveys will be undertaken of bridges and culverts that are along the haul roads
- Where requested by the local authority prior to the commencement of construction operations, pavement condition surveys will also be carried out along roads forming part of the haul route. These will record the baseline structural condition of the road being surveyed immediately prior to construction
- Throughout the course of the construction of the proposed road development, on-going visual inspections and monitoring of the haul roads will be undertaken

to ensure any damage caused by construction traffic is recorded and that the relevant local authority is notified. Arrangements will be made to repair any such damage to an appropriate standard in a timely manner such that any disruption is minimised

Upon completion of the construction of the proposed road development, the surveys carried out at pre-construction phase shall be repeated and a comparison of the pre and post construction surveys carried out.

11.3.8 Road Closures

Refer to Chapter 7, Construction Activities and Figures 7.101-123 of the EIAR and Figures 8.3.1 and 8.3.2 of the NIS for temporary and permanent road closures.

11.3.9 Enforcement of Traffic Management Plan

All project staff and material suppliers will be required to adhere to the CTMP. As outlined above, the Contractor shall agree and implement monitoring measures to confirm the effectiveness of the CTMP and compliance will be monitored by the Employer. Regular inspections / spot checks will also be carried out to ensure that all project staff and material supplies follow the agreed measures adopted in the CTMP.

11.3.10 Emergency Procedures During Construction

The Contractor shall ensure that unobstructed access is provided to all emergency vehicles along all routes and site accesses.

The Contractor shall provide to the local authorities and emergency services, contact details of the contractors personnel responsible for construction traffic management.

In the case of an emergency the following procedure shall be followed:

- Emergency Services will be contacted immediately by dialling 112
- Exact details of the emergency / incident will be given by the caller to the emergency line operator to allow them to assess the situation and respond in an adequate manner
- The emergency will then be reported to the Site Team Supervisors and the Safety Officer
- All construction traffic shall be notified of the incident (where such occurs off site)
- Where required, appointed site first aiders will attend the emergency immediately
- The Safety Officer will ensure that the emergency services are directed to and arrive at the emergency site

11.3.11 Communication

The Contractor shall ensure that close communication with the relevant local authorities and the emergency services shall be maintained throughout the construction phase. Such communications shall include:

- Submissions of proposed traffic management measures for comment and approval
- Ongoing reporting relating to the condition of the road network and updates to construction programming
- Information relating to local and community events that could conflict with proposed traffic management measures and construction traffic in order to implement alternative measures to avoid such conflicts

The Contractor shall also ensure that the local community is informed of proposed traffic management measures in advance of their implementation. Such information shall be disseminated by posting advertisements in local newspapers and delivering leaflets to houses in the affected areas. Such information shall contain contact information for members of the public to obtain additional information and to provide additional knowledge such as local events, sports fixtures etc. which may conflict with proposed traffic management measures.

11.4 Conclusions

This CTMP will form part of the construction contract and is designed to reduce possible impacts which may occur during the construction of the proposed road development.

The CTMP shall be used by the appointed contractor as a basis for the preparation of a finalised CTMP and shall detail, at a minimum, the items detailed in this CTMP and any subsequent requirements of the local authorities and ABP.

The employer shall be responsible for ensuring that the Contractor manages the construction activities in accordance with this CTMP and shall ensure that any conditions of planning are incorporated into the finalised CTMP prepared by the appointed works Contractor.

12 Environmental Awareness Training Strategy

All of the Contractor's site staff will receive relevant and appropriate training to ensure that they have the appropriate knowledge to successfully implement the CEMP. The use of the term "Contractor's site personnel" in this CEMP is intended to include the site personnel of all subcontractors whom the Contractor has subcontracted part of the works. The terms is also intended to include the site personnel of any specialists, nominated subcontractors, etc. Training will include that detailed below.

12.1 CEMP, EIAR, NIS and Contractual Requirement Briefing

The SEM will provide a briefing for all of the Contractor's senior management including the Project Manager, Programme Manager, Construction Manager, Design Engineers, Structures Agents and Site Agents on the CEMP and the Environmental Commitments/Requirements that must be met during the construction phase. The Employer's Site Monitoring Team will be monitoring compliance with the CEMP.

