

Blessington Lakes eGreenway

Outline Construction Environmental Management Plan

Wicklow County Council

Quality information

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1. Introduction

1.1 Background

AECOM have been appointed to prepare an Outline Construction Environmental Management Plan (Outline CEMP) for Wicklow County Council (WCC) (hereafter referred to as the 'Client'/'WCC').

This Outline CEMP sets out the procedures, standards, work practices and management responsibilities to address potential environmental effects that may arise from construction of the greenway (hereafter referred to as the 'Project') in Blessington, Co. Wicklow (hereafter referred to as the 'Site').

The Outline CEMP outlines the approach that will be adopted to environmental management throughout the Project works at the Site, with the primary aim of reducing any adverse effects from construction on the environment. The Outline CEMP is a live document, subject to amendment including the revision and addition of content throughout the works. In this context, the values and information presented herein is subject to change and refinement through the selection of the contractor and the delivery of the Project.

This plan shall be further refined and expanded by the appointed Contractor following planning (hereafter referred to as the Contractor) into a full Contractor CEMP as more certainty and more information becomes available in terms of the proposed layout, construction methods, programme and potential environmental impacts to be mitigated against. The elements contained within this plan will be included in the Contractor's CEMP, which will be prepared prior to construction by the appointed Contractor and approved by the Client.

At the end of the construction phase, the Contractor shall prepare a Handover Environmental Management Plan (HEMP) that shall contain essential environmental information needed by the bodies responsible for the future maintenance and operation of the asset.

With this purpose in mind, it therefore follows that this Outline CEMP should be treated as a live document throughout the Project lifecycle, requiring regular review and update as necessary.

1.2 Objectives

The objectives of this Outline CEMP and any subsequent Contractor CEMP are therefore to:

- Act as a continuous link and reference document for environmental issues between the design, construction, testing and commissioning stages of the Project;
- Demonstrate how construction activities and supporting design shall properly integrate the requirements of environmental legislation, planning consent conditions, policy, good practice, and those of the environmental regulatory authorities and third parties;
- Record environmental risks and identify how they will be managed during the construction period;
- Record the objectives, commitments, and mitigation measures to be implemented together with programme and date of achievement;
- Identify key staff structures and responsibilities associated with the delivery of the Project and environmental control and communication and training requirements as necessary;
- Describe the Contractor's proposals for ensuring that the requirements of the environmental design are achieved, or are in the process of being achieved, during the Contract Period;
- Act as a vehicle for transferring key environmental information at handover to the body responsible for operational management. This shall include details of the asset, short and long-term management requirements, and any monitoring or other environmental commitments; and
- Provide a review, monitoring and audit mechanism to determine effectiveness of, and compliance with, environmental control measures and how any necessary corrective action shall take place.

1.3 Scope

The scope of this Outline CEMP covers the design and construction of the Blessington Lakes eGreenway. As described in Section 2 (Project Description) the spatial scope of the Project will cover the:

- Site boundary;
- Any additional working areas; and
- Access to and egress from Site(s).

This Outline CEMP considers the following subject areas:

- Environmental management;
- General site management;
- Air quality and climate;
- Cultural heritage;
- Biodiversity;
- Land and soils;
- Water quality;
- Noise and vibration;
- Traffic Management; and
- Waste Management.

It is noted that the Outline CEMP provides guidance, both descriptive and prescriptive, for the information to be included in the CEMP to be prepared by the Contractor. The CEMP is the Contractor produced document that describes how the information and conditions provided in the Outline CEMP is incorporated and adhered to respectively. The CEMP will be submitted for consultation and approval by WCC (or as outlined in the planning conditions).

2. Project Description

2.1 Location

The Project is located on a predominantly greenfield site in Blessington, Co. Wicklow. The route will take walkers and cyclists along the shoreline of the reservoir and will pass through the townlands of Blessington, Haylands, Knockieran Lower, Knockieran Upper, Carrig, Sroughan, Lacken, Ballynastockan, Ballyknockan, Carrigacurra, Annacarney, Vallemount, Monamuck, Humphrystown, Baltyboys Upper, Baltyboys Lower, Burgage Moyle, Russellstown, Russborough, Rathballylong, Tulfarris, Glebe East, and Burgage More and passing adjacent to the villages of Vallemount, Vallyknockan and Lacken before returning to Blessington at Knockieran Bridge. The indicative route of the greenway is presented in Figure 2-1.

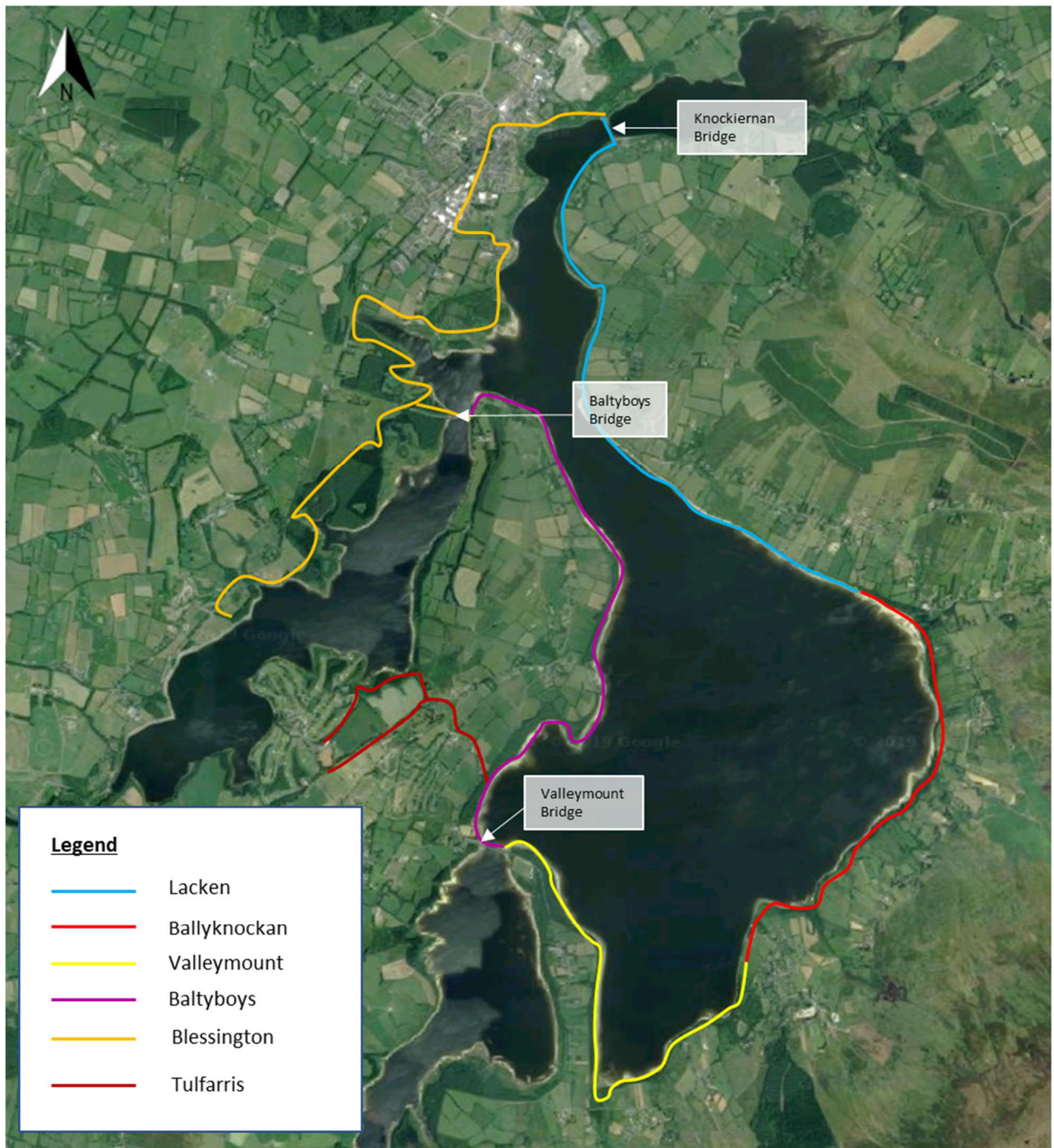


Figure 2-1 Blessington eGreenway Routing

2.2 Overview

The scheme is proposed to provide a predominately off-road shared use path for pedestrians and cyclists. The scheme will cover approximately 33 km and involve the provision and upgrading of a greenway mostly through forest and woodlands adjacent to the shoreline of the Blessington Lake/Poulaphouca Reservoir SPA. The greenway route will follow the predominantly planted conifer plantation around the lakeshore and for some sections there is an existing trail.