12.2 Environmental Induction Training

The SEM will provide Environmental Induction Training for all senior management and forepersons using an Environmental Induction Sheet, the contents of which will be included in the finalised CEMP. All other site personnel will receive environmental induction in conjunction with safety induction training. No person will work on site without first receiving environmental induction. Signed records of training will be kept for all environmental training provided and copies of training records will be given to the SEM.

12.3 Task Specific Training

Where a site-specific method statement/plan has been devised for a works activity (e.g. working in an area where non-native invasive species are present or waste management), all Contractor site personnel involved in that activity will be given a toolbox talk outlining the Environmental Control Measures. The foreperson will be responsible for providing the toolbox talk and for providing signed training records to the SEM.

13 Communications Strategy

This section sets out the communications strategy which will be adopted during the construction phase. A good communications strategy promotes awareness, education and information sharing on a particular project's progress. The procedures adopted for internal and external communication of information regarding the specific elements of the proposed road development strategy will be finalised by Contractor.

13.1 Public Communications Strategy

The Contractor will put in place a Public Communications Strategy which will provide a two-way mechanism for members of the public to communicate with a designated member of the Contractor's staff and for the Contractor to communicate important information on various aspects of the proposed road development to the public. The public communications strategy, which will be finalised by the Contractor, will include:

- procedures to inform members of the community directly affected by the construction phase on schedules for any activity of a particularly disruptive nature which is likely to impinge on their property such as blasting, demolition, road closures and diversions, pile driving and any mitigating actions that are being taken (shielding, restriction on work hours, etc.) to minimise such disruption
- Details of a contact name and number for any complaints that may arise during such works

A complaints register will form part of the communications strategy and all complaints will be handled in an efficient manner. The register will have prescribed methodologies for documenting and actioning complaints received from the community and other relevant stakeholders.

13.2 Internal Communication

The Contractor will put in place an internal communications strategy which will include procedures for effective internal communications. The strategy, which will be finalised by the Contractor will include measures such as the following:

- The site management meeting will include environmental issues on the agenda
- Weekly site safety meetings will include environmental issues on the agenda
- The SEM will report on environmental issues to the site management meetings
- The SEM will attend the weekly meetings

14 Inspections, Auditing and Monitoring Compliance Strategy

This section outlines the inspections, auditing and monitoring compliance strategy that will be finalised by the Contractor.

14.1 Inspections

The Site Environmental Manager (SEM), who has been identified as being responsible for the successful development, implementation and maintenance of the CEMP, will carry out environmental inspections at appropriate intervals. Where appropriate and when required, the SEM will arrange to be accompanied on these environmental inspections by qualified and accredited environmental professionals, whose knowledge and experience may cover the fields of ecology, hydrology, hydrogeology, landscape architecture, noise, air quality and other environmental sciences. The locations, frequency and nature of the inspections will depend on the nature of the construction activities being carried out and the sensitivity of the surrounding environment (e.g. works within the Lough Corrib cSAC). The inspection strategy will be finalised by the Contractor. The SEM will append the reports of the environmental inspections to the CEMP and the results of the inspections will be discussed at the weekly site safety and environmental meetings.

14.2 Monitoring

The Contract documents, EIAR, NIS, Conditions and/or Modifications imposed by ABP, Schedule of Environmental Commitments, environmental legislative requirements, the provisions of licences and the results of consultations with contractually or legally prescribed third parties may require the execution of certain types of monitoring (e.g. water quality, noise and vibration and/or air quality modelling, etc.).

The SEM will draw up a schedule of monitoring required, listing the type of report expected and detailing to whom the reports should be sent, etc. It is the responsibility of the SEM to ensure that all monitoring is carried out by competent persons.

Where the monitoring results fall outside the range contractually required, the SEM is responsible for initiating and reporting on corrective action. This may require the alteration of relevant Environmental Control Measures.

Refer also to **Sections 8.3.2** and **8.3.8** of this CEMP for details on monitoring and inspections by the SEM in relation to silt, erosion and pollution control.

14.3 Audits

Contract documents generally require the Contractor to submit the CEMP to the Contracting Authority within 28 days after receiving notice of Commencement of Works from the Contracting Authority and at defined intervals thereafter. In order to help fulfil his/her duties under the Contract, the Contracting Authority will carry

out an audit of the CEMP at sufficient intervals to ensure that the Contractor is complying with the environmental provisions of the Contract.

The SEM in conjunction with the Construction Manager, will carry out an audit of the CEMP on each bi-monthly anniversary of the commencement date to determine whether the CEMP is effective in ensuring that the Contractor is meeting all Environmental Commitments/Requirements. Where required as a result of such audits, the SEM will make all necessary changes to the CEMP and bring them to the attention of the Site Agent and Forepersons, etc. All changes to the CEMP will be made by the SEM and approved by the Construction Manager. The reports of these audits will be annexed to the CEMP. The CEMP may be revised, as appropriate, between annual audits (e.g. where Environmental Control Measures are updated). The SEM will track environmental legislation on a six monthly basis. Any changes in the legislation that could affect the CEMP will be brought to the attention of the Construction Manager, the Site Agents and Forepersons, etc.

The contract documents may provide that the design and execution of the works and the remedying of defects therein shall meet the requirements of and shall be consistent with the EIAR, NIS and any Schedule of Environmental Commitments and Ameliorative Measures or otherwise extracted from the EIAR and NIS, or arising from the oral hearing or from the approval of the proposed road development by An Bord Pleanála. The design and execution of the works and the remedying of defects therein will also comply with relevant legislation. In order to help fulfil his/her duties under the Contract, the Employer will carry out an audit of the CEMP at regular intervals, maximum time between intervals being three months, to ensure the Contractor is complying with the environmental provisions of the Contract.

15 Handover of the Final CEMP to the Contracting Authority

Two copies of the final and complete CEMP will be supplied to the Contracting Authority immediately following the end of the defects notification period.

Appendix A

List of Wastes- Chapter 17, Construction and Demolition Waste (including Excavated Soil from Contaminated Sites)

A. List of Waste Chapter 17, Construction and Demolition Waste (including Excavated Soil from Contaminated Sites)

17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)
17 01	**concrete, bricks, tiles and ceramics**
17 01 01	concrete
17 01 02	bricks
17 01 03	tiles and ceramics
17 01 06*	mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing hazardous substances
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 02	**wood, glass and plastic**
17 02 01	wood
17 02 02	glass
17 02 03	plastic
17 02 04*	glass, plastic and wood containing or contaminated with hazardous substances
17 03	**bituminous mixtures, coal tar and tarred products**
17 03 01*	bituminous mixtures containing coal tar
17 03 02	bituminous mixtures other than those mentioned in 17 03 01
17 03 03*	coal tar and tarred products
17 04	**metals (including their alloys)**
17 04 01	copper, bronze, brass
17 04 02	aluminium
17 04 03	lead
17 04 04	zinc
17 04 05	iron and steel
17 04 06	tin
17 04 07	mixed metals
17 04 09*	metal waste contaminated with hazardous substances
17 04 10*	cables containing oil, coal tar and other hazardous substances
17 04 11	cables other than those mentioned in 17 04 10

17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**
17 05 03*	soil and stones containing hazardous substances
17 05 04	soil and stones other than those mentioned in 17 05 03
17 05 05*	dredging spoil containing hazardous substances
17 05 06	dredging spoil other than those mentioned in 17 05 05
17 05 07*	track ballast containing hazardous substances
17 05 08	track ballast other than those mentioned in 17 05 07
17 06	**insulation materials and asbestos-containing construction materials**
17 06 01*	insulation materials containing asbestos
17 06 03*	other insulation materials consisting of or containing hazardous substances
17 06 04	insulation materials other than those mentioned in 17 06 01 and 17 06 03
17 06 05*	construction materials containing asbestos
17 08	**gypsum-based construction material**
17 08 01*	gypsum-based construction materials contaminated with hazardous substances
17 08 02	gypsum-based construction materials other than those mentioned in 17 08 01
17 09	**other construction and demolition wastes**
17 09 01*	construction and demolition wastes containing mercury
17 09 02*	construction and demolition wastes containing PCB (for example PCB-containing sealants, PCB-containing resin-based floorings, PCB-containing sealed glazing units, PCB-containing capacitors)
17 09 03*	other construction and demolition wastes (including mixed wastes) containing hazardous substances
17 09 04	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03