Traffic lights are proposed at three existing bridge crossings (Knockiernan Bridge, Baltyboys Bridge and Vallemount Bridge) to manage a new shuttle system for vehicular traffic. This will create space within the existing bridge cross section for the provision of a shared use path to accommodate users of the eGreenway.

The greenway surface construction is proposed to consist of a machine laid bound pavement. A 20 mm surface course is proposed to be laid on a 40 mm to 55 mm base course on 150 mm Clause 804 subbase on a geotextile layer as required. Construction works will require shallow excavation (maximum depth of 200 mm - 300 mm), tree removal and replacement, placement of culverts, single span bridges over larger streams, fencing and minor landscaping.

Existing public car parks will undergo refurbishments, to include the provision of bike parking stands, information boards, waste collection, seating areas, drinking water stations and electric vehicle charging points. In addition, the car parks at Knockieran and Russellstown will be extended with provision for 50 additional car parking spaces at each location.

The Proposed Development is designed in accordance with current best practice; it follows the TII Publication 'DN-GEO-03047-02 – Rural Cycleway Design' design standard. A full list of design standards and guidance are referenced in the Design Report that accompanies this application. The Project can be disaggregated as follows:

- Total Length of Greenway: approximately 33 km
- Length of new greenway: 25 km.
- Existing greenway to be upgraded: 4 km (additional parts of the existing greenway are being retained); and
- Urban cycle scheme/traffic calming: 4 km.

The Project site covers an area of circa 15.86 ha, with an additional area of 3.34 ha for earthworks during construction phase. The urban cycle paths/footpath improvement involve an area of 10,957 m² (1.2 km). The extensions to car parking involve an area of 1,690 m² while the area of existing car parks is 7,436 m².

The project involves the following (as shown in Figure 2-1 Blessington eGreenway Routing

1. Blessington – The Blessington section of the Proposed Development extends from the Wicklow County Council boundary at Russellstown to Blessington. The section comprises 9.2km in length. This section is proposed to consist of new greenway and the upgrade of existing sections along the route with a connection to Russborough House via an existing underpass of the N81. It is proposed to extend the capacity of the Russellstown car park with an additional 50 car spaces. Works to both the Russellstown car park and the Blessington eGreenway Hub and car park will provide electric vehicle charging points, bicycle parking, bins, seating areas, drinking water stations and CCTV. There is 1 no. new watercourse crossing included in this section while several existing crossings are to be retained.
2. Baltyboys – The Baltyboys section of the Proposed Development extends from the Blessington section to the Vallemount section. This section comprises 5.3 km in length. Works to the Vallemount West car park and Baltyboys car park will provide electric vehicle charging points, bike parking, bins, seating, drinking water stations and CCTV. Precast box culverts and gabion retaining walls will be required within this section to construct the Proposed Development. There are approximately 5 no. small watercourses/ditches crossings along this section.
3. Tulfarris – The Tulfarris section of the Proposed Development connects the Baltyboys section to Tulfarris via the R758. This section comprises 3.7 km in length. This section is proposed to

consist of new greenway and share the existing road to connect with the Tulfarris Hotel & Golf Resort. There are approximately 2 no. new small watercourse/ditch crossings along its length.

4. Vallemount – The Vallemount section of the Proposed Development extends from Baltyboys to Ballyknockan. This section comprises 5.2 km in length commencing at the Vallemount carpark, which is located adjacent to Vallemount GAA Club. Works to the two carparks in Vallemount East and West will provide electric vehicle charging points, bicycle parking, bins, seating areas, drinking water stations, and CCTV. Precast box culverts and gabion retaining walls will be required within this section. There are approximately 3 no. small watercourses/ditches crossed by the Proposed Development in this section as well as a crossing of the Annacarney Stream.
5. Ballyknockan – The Ballyknockan section of the Proposed Development extends from Ballyknockan to Lacken. This section comprises 4.3 km in length. Gabion retaining walls will be required within this section. Due to the high ground to the east there are a few small tributaries on this section with approximately 13 no. small watercourses/ditches requiring to be accommodated by the Proposed Development.
6. Lacken – The Lacken section of the Proposed Development extends from Lacken to Knockiernan Bridge. This section comprises 5.6 km in length. The section involves new greenway construction. Precast box culverts, concrete underpasses, and gabion retaining walls will be required within this section. It is proposed to extend the capacity of the Knockiernan car park with an additional 50 car spaces. Works to both Knockiernan and Lacken car park will provide electric vehicle charging points, bicycle parking, bins, seating areas, drinking water stations, and CCTV. The eastern side of the lake has many small tributaries which will require the Proposed Development to accommodate approximately 7 no. small watercourses/ditches.

Signage will be provided to incorporate visitor information, way-finding information, heritage information and advisory/regulatory information in proximity to road crossings. All signage will be subject to full specification at detailed design stage of the project in accordance with national technical standards and guidance.

3. Environmental Management

3.1 Overview

The Contractor's CEMP shall fully address the requirements of the Objectives listed in Section 1, and any updated or new supplementary environmental reports made available to the Contractor as necessary. The CEMP shall also comply with the requirements of the relevant authorities/environmental bodies.

The CEMP shall be prepared by the Contractor and submitted to WCC for approval prior to works commencing onsite. It shall be prepared in sufficient detail to describe the framework of the Contractor's proposed management, control, and mitigation strategy for each environmental aspect. Consideration will also be given to relevant adjacent developments in the management of future construction activities onsite. The CEMP should include, where required, specific Method Statements for specific works (e.g. working in or near watercourses).

The CEMP shall be developed/updated as necessary during the construction phases and will be reviewed on a regular basis with the Client as necessary.

3.2 Environmental Aspects and Impacts

The Contractor will prepare a project specific Project Environmental Risk Assessment (ERA), which will be included in Appendix B. The Contractor should also include the following:

- Environmental guidelines on how to prepare an ERA;
- Monitoring and checklists that shall be implemented to manage the environment;
- Environmentally sensitive area(s) and control measures to be implemented onsite which will be included as an appendix to the CEMP; and
- The procedure for undertaking an ERA to assist in the identification of environmental aspects of the Project's activities, products, and services.

3.3 Roles & Responsibilities

The Contractor shall employ a suitably experienced and qualified Construction Environmental Management Plan Co-ordinator (CEMPC) to undertake co-ordination of monitoring of the works' impacts and implementation of the Contractor's proposals, in respect of all environmental requirements. Further information is provided in Table 3-1.

A CEMPC or an Environmental Site Representative(s) shall be present onsite for the duration of the Project.

The CEMPC shall be the point of contact for dealing with environmental issues for the Contractor's employees, Subcontractors, relevant authorities/environmental bodies, and members of the public. The CEMPC will also be responsible for controlling the construction impacts arising from the activities of the Contractor and his Subcontractors in accordance with the CEMP.

The CEMPC shall prepare, implement, manage, review and revise the CEMP with the sole purpose of ensuring that the environment is safeguarded at all times from anticipated or unexpected adverse impacts during construction.

Within the Contractor's team, the CEMPC shall have the authority to ensure that the CEMP is effectively implemented. The CEMPC must notify the Client of any transgressions in respect of the CEMP so that necessary sanctions can be imposed.

In general, the duties of the CEMPC shall include the following:

- Implementation of the CEMP procedures;
- Routine environmental monitoring, recording, and reporting;
- Maintaining and auditing the CEMP and documents that underpin it;
- Environmental training including daily toolbox talks to site staff and design staff;

- Liaison with statutory authorities as required;
- Assist in liaison with the relevant authorities/environmental bodies and local community; and
- Any other activities that may be necessary in order to protect wildlife and the environment during the works.

In addition, other environmental specialists as listed in Table 3-1 must be available to provide advice on the CEMP during construction. The CEMP shall typically place environmental responsibilities on the key roles within the Project as set out below.

Table 3-1 Key Contractor Team Roles and Responsibilities (Indicative)

Role	Responsibilities
Contractor's Project Director	<ul style="list-style-type: none"> ▪ Assign specific environmental duties to competent members of the Contractor's Team. ▪ Identify the environmental training needs of personnel under their control and arrange appropriate training programmes and ensure records are being maintained. ▪ Ensure that significant environmental aspects identified for the Project are managed. ▪ Promote the continual improvement of environmental performance
CEMP Coordinator	<ul style="list-style-type: none"> ▪ Develop, maintain, and audit the CEMP (and supporting documents/plans) to ensure all aspects, impacts and statutory requirements etc. are reflected in the CEMP. ▪ Develop and implement a programme of regular Project environmental inspections, monitoring, recording, and reporting by the Environmental Site Representative(s) in accordance with procedures set out in the CEMP. ▪ Ensure that the works are constructed in line with the CEMP. ▪ Liaise with statutory authorities. ▪ Attend regular construction meetings to ensure environmental issues are discussed and addressed by the Contractor's Team. ▪ Liaise with relevant authorities/environmental bodies and the local community as required. ▪ Comply with duties under relevant legislation and company procedures in relation to environmental incident investigation and reporting. ▪ Provide support and training to the workforce with regard to understanding environmental aspects, impacts, regulatory requirements, best practice, constraints, and methods of working. ▪ Nominate the Environmental Site Representative(s). ▪ Appoint environmental specialists as required. ▪ Ensure identified environmental specialists are in attendance onsite as required by the CEMP. ▪ Review non-conformance reports provided by the Environmental Site Representative(s) and/or the Inland Fisheries Ireland Environmental Advisors to identify any underlying issues or patterns to identify suitable ameliorative measures
Contractor's Project Manager	<ul style="list-style-type: none"> ▪ Ensure that the CEMP is produced, maintained, and implemented and distributed to all relevant parties. ▪ Provide an on-call 24hr resource as a first point of contact for environmental issues/incidents. ▪ Monitor the completion of corrective actions by the Site Manager and act as required to expedite completion. ▪ Provide regular reports to the Client on environmental performance, including details of any identified incidents or non-conformances and corrective actions. ▪ Ensure that all personnel for whom they are responsible are aware of the CEMP and implement the relevant requirements. ▪ Evaluate the competence of all subcontractors and suppliers and ensure that they are made aware of and comply with the CEMP and associated procedures. ▪ Establish a consultation and communication system with all relevant stakeholders and interested parties associated with the Project, including employees, partners, sub-contractors, designers and third parties, etc., where relevant.

Role	Responsibilities
Site Manager	<ul style="list-style-type: none"> ▪ Ensure that all personnel undergo suitable and sufficient environmental induction before starting work on the Project, and periodic refresher environmental awareness training throughout the construction. ▪ Ensure staffs attend the appropriate environmental courses that are organised by the Environmental Manager (CEMPC). Ensure the Environmental Manager is maintaining records of training delivered to site staff. ▪ Monitor the performance of personnel and activities under their control and ensure arrangements are in place so that all personnel can work in a manner which minimises risks to them and to the environment. ▪ Undertake a programme of regular environmental inspections in liaison with the Environmental Site Representative(s). ▪ Complete any corrective actions identified by the Environmental Site Representative(s) and provide status reports as required to the Client ▪ Assist and support the Environmental Manager (CEMPC) and statutory bodies in the investigation of any incidents. ▪ Notify the Environmental Site Representative(s) of all environmental issues or incidents arising over the course of operations.
Environmental Specialists (i.e. Ecological Clerk of Works (ECoW))	<ul style="list-style-type: none"> ▪ Attend Site as required to monitor the protection of asset in accordance with the requirements of relevant legislation, the EclA mitigation measures, the construction contract, and the CEMP. ▪ Identify potential risks to wildlife and develop suitable control measures. ▪ Provide status reports and updates to the Environmental Site Representative(s) in the completion of their activities.

3.4 Complaints

A Complaints Register for internal communication and for receiving, documenting, and responding to environmental complaints from external parties has been established and is being maintained. When a complaint is received, the following information must be taken:

- Date and time of the complaint are recorded;
- Name of complainant (if provided);
- Nature of complaint;
- All complaints received from external sources must be reported to the Environmental Co-ordinator and Senior Site Management;
- All complaints received from external sources and incidents must be reported to the Environmental Co-ordinator; and
- Complaints must be dealt with in a timely manner and reported to WCC monthly.

3.5 Monitoring and Inspections

Monitoring and inspection activities will be carried out on activities that can have a significant environmental impact as outlined in the sections below.

3.6 Environmental Auditing

Planned and documented audits aimed at evaluating the conformance of the project shall be carried. The frequency of the audits will be agreed in advance with WCC. As a minimum, the CEMP will be reviewed and audited every 12 months and updated in line with current guidance and legislation.

3.7 Local Active Quarries

A search of the Geological Survey Ireland Spatial Resource was carried out on the 3rd of December 2020 to identify active stone quarries. A number of stone quarries within 10 km of Blessington Reservoir are outlined in Table 3-2.

Table 3-2. Active Quarries Located within 10 km of Blessington Reservoir

Quarry Name	Quarry Location	Approximate Distance from Blessington Reservoir	Geological Survey Ireland Quarry Number	Products	Yearly Output (tonnes)
New Paddocks	Hudson Brothers Ltd., New Paddocks, Blessington, Wicklow	Circa 1.3 km west	WW 001	Fine sand, coarse sand, pebble, natural gravel, crushed gravel, graded aggregate, uniform aggregate	Not known
Dillonsdown	Dermot Carnrgie, Dillonsdown, Blessington, Wicklow	Circa 2 km west	WW 003	Washed pebbles for drainage, washed sands for construction and concrete	200,000
Corrigan's Quarry	Peter Corrigan, Rathattin, Hollywood, Wicklow	Circa 4.7 km south west	WW 002	Not known – operation type is sand and gravel	Not known
Badgers Rock Quarry	Paul Ryan, Togher, Granabeg, Valleymount, Wicklow	Circa 2.6 km south	WW 004	Dimension stone and rubble	500
Granabeg Quarry	Oliver Morgan, Granabeg, Valleymount, Wicklow	Circa 2.8 km south	WW 005	Dimensional granite block, random rubble wall stone	1000
Shillelagh Quarries	Shillelagh Quarries Ltd., Aghfarrell, Brittas Dublin	Circa 6.9 km north	D 002	Crushed rock	150000
Ballinascorney Quarry	Kilsaran Build, Ballinascorney, Brittas, Dublin	Circa 7.9 km north	D 001	Aggregates, asphalt and macadam, hardcore and fill materials	300,000-600,000
Brownstown Pit	Kilsaran Build, Brownstown, Kilcullen, Kildare	Circa 10 km west	KE 004	Aggregates, bulk silo mortar, large range of bagged pre-mixed dry products, (patio bedding mix; sand and cement mix; jointing sands; post 10 rapid setting, etc.)	Not known

Source: < Geological Survey Ireland Spatial Resources

<https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aac3c228>>

4. Environmental Management Procedures and Plans

4.1 General Site Management

An example list of relevant legislation and guidance can be found in Appendix C (this would need to be updated by the Contractor in the CEMP as it is an example only).