Any waste marked with an asterisk (*) is considered as a hazardous waste

Appendix B

Circular Letter NPWS 2/08 dealing with the application of herbicide on to non-target areas from the National Parks and Wildlife Service

B. Circular Letter NPWS 2/08 dealing with the application of herbicide on to non-target areas from the National Parks and Wildlife Service

Circular Letter NPWS 2/08

30 May 2008

Use of Herbicide Spray on Vegetated Road Verges

Dear Manager

I am directed by the Minister for the Environment, Heritage and Local Government to refer to Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000 (which places restrictions on the destruction of vegetation on uncultivated land during the period from 1 March to 31 August in any year), and to the Habitats Regulations 1997-2005.

The Minister has reason to believe that there have been recent instances in which extensive poorly-targeted spraying of road verges with herbicide has been carried out by local authorities, ostensibly in an effort to control noxious weeds. The Minister has been in contact with the National Roads Authority regarding a circular which they issued in regard to the control of noxious weeds, and understands that that circular, and accompanying guidelines, contained detailed procedures that, if observed, would not have led to such spraying.

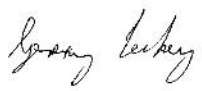
It must be emphasised that while Section 40 of the Wildlife Act permits the destroying of noxious weeds (section 40 (1) (d) of the Act as amended), it does not in that context authorise the destruction of adjacent vegetation. Accordingly, the Minister has asked me to say that extensive, untargeted spraying of road verges with herbicide is, *prima facie*, an offence under Section 40 of the Wildlife Acts, and it is his policy to prosecute in such cases.

The National Parks and Wildlife Service of the Department of the Environment Heritage and Local Government are currently consulting with the National Roads Authority (NRA) and the Department of Agriculture, Fisheries and Food regarding the requirements for the protection of ecologically sensitive habitats and in particular for Natura 2000 sites. It is envisaged that the NRA will issue comprehensive guidelines, which will, in addition to noxious weeds, also address the issue of controlling invasive species. In this regard, the requirements of the Noxious Weeds Act, the Wildlife Acts and the European Communities

(Natural Habitats) Regulations must be considered in tandem given the exigencies of the national roads network with regard to the control and management of noxious weeds and the requirements of national and EU law for the protection of wildlife species and habitats. It is intended that these guidelines will be available in advance of the 2009 growing season.

In conclusion, I am to emphasise that, where there is the possibility that spraying (or any other control method) could be detrimental to any Natura 2000 site or candidate site or to a species referred to in Annex IV of the Habitats Directive or to wild birds or their habitats, the procedures set out in this Department's Circular Letter PD 2/07 and NPWS 1/07 and Circular Letter NPWS 2/07 should, respectively, be followed before any spraying is carried out. Where such issues need to be considered, the local National Parks and Wildlife staff should be contacted.

Yours sincerely



Gerry Leckey
Assistant Director
National Parks and Wildlife Service
7 Ely Place
Dublin 2

To all County and City Managers, Town Clerks

Appendix C

Karst Protocol

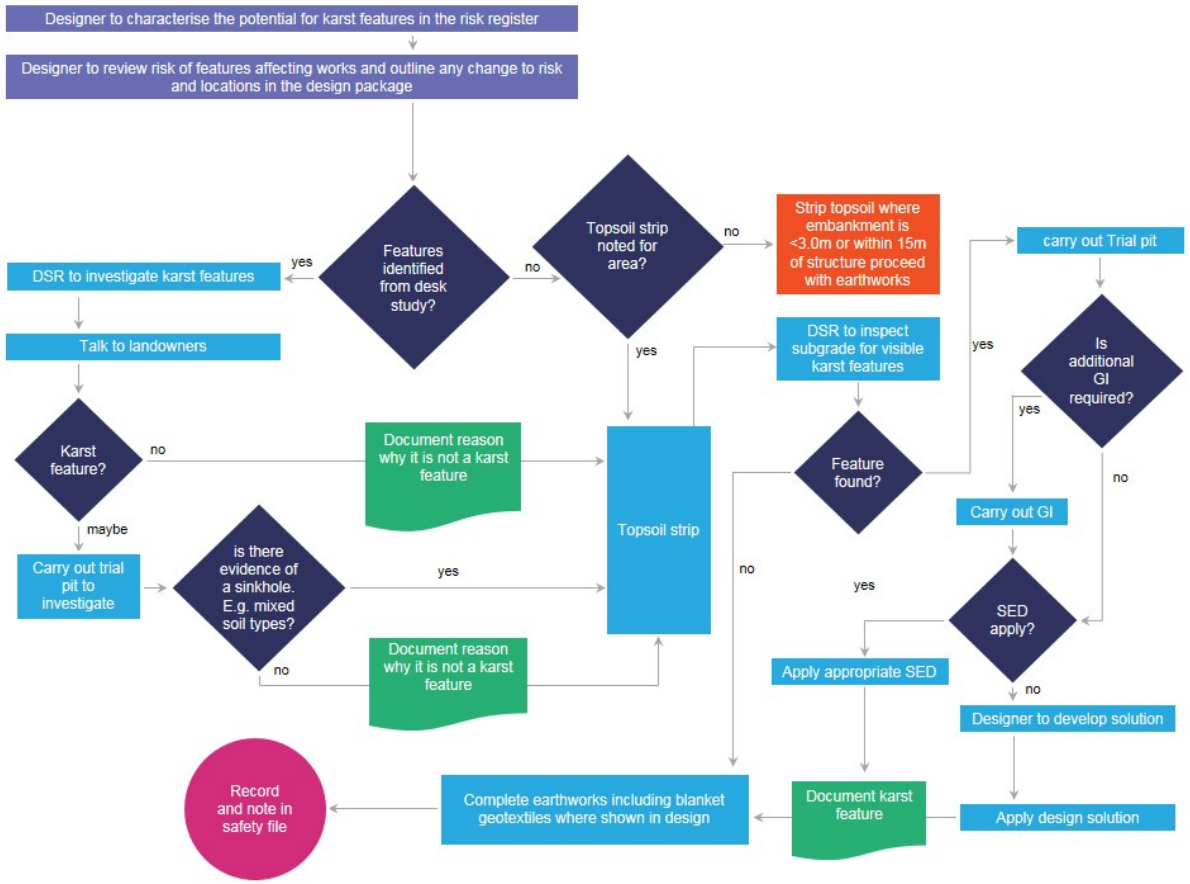
C. Karst Protocol

CC.1 General

The eastern section of the proposed road development is underlain by Limestone where there is some risk of karst subsidence (i.e. rock or superficial soils collapsing leaving a surface depression of voided, weak ground). The unpredictable nature of karst subsidence should be recognised in the course of the construction works. Where karst features are encountered or suspected, care shall be taken to avoid disturbing them and they shall be brought to the attention of the Geotechnical Designer as soon as possible. These features represent a hazard to construction operations and may represent a hazard to the performance of the proposed road development. They also represent potential point inputs were runoff from the site could enter the aquifer impacting on groundwater and downstream surface water receptors. Based on desk studies and the available ground investigation data, it is anticipated that karst features will be encountered along the proposed road development. All known karst features are presented in the Chapter 9, Soils and Geology of the EIAR and are discussed in terms of flow paths and groundwater bodies in the Chapter 10, Hydrogeology of the EIAR. A protocol for the karst inspection is shown on **Figure 1**.

A hydrogeologist and geotechnical expert will be appointed, as per the Schedule of Environmental Commitments, for the construction phase by the contractor.

Figure 1: Flowchart for the karst inspection protocol[2]



CC.2 Formation inspection

In all cases the formation level is to be checked by the Designer for any local soft / weak or loose areas. The Designer is to be notified if any soft / weak or loose areas are identified.

Due to karst risks the following investigations shall be carried out:

- Formations for embankments or cuttings to be proof rolled and observed for signs of weakness
- Formations for structure foundations to be proof rolled as above. The excavation shall be extended to rock head in areas where possible

Prior to detailed design, or early in the detailed design stage, all karst features identified within the proposed development boundary shall be investigated in accordance with **Figure 1**. The results shall be documented for each feature. Where karstic features are encountered they shall be investigated by determining their surface extent and by excavating a trial pit. The Designer shall consider if additional ground investigation, geological or hydrogeological assessment is required. The Designer shall direct the Contractor on which Standard Earthwork Detail (SED)

[2] **Terminology:** SED – Standard Earthwork Detail; GI – Ground Investigation. Where SEDs are indicated, these refer to details/drawings which shall be developed at the detailed design stage of the proposed road development.

shall be employed (if applicable). Where the feature is more extensive than shown on the SEDs, the Designer shall design the remediation measures.