4.1.1 Working Hours/Periods

- Onsite construction works shall be permitted to take place between 08:00hrs and 18:00hrs Monday to Friday and between 08:00hrs and 13:00hrs on Saturdays or as directed by WCC.
- Working outside these hours will only take place in exceptional circumstances unless agreed in advance with WCC.
- No works shall take place on Sundays or Bank Holidays. In exceptional cases, WCC may permit works to proceed outside the above times/days. This will be subject to the written agreement of WCC prior to such works proceeding. Locations of works that are anticipated to be outside normal working hours will be defined and confirmed.

4.1.2 Site Housekeeping

- Good housekeeping is an important part of good environmental practice and helps to maintain a more efficient and safer site. The Site should be tidy, secure, and have clear access routes that are well signposted. The appearance of a tidy, well-managed site can reduce the likelihood of theft, vandalism, complaints and/or specific hazards that could affect the safe operation of the other businesses in the area, such as bird hazards and wind-blown litter.
- As outlined in the fourth edition of CIRIA's 'Environmental good practice on site guide' (C741), when considering good housekeeping, the Contractor will implement the following steps:
 - Adequately plan the site with designated areas of materials and waste storage;
 - Segregate and label different types of waste as it is produced and arrange frequent removal;
 - Keep the site tidy and clean;
 - Ensure that no wind-blown litter or debris leaves the site, use covered skips to prevent wind-blown litter;
 - Keep hoarding tidy – repair and repaint when necessary, removing any fly posting or graffiti;
 - Frequently brush-clean wheel washing facilities and keep haul routes clean from site derived materials;
 - Keep roads free from mud by using a road sweeper; and
 - Ensure site is secure.

4.1.3 Tree Protection and Mitigation

Most tree roots grow in the upper metre of soil and they may spread outwards in any direction. Any disturbance of the ground within the root spread of a tree can damage its roots and may severely injure the tree. Damage to roots will interrupt the supply of water and nutrients necessary to keep the tree alive and may cause decline in vigour, dieback or even death of the tree. Damage to roots can also destabilize the tree and pose an unacceptable threat to the safety of people.

When soil is compacted a combination of high soil bulk density and elevated soil strength can directly limit root growth. The large pores in well-structured soil are important for gas exchange, the process of respiration and diffusion, and these are lost when soils are compacted to high bulk densities. Soil compaction also reduces the rate of water infiltration and the availability of water to the roots, it impairs root growth and the root system's ability to support a healthy crown. The compaction of soil within tree root protection areas (RPA) can ultimately lead to crown dieback and a decline in tree health.

4.1.3.1 Tree Works

Before any onsite works can begin, protection measures should be taken to ensure the wellbeing of trees to be retained. Protection should consist of a combination of barriers and ground protection, however in some cases it is recommended that off-ground measures be taken, such as reducing the weight of the tree to reduce the likelihood of failure, or the bracing of trees to minimise the damage that would occur in the event of failure.

The protection of all trees onsite must be able to accommodate all building works, ingress, and egress roots outside the designated RPA. Appropriate planning should be in place to accommodate the ingress and egress of plant machinery onsite, so no trees selected for retention are impacted.

4.1.3.2 Tree Removal

Any trees to be removed that are located within the RPA of trees to be retained should not be felled with the use of excavation machinery but will be done so according to best practice as recommended in BS 3998:2010 Tree Work - Recommendations. All tree work operations should be undertaken by suitably qualified tree surgeons with the appropriate insurance.

Where the stumps from trees that were felled are to be removed and are within the RPA of retained trees only the use of appropriate machinery, stump grinders, will be allowed within this restricted area. No excavation machinery will be allowed within the RPA of retained trees.

4.1.3.3 Compensatory Tree-Planting

An Arboricultural Survey and Assessment (ASA) prepared by Flynn Furney Environmental Consultants concluded that approximately 7,265 trees will be required to be removed to facilitate the Scheme.

Tree management activities undertaken on behalf of the ESB typically involve the clear felling of between 1,750 and 2,500 trees every 2/3 years. ESB also conducts thinning activities which typically involves the removal of 75 to 225 trees every 2/3 years. Thus, tree felling occurs in this area as part of routine tree management activities.

The project will replace the approximately 7,265 trees that will be required to be felled to facilitate the Scheme. This will involve planting new native species tree along the route in ESB lands (approx. 2,300 trees at 10 m centres over approx. 23 km), and lands adjacent to scheme owned by Wicklow County Council (at Knockieran car park, Burgage area and the Avon area) which will accommodate 4,900 trees.

4.1.3.4 Mitigation

- A suitably qualified arborist must be present onsite during all tree works to oversee installation and maintenance of protective measures as well as tree reduction/removal.
- The onsite arborist should be responsible for checking and approving the position of all tree protection measures at the first site visit prior to the commencement of works.
- Site operatives and site managers involved in clearance works should be made familiar with the location of specimen trees within the vicinity of their works areas and be able to identify species even if no leaves are present at the time of clearance;
- In instances where specimen trees are on or near the clearance area works should aim to go around these trees where possible;
- Saplings found along the clearance route should be carefully lifted and transplanted into areas of low tree cover. This will help offset the overall loss of trees and help create greater woodland cover;
- To prevent losses of biodiversity associated with tree clearance, cut logs from removed trees should be left along the embankments locally, to support communities of detritivores (worms, millipedes, wood lice and other invertebrates), fungi and lichen species;
- To avoid damage to tree roots, existing ground levels should be retained where possible within the RPA. Intrusion into soil within the RPA is generally not acceptable and topsoil within it should be retained in situ. Where alternative design solutions are not available or practical, limited manual excavation within the RPA may be acceptable subject to justification and consultation with the onsite arborist. Such excavations should be undertaken carefully using hand-held tools and preferably by using an air-spade – the use of compressed air to expose the tree's root system.
- If roots are exposed, they should be wrapped or covered immediately to prevent desiccation and to protect them from rapid temperature changes. Any coverings or wrappings will be removed before backfilling commences, which should happen as soon as possible. If a new hard surface is

to be laid, it would be preferable to leave any existing sub-base in situ augmenting it where required and use cellular confinement systems.

- The removal of any trees as a result of the greenway improvement scheme should be mitigated with the planting of as many trees where the space allows.
- Category A and B trees, as outlined within the Arboricultural Survey, are trees of high quality and arboricultural or landscape value and their protection should be paramount.
- Details of protection measures as recommended in Section 6.2 Barriers and Ground Protection of BS 5837 should be adhered to.
- Dynamic/Static Cable Bracing: Bracing ensures the union of co-dominant stems is at a reduced risk of failure during sudden loads by holding them together and limiting the amount that the weight at the top of the lever arm can pull the union apart. Dynamic bracing systems are less rigid than traditional steel systems; incorporating an elastic insert inside polymer cables or metal springs in the steel cables, this means there is some movement during gentle wind loads which can allow the tree to form compression wood, and a slack loop in the cable that becomes taut when the stems pull apart to apprehend the load before there is stress on the union. Bracing with a belt attachment (as practised in Cobra bracing systems) negates the need to bore holes for bolts, belts may be considered unsightly/expensive in comparison to bolts but they can be easily readjusted, have shown no indication that they interfere with the cambial activity and have the obvious advantage in that they do not allow an entry point for decay. It is best to procure a belt with a supplementary internal belt to stop any risk of the system slipping.
- Staged Veteranisation: Staged veteranisation is the process of mimicking naturally veteran trees by employing techniques such as pollarding, canopy reductions and conversion to standing monoliths. The staged process occurs over an extended period to allow for the trees to respond and is subject to regular review. This is to be carried out by a qualified arborist on a case by case basis.
- Cellular Confinement Systems: further information is provided in Section 4.1.3.5 below.
- Protective Barriers: The installation of the protective barriers, as outlined in Section 6.2 of BS 5837: 2012 - Barriers and Ground Protection is advised where trees to be retained are subject to risk from development. The tree protection barriers will remain in place for the duration of the construction works and should only be removed once the onsite arborist has signed off on its removal. The appropriate tree protection signage should be attached to the protective fencing, for example, "T.P.A. Tree Protection Area - Restricted Access Keep Out".
- Ground Protection: Where the RPAs of the trees selected for retention extend beyond the proposed location of the protective fencing adequate ground protection will be required. Where the RPA extends under existing hard surfaces to be retained there will be no need for additional protection. Where there is no existing hard surface present ground protection must be used in order to protect the soils from compaction. For pedestrian movement the construction of an appropriate raised walkway or the use of load bearing geotextile membrane would be required. For the use of machinery within the RPA the appropriate method should be selected depending on the weight of the machinery e.g. interlinked ground protection boards, compression resistant layers of geotextile membrane or precast reinforced concrete slabs. In all cases the objective should be to avoid compaction of the soil so that the tree root functions remain unimpaired.
- Landscaping: Post construction phase there is usually a need for landscaping works to take place. The removal of the tree protection barriers in order for the landscaping works to commence will allow access to previously restricted areas. The landscape contractor should have access to the Arboricultural Survey and any other reports pertaining to the ecology of the area such as the EcIA. The landscape contractor should have his own method statement detailing his proposed work. No rotovating should take place within the RPAs. The use of machinery should be restricted from entering the RPAs and there should be no alteration of the soil levels within the RPAs.

4.1.3.5 Cellular Confinement Systems:

In order to ensure the health and vigour of trees, their roots need to be retained/undamaged. To achieve this there must be no excavation, no soil stripping, and no grading of the greenway within the RPA of trees to be retained. This implies that the proposed extension of the existing greenway will be constructed above the existing ground level, where possible.

Cellular confinement systems can be used for ground protection where tree roots are at risk from soil compaction and where it is unacceptable to dig into the ground to lay a conventional sub-base. Standard engineering practice is to remove the upper layer of soil and lay a compacted sub-base and a final surface that is level with the surrounding ground. Surfaces constructed in this way can sever tree roots at a shallow depth and future root growth can be inhibited by soil compaction.

A cellular confinement system is a series of geo-cells arranged in a honeycomb-like formation that is combined with an underlying geotextile to spread loads in such a way as to avoid compaction of underlying soils. To create a stable base for hard surfacing near trees it is recommended that a cellular confinement system made of high-density polyethylene (HDPE) should be used for the expansion of the greenway. The plastics are bonded together to form a three-dimensional matrix that can be filled with angular stone. Only 20 mm and 40 mm, or its equivalent, angular stone with a “no fines” content should be used as, even when compacted, it will be free draining and will thus allow gaseous diffusion into and out of the soil. Angular stone infill also increases friction between stones and enhances load spreading. For a cellular confinement system to function effectively it is crucial that all of the cells are expanded and filled to capacity. Geo-cells made from flexible geotextiles are not suitable for use near trees as they have a tendency to deform as they are filled, which can impact on their load-spreading ability. The underlying geotextile material used should be needle punched non-woven as it provides adequate tensile resistance and allows water to reach the soil.

The cellular confinement system chosen for use should conform to ISO 13426 - 1: 2019 Geotextiles and geotextile related products - strength of internal structural junctions - Part 1: Geo-cells.

In order to protect soils and the RPA of trees the cellular confinement system to be used in the greenway improvement scheme should be fenced off and treated as an exclusion zone during construction. As a final surface course is not laid down until the end of construction works the cellular confinement system will be exposed and may be vulnerable to wear and tear. If the geo-cell surface needs to be used as an access road during construction, it should be taken into consideration the type of traffic that the surface will be subject to should be taken into consideration. The surface will experience heavier traffic than its intended final use, vehicles of particular concern could include dumpers, excavators, or HGV's. Mud from the tyres of the machinery used in the installation process has the potential to be deposited on the unprotected infill which could impair its long-term permeability. Installing a temporary surface or over-filling the geo-cells with 50-75 mm of material could be a suitable solution for temporary protection.

4.2 Air Quality and Climate

4.2.1 Legislation and Guidance

The following legislation and guidance documents are of relevance to the air quality of the Site:

Legislation

- Planning and Development Act, 2000 (as amended);
- Air Quality Standards Regulations 2011 (S.I. No. 180/2011);
- Technische Anleitung zur Reinhaltung de Luft (TA Luft) Regulations (2002); and
- Clean Air for Europe (CAFE) Directive 2008/50/EC.

Guidance Documents

- Institute of Air Quality and Management's (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction' (2014);
- NRA's 'Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes' (Revision 1, May 2011); and
- EPA's 'Air Quality in Ireland 2019: Indicators of Air Quality'.

4.2.2 Potential Impacts

Negative air quality impacts can come from many sources during construction. Emissions from the construction phase are transient in nature and would include emissions from vehicles and plant, and dust-raising activities from earthworks and construction processes utilising concrete and aggregates. Dust and air pollution, including odours, can cause disruption to properties and the public adjacent to the construction works, and can also have adverse impacts upon other environmental receptors, including watercourses and ecologically designated sites.

Climatic impacts are expected to be minor emissions of greenhouse gases to the atmosphere from truck movements and the operation of Site construction equipment.

Mitigation and general control measures (as described below) shall be required so that construction works are carried out in such a manner that emissions of dust and other pollutants are limited, and that best practicable means are employed to minimise disruption, risks to human health, and to avoid unnecessary impacts on sensitive ecological habitats.

4.2.3 Environmental Mitigation and Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented. The following mitigation and general control measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from the Project.

4.2.3.1 General Measures

The Contractor will be required to implement measures to minimise the amount of dust and emissions (including odour) produced during the Project. There will be a Duty of Care on the Contractor to ensure that dust-raising activities are located away from sensitive receptors wherever possible, such as nesting birds and residential dwellings as much as feasibly possible and duration kept to a minimum when in proximity to a receptor/activity.

The Contractor shall follow the relevant mitigation measures that are outlined below and any additional mitigation measures from the planning consent document.

The important aspects of air quality mitigation include:

- The assignment of responsibility for dust and emissions (including odour) management to an individual member of the Contractor's staff (i.e. CEMPC);
- Training staff to understand the importance of the issue; and
- Communicating with the local community (as necessary).

Regular Site inspections shall be undertaken by the Contractor's CEMPC/Environmental Site Representative to monitor compliance with the CEMP and record inspection results. It is anticipated that a daily visual check would be carried out and these records would be available to WCC/the Client upon request.