Each karstic feature and the remediation measures shall be documented and included in the Safety File for the operational phase of the proposed road development.

Weaknesses identified shall be investigated by probing or further rolling as appropriate to be agreed between the Designer and the Contractor. The Designer shall request additional ground investigation such as geophysics, rotary boreholes or other intrusive methods to be agreed on site.

Where karst features are identified, the details as shown on the SEDs shall be used as instructed by the Designer. The minimum design sinkhole diameter will be based on the size of the original void.

CC.3 Remedial works to karst features beneath earthworks

All loose, soft, weak or voided soil material encountered within the karst feature shall be removed to a minimum depth as determined in the detailed design. The slopes of the excavation shall be battered to ensure stability during the works. The extent of the excavation shall be into suitable strata as agreed with the Designer. The extent of the base of the excavation shall be in accordance with the SEDs.

The base of the excavation shall be assessed to demonstrate that it is safe to support construction plant, and where this assessment reveals loose / weak ground then a base of Boulders Cobbles / Chunk Rock / Cement Slurry shall be tipped into the subsidence sinkhole as per the SEDs to form a competent, safe foundation. The remainder of the excavation shall be backfilled as per the SED with successive layers from the base upwards of coarse sand and gravel, coarse sand, fine sand and general fill to formation level. Use of cement slurry or grout will require approval from a qualified hydrogeologist to ensure that the slurry will not impact on groundwater pathways, groundwater quality or downstream surface water receptors.

A high strength geotextile shall be placed over the backfilled subsidence sinkhole. The general layout of high strength geotextiles shall be provided in the SEDs. The geotextile reinforcement shall have a 120year design life. The detailed layout of the geotextile at each location to span the void sizes identified and confirmed on site, shall be decided by the Designer.

When a karst feature is encountered during excavation, it will be examined by the hydrogeologist who will provide guidance regarding the requirement for the feature to be sealed to prevent runoff draining into the remediated karst feature. In many situations, the construction of the carriageway will provide the seal preventing runoff from entering the feature but in others geotextile liner or a cement seal shall be used as a preventative measure to stop subsidence occurring for re-activation. If karst is encountered during excavations for structures such as bridge piers or tunnel excavations then these features shall be dealt with using the karst plan and may also require sealing to prevent cement grout from entering the aquifer and impacting on groundwater flow paths but also groundwater quality. In the case of excavation any geotextiles used shall provide a good seal on the backfilled karst feature and prevent cement grout entering the aquifer.

Inspections of formations in rock shall include for identification of open joints and fissures that may be related to karst features.

Any exposed joints (fracture which shows little to no displacement normal to their surface) or fissures (long narrow opening or crack) less than 50mm width shall be inspected by probing or by other means as agreed with the Designer. Where it is identified that the fissure is not extensive and does not widen below formation level the fissure shall be bridged over by providing a layer of high strength geotextile reinforcement. The extent of geotextile reinforcement on either side of fissure shall not be less than 3m.

If the fissure is shown to widen below ground or in cases where the joints or fissures are greater than 50mm width at formation level, excavation shall be carried out to inspect the extent of fissuring below formation level. Treatment of the area shall be carried out as agreed with the Designer. The agreed treatment is expected to comprise backfilling of the excavation and bridging over using geotextile reinforcement in line with the proposals set out on the SEDs.

CC.4 Remedial works to karst features in cutting slopes

Inspections of cutting slopes in rock shall be carried out to identify open fissures or cavities. Treatment shall be in accordance with the SEDs, or as otherwise agreed with the Designer.

CC.5 Remedial works to karst features below structures foundations

A bespoke karst treatments system shall be designed by the Designer for all karst features identified below structure foundations. Use of cement slurry or grout will require approval from a qualified hydrogeologist to ensure that the slurry will not impact on groundwater pathways, groundwater quality or downstream surface water receptors.