- The Contractor shall comply with the mitigation measures that may be provided in documents which accompany the planning application, any planning consent conditions, relevant documents listed in Appendix C of this Outline CEMP (however this is not an exhaustive list and documents considered should not be limited to the list provided within Appendix C), statutory authority requirements and any updated or new supplementary environmental reports made available to the Contractor as necessary.
- Works shall be planned to consider the location of sensitive receptors, sensitive core activities associated with operation of other businesses, local topography, wind direction and any potential sources of pollution.
- Discussion with WCC/the Client shall be undertaken at an early stage by the Contractor to determine any specific monitoring requirements and to agree to any proposed trigger/action levels.

4.2.3.2 Vehicle and Plant Emissions

- Emissions to the atmosphere, in terms of gaseous and particle pollutants from vehicles and plant used onsite, should be controlled and limited, as far as reasonably practicable, using measures and appropriate control techniques as listed below:
 - The engines of all vehicles and plant onsite should not be left running unnecessarily (i.e. idling) to minimise exhaust emissions (and noise);
 - Vehicles and plant shall adhere to applicable emissions standards;
 - Plant, equipment, and emission control apparatus shall be selected to minimise the engine exhaust emissions, taking into consideration economic constraints and practicability;
 - Vehicles and plant shall be in good working order and certified where applicable, with servicing completed in line with manufacturer’s recommendations. Records of servicing shall be maintained, and visual checks carried out to ensure that black smoke is not emitted at times other than at ignition;
 - Haul routes and plant shall be situated and operated away from sensitive receptors and sensitive core activities associated with operation of other businesses (where possible);
 - The use of diesel or petrol-powered generators shall be minimised, with mains electricity of battery powered equipment used as an alternative (where feasible);
 - Movement of vehicles and plant shall be minimised around the Site;
 - Vehicle/plant exhausts shall be directed away from the ground to minimise risk of re-suspension of ground dust; and
 - Maximise energy efficiency, which may include using alternative modes of transport, maximising vehicle utilisation by ensuring full loading and efficient routing.

4.2.3.3 Control of Dust

4.2.3.3.1 Generation of Dust

- The Contractor should take all necessary measures to minimise disturbance caused by dust, during construction works.
- As per industry standard for the construction phase, the TA Luft Regulations limit value of 350 mg/m²/day (as accepted by the Irish EPA) will be adhered to by the Contractor.
- Visual inspections shall be undertaken regularly by the Contractor when dust-raising activities are occurring. Inspections should consider prevailing meteorological conditions, and results shall be recorded and maintained.
- Measures to minimise the amount of dust produced might include, dampening haul roads and stockpiles (should they occur), keeping roads clean and using covers to minimise dust blow from haulage vehicles. Appropriate measures should reflect the nature of the construction activity (type, dust source points, construction operation periods and time of year) as well as ameliorating conditions (such as prevailing wind directions and speeds, typical precipitation and the dampening effect of retained soil moisture. Possible methods of reducing and controlling dust emissions during construction are listed in Table 4-1 and detailed further in sub-sections below.

Table 4-1 Possible Dust Control Measures

Operation	Dust Control Measure
Drilling	<ul style="list-style-type: none"> ▪ Use dust-extraction equipment such as filters, on exhaust air emissions from drill rigs.
Loading/Unloading	<ul style="list-style-type: none"> ▪ Reduce drop heights wherever practicable. ▪ Protect activities from wind.
Material storage	<ul style="list-style-type: none"> ▪ Dampen material. ▪ Protect from wind and store under cover. ▪ Screen material to remove dusty fractions prior to external storage.
Overburden handling	<ul style="list-style-type: none"> ▪ Protect exposed material from wind (by keeping material within voids or protecting them by topographical features).

Operation	Dust Control Measure
	<ul style="list-style-type: none"> ▪ Spray exposed surfaces of mounds regularly to maintain surface moisture unless mound surface has formed a crust after rainfall or is grassed. ▪ Minimise handling.
Soil handling and storage	<ul style="list-style-type: none"> ▪ Restrict the duration of the activity. Seal and seed storage mound surfaces as soon as is practical. ▪ Protect surfaces from winds until disturbed areas are sealed and stable.
Transport by vehicle within and off-Site	<ul style="list-style-type: none"> ▪ Restrict vehicle speed. ▪ Water unsurfaced roads and paved roads. ▪ Wheel or body wash at an appropriate distance from Site entrance. This should always be within the Site, and the roadway from the washing facility to the road shall be hard-surfaced. ▪ Load and unload in areas protected from wind. ▪ Minimise drop heights. ▪ Sheet or cover loaded vehicles. ▪ Use water sprays/spray curtains to moisten material. ▪ Sweep/wash paved roads. ▪ Use paved roads where practicable.

4.2.3.3.2 Vehicle and Plant Dust

- Adherence to Site speed limits helps to avoid excessive dust emissions.
- Care shall be taken to ensure that machinery or dust-causing activities shall be sited away from sensitive receptors and sensitive core activities associated with operation of other businesses where practicable.
- The production of dust shall be considered when selecting plant equipment, with apparatus with emission controls being chosen, as far as economically practical.
- Vehicles shall not be overloaded, and all loads entering and leaving the construction Site and carrying waste and other dusty materials shall be adequately sheeted to prevent the spillage of material during transport.
- Any cutting and grinding operations to be carried out should use equipment and techniques which incorporate dust suppression measures and reduce emissions.
- Facilities for vehicle washing/wheel washing shall be provided onsite at the Site compounds, as well as procedures for effective cleaning and inspection of vehicles, to keep dust and mud off the public road network.

4.2.3.3.3 Earthwork Dust

- Exposed earthworks shall be kept damp at all times to prevent airborne dust emissions. Should this not be possible, windbreaks shall be used to minimise the potential for dust generated by wind erosion.
- Dust generation shall be minimised from earthworks by sealing or seeding of surfaces to stabilise them as soon as possible.

4.2.3.3.4 Site Fires

- No Site fires are permitted.

4.2.3.3.5 Dust arising from Haul Roads, Compounds and Works Areas

- Haul roads will be dampened down using water, spraying will be repeated regularly and frequently during warm and sunny weather (including treatment for any run-off containing suspended solids) where required.
- Hard standing surfaces used within the construction Site shall be regularly maintained and kept clean.
- An approved mechanical road cleaner shall be employed to clean the Site's hard standing area and the public roads in the vicinity of the Site.

- Wheel washing facilities shall be provided at Site compounds. They shall be used by all vehicles leaving the Site and should be checked and maintained regularly. A record of all checks and maintenance should be kept by the Contractor and should be available for inspection at any time.

4.2.3.3.6 Dust arising from Materials Handling and Storage

- Materials stockpiles onsite (if required) shall be designed so as to minimise dust generation by wind erosion (i.e. no steep-sided stockpiles or mounds or those that have sharp changes in shape), covered securely, or damped down or suitably treated to prevent the emission of dust.
- Stockpiles and mounds shall be located away from the Site boundary, sensitive receptors, watercourses, and surface drains and sited to consider the predominant wind direction.
- Stockpiles shall be maintained at suitable heights.
- Double handling of material shall be avoided wherever reasonably practicable.
- Drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment shall be minimised, with fine water sprays used on such equipment wherever appropriate.
- Where drop heights are greater than 2 m, suitable dust suppression measures shall be utilised to control dust emissions.
- Stockpiled materials that are likely to remain undisturbed for a significant duration shall be vegetated or covered. In the case of long-term stockpiles, they can be seeded, re-vegetated or turfed to stabilise surfaces.
- Any construction materials stored within the Site shall be located away from the Site boundary and downwind of sensitive receptors unless used for the purposes of screening.
- The Site shall be regularly inspected by the Contractor for spillages of dusty or potentially dusty materials and shall have procedures in place for prompt clearance of any such spillage.
- The frequency of Site inspections shall be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

4.2.3.3.7 Concrete Work

- Where ready-mixed concrete will be brought to the Project by truck a suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil.
- The pouring of concrete will take place within a designated area using a geosynthetic material to prevent concrete runoff into the soil/groundwater media.
- Washout of concrete transporting vehicles will take place at an appropriate facility offsite where possible such as the concrete manufactures premises. Alternatively, where wash out takes place onsite, it will be carried out in a designated, carefully managed onsite wash out area. Washout should occur into a lined skip to be in good condition (or similar). The container should not overflow or leak and should be easily accessible to vehicles. The containers must be checked and emptied at a frequency equivalent to the volume of concrete being used and no runoff should leave the washout location. The area must be clearly marked and must be located away from storm drain inlets, open drainage facilities & water courses (streams, lakes etc.).
- Before concrete pours, the pour structure shall be cleaned, and fine non-ferrous debris shall be removed from the pour area.

4.3 Cultural Heritage

4.3.1 Legislation and Guidance

The following legislation and guidance documents are of relevance to the archaeology and cultural heritage of the Site:

Legislation:

- National Monuments Act, 1930 (as amended);
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999;
- Planning and Development Act, 2000 (as amended); and
- The Heritage Act, 1995 (as amended).

Guidance documents:

- Department of Arts, Heritage, Gaeltacht and Islands (1999), 'Framework and Principles for the Protection of the Archaeological Heritage';
- Department of Arts, Heritage and the Gaeltacht's (2011) 'Architectural Heritage Guidelines, Guidelines for Planning Authorities'; and
- Department of the Environment, Heritage and Local Government's (2009) 'Government Policy on Architecture 2009 – 2015'.

4.3.2 Potential Impacts

As identified in the Archaeological and Architectural Assessment (AIA) produced by AECOM, there are a number of Protected Structures and assets recorded on the National Inventory of Architectural Heritage (NIAH) located along the existing roads and lanes within the Project. The only proposed works will be the addition of signage relating to the Project while some modification will be made to the existing road layouts. The modification of the road layouts will not alter the setting of the area as the infrastructure is already in place. The siting of this signage could impact upon the settings of the Protected Structures and assets recorded on the NIAH. The Project design takes this into account and signage will not be placed adjacent to these assets.

The construction of the Project will also introduce additional traffic and noise to the areas of the Protected Structures and assets recorded on the NIAH located along the adjacent roads and lanes. While these have the potential to impact upon the settings of these assets, this will be a temporary impact limited to the construction phase and will not extend to the operational phase once the Project is in use. Given the potential impact to archaeological remains adjacent to known assets within the forested strip, it is recommended appropriate mitigation strategy be applied during the construction phase, as outlined in the below section.

4.3.3 Environmental Mitigation and Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented. The following mitigation and general control measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from the Project.

4.3.3.1 General Measures

- The Contractor shall ensure that mitigating measures outlined in the Outline CEMP, planning consent and in the documents listed in Appendix C, WCC's requirements, and any updated or new supplementary environmental reports are included in the CEMP.
- The Contractor will agree with the planning authority details regarding any further cultural heritage requirements (including if necessary further testing) prior to commencement of construction works and demolition on the Site.
- Archaeological monitoring of all earthmoving works for Site preparation will be undertaken to ensure that any features of an archaeological nature that may be revealed are identified, recorded,

and fully resolved. Hoardings, additional support, and temporary weathering will be provided, if required for protected structures onsite.

- If any features of archaeological potential are discovered during the course of the construction phase, further archaeological mitigation may be required such as preservation in-situ or by record.

4.3.3.2 Archaeological Watching Brief

An archaeological watching brief is required (involving archaeological monitoring and recording) alongside groundworks adjacent to the recorded Record of Monuments and Places (RMP) sites immediately adjacent to, the scheme. These comprise:

- Assets associated with the medieval borough of Burgage More (WI005-07001-016);
- Wedge tomb (WI010-062) at Carrigacurra;
- Enclosure (WI010-019) at Ballyknockan;
- Ringfort (WI010-018) at Ballyknockan;
- Moated site (WI005-078) at Carrig;
- Mill site (WI005-078) at Burgage More; and
- Neolithic house (WI010-058) at Boystown/Baltyboys Upper.

The appointed archaeologist will also undertake a watching brief of the sections of the Project at Valleymount and the car parks at Knockieran and Russborough. This will relate to the following:

- Valleymount- The existing stone walls, steps and paths should be subject to record by photograph and written description prior to construction works within this area;
- Valleymount- The memorial erected post February 2018 should remain in situ with care taken to ensure no accidental impact during the works;
- The tunnel to Russborough House (4256) should be subject to record by photograph and written description prior to conversion to an access as part of the Project;
- The Cross Inscribed stone (WI010-048) and Ballyknockan Ruin/Biddy Mulvey's Cottage (RPS ref 10-5) should be noted to all contractor staff. Care should be taken to avoid accidental impact during adjacent works. The Cross Inscribed stone (WI010-048) should be demarcated with barrier tape if practical;
- Groundworks associated with construction accesses and works compounds within Greenfield be subject to constant archaeological monitoring;
- Groundworks associated with the extension of Knockieran car park be subject to constant archaeological monitoring; and
- Groundworks associated with the extension of Russborough car park be subject to constant archaeological monitoring.

It is recommended that an archaeological watching brief should be carried out (involving archaeological monitoring and recording) alongside groundworks adjacent to the recorded RMP sites within, and immediately adjacent to, the Project such as construction access through Greenfield. The appointed archaeologist will also undertake a cursory watching brief of the remainder of the path works during the construction phase. A photographic and written record must be made of the existing stone walls, steps, and paths at Valleymount and the tunnel at Russborough. Care must be taken during works adjacent to the Cross Inscribed stone (WI010-048), Ballyknockan Ruin/Biddy Mulvey's Cottage (RPS ref 10-5) and the modern memorial erected post February 2018. Any archaeological mitigation must be agreed in consultation with the National Monuments Service and WCC.

It is recommended that the mitigation be undertaken by a suitably qualified archaeologist working under licence to the NMS. The construction of the paths should be performed by mechanical excavation using a smooth toothless bucket down to sterile glacial tills/scheme formation level at the specified locations. The appointed archaeologist will undertake full-time monitoring of the excavations and where appropriate, carry out archaeological investigation. During this watching brief, the archaeologist will be delegated authority by the Contractor's engineer to:

- Halt construction work by the Contractor in a specified area where it is necessary to examine any potential archaeological material encountered;
- Undertake any archaeological procedure necessary for the recording and removal of archaeological objects or features before work by the Contractor can resume within a specified area; and
- Instruct the Contractor as to the measures required to be taken to protect archaeological remains to be left in situ, should circumstance arise.

The Contractor will agree with WCC/AECOM and the Archaeologist:

- A programme to ensure that excavation of deposits that are of archaeological interest, is carried out under the supervision of the Archaeologist;
- A method statement describing how the paths and car park extensions will be excavated and what excavation machinery will be used in the stripping and removal of the topsoil and underlying deposits;
- Arrangements to allow the Archaeologist sufficient time to examine, record and remove, if necessary, the revealed and discovered archaeological remains; and
- Arrangements to protect archaeological remains to be left in situ.

In the event that significant or complex archaeological features are uncovered during monitoring, consultation may include a visit to the Site by the National Monuments Service and WCC/AECOM to inspect the remains and agree an appropriate mitigation strategy.

The appointed archaeologist shall comply with the requirements of the National Monuments Section of the Department of Arts, Heritage, and the Gaeltacht as to the appropriate mitigation in the event of the discovery of archaeological material during monitoring.

Any recommendations contained in this report are subject to the ratification of the National Monuments Section, Department of the Culture, Heritage and The Gaeltacht.

4.3.3.3 Mitigation Measures

It is recommended that the mitigation be undertaken by a suitably qualified archaeologist working under licence to the NMS.

The construction of the paths should be performed by mechanical excavation using a smooth toothless bucket down to sterile glacial tills/scheme formation level at the specified locations. The appointed archaeologist will undertake full-time monitoring of the excavations and where appropriate, carry out archaeological investigation.

It is recommended that the following mitigation take place at the sections of the scheme at Vallemount and the car parks at Knockieran and Russborough:

- The existing stone walls, steps and paths should be subject to record by photograph and written description prior to construction works within this area;
- The memorial erected post February 2018 should remain in situ with care taken to ensure no accidental impact during the works;
- Groundworks associated with the extension of Knockieran car park be subject to constant archaeological monitoring; and
- Groundworks associated with the extension of Russborough car park be subject to constant archaeological monitoring.

4.3.3.4 Awareness and Training

During the project induction meeting, all contractors will be made aware of the presence of a Project Archaeologist who will monitor earthmoving and excavation activities.

4.4 Biodiversity

4.4.1 Legislation and Guidance

The following legislation and guidance documents are of relevance to ecological constraints present within the Site.

- The Irish Wildlife Act 1976-2021 (as amended);
- European Communities (Birds and Natural Habitats) Regulations 2011 (as amended);
- The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna);
- The Birds Directive (Council Directive 2009/147/EC on the Conservation of Wild Birds);
- The Water Framework Directive (WFD) 2000/60/EC;
- Fisheries Consolidation Act 1959 (No. 14 of 1959) (as amended);
- The Inland Fisheries Act 1959 (as amended);
- The Local Government (Water Pollution Acts) 1977 (as amended); and
- Various National Road Authority (NRA) guidance from the 'Environmental Planning and Construction Guidelines series'.

4.4.2 Potential Ecological Impacts

Poulaphouca Reservoir Special Protection Area

The reservoir at Blessington and part of the shoreline here is a site of international importance for birds. It is vital that no works are carried out that cause undue disturbance or other impacts to the birds that utilise this site. The key bird species here are Greylag Goose – a species that migrates to Ireland and over-winters here and Lesser Black-backed Gull – a species that is found in Ireland throughout the year. However, greater numbers of these birds come to Ireland after autumn as they migrate south. Disturbance to these species has been identified as a potential impact.

Bird Species

In addition to the above species, a wide range of native breeding birds have been recorded at Poulaphouca Reservoir. It is essential that works do not impact on these. The greater majority of birds at this site breed in the woodland and scrub areas surrounding the reservoir.

It is advised all clearance works are conducted outside of the bird breeding season and track clearance in the woodland should take place outside of the breeding season for birds.

Minor clearance, though discouraged, could be permitted within the bird nesting season, March – September, if small patches due to be cleared were surveyed by experienced bird surveyors, during the bird nesting season. Local area clearance should be conducted within 24 hours of bird surveys during the breeding season if no active nests were identified.

If bird nests are present works will cease and an ecologist consulted before works can recommence.

Sand Martins are migratory birds that breed here in Ireland in the summer. Some of their nesting sites (in a sandy bank in the Blessington Section) have been identified. Works activities in these areas are to be carried out under the supervision of and will be the responsibility of the site Ecological Clerk of Works (ECoW)

Badgers

Evidence of this protected species was found at several locations within the proposed route. Some setts of this species were also found. The protection of these is of the utmost importance. The location of these is also to be kept confidential to reduce the risk of persecution of these animals. The onsite ecology team will make known the sensitive areas where these animals must be considered as a priority for protection.

Otters

Evidence of activity of this protected species was found in a number of locations throughout the proposed route. It is likely that Otters occur widely around the reservoir. No confirmed refuges (known as Holts) were found during survey. However, there are some limited areas where these may occur. The onsite ecology team will make the location of these known to Site managers and where necessary, these will be cordoned off. As with many protected species at this reservoir Site, disturbance is a key potential impact. Therefore, reducing duration and intensity of noise and vibration will be a key action.

Bats

No confirmed bat roosts were found during survey. However, potential bat roosts have been identified. The onsite ecologist will ensure that these areas are made known to the contractor ahead of works. Mature trees may hold bat roost habitat. No mature trees are to be felled prior to consultation/clearance from the onsite ecologist.

Habitats and Flora

No woody vegetation – including trees, bushes, hedgerows, or scrub is to be cleared during the bird nesting season (March-August inclusive). It is advised all clearance works are conducted outside of the bird breeding season and track clearance in the woodland should take place outside of the breeding season for birds. Minor clearance, though discouraged, could be permitted within the bird nesting season, March – September, if small patches due to be cleared were surveyed by experienced bird surveyors, during the bird nesting season. Local area clearance should be conducted within 24 hours of bird surveys during the breeding season if no active nests were identified. If bird nests are present works will cease and an ecologist consulted before works can recommence

Areas of dense bracken or grassland may be cleared following consultation with the onsite ecologist. No areas of wet grassland, marsh, swamp or reeds are to be impacted upon. These are sensitive habitats that are readily damaged. Any works near these areas are to be carried out under ecologist supervision.

Freshwater & Aquatic Habitats

The reservoir must be treated as a sensitive habitat type. Water quality here is of the highest importance. A series of measures must be put in place in order to ensure water quality is not threatened by works. These are detailed in Section 4.4.3.2 (below). No works will be permitted on the shoreline unless by express permission of WCC and the onsite ecology team.

A number of minor watercourses are crossed by the route. Detailed design will indicate the necessity for culverts or bridges across these. There is potential for damage to these watercourses and also to the reservoir arising from works in these areas. Again, a series of measures which must be strictly adhered to are given in Section 4.4.3.2 (below).

4.4.3 Environmental Mitigation and Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented. The following general control and mitigation measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from the Project.

An Ecological Impact Assessment (EclA) has been prepared for the Project, the Contractor should include within the Contractors CEMP any mitigation measure outlined within the EclA or any other environmental reports prepared for the Project.

4.4.3.1 Roles and Responsibilities

Environmental Manager

The following duties in relation to ecology should be included under the Environmental Manager Responsibilities:

- Ensure that the ECoW implements ecological mitigation and control measures satisfactorily;
- Liaise with the ECoW on all matters relating to ecology (particularly protected species including badgers, roosting bats, and nesting birds); and
- Engage and consult with the ECoW and a bat specialist prior to any felling or removal of trees within the Site and if bats are unexpectedly encountered during any element of construction works.

Ecological Clerk of Works (ECoW)

The ECoW will be responsible for advice and provision of services in relation to implementation of ecological mitigation measures described in the planning package in addition to any required as a condition of any consent(s). The ECoW will be engaged and consulted on a regular basis by the Environmental Manager. The responsibilities and duties of the ECoW will include the following:

- Carry out pre-construction surveys to verify findings of and update surveys carried out in 2020;
- Provision of specialist input and supervision (licensed or otherwise), where necessary, of construction in relation to protected species including roosting bats;
- Training of construction staff regarding measures to protect nesting birds and roosting bats; and
- Liaison with the National Parks and Wildlife Service (NPWS), WCC and other nature conservation agencies on ecological matters where required.

4.4.3.2 General Measures

Proposed mitigation includes the following:

- The Contractor shall comply with ecological mitigation measures described in the planning package and ecological pre-construction reports in addition to any measures required as a condition of consent, and any updated or new supplementary environmental reports made available to the Contractor as necessary.
- The Contractor shall ensure that mitigating measures outlined in the Outline CEMP, planning consent and in the documents listed in Appendix C, WCC's requirements, and any updated or new supplementary environmental reports are included in the CEMP.
- Works should be planned to take account of the location of identified sensitive ecological receptors and any seasonal restrictions and/or surveys that are required prior to construction works commencing. It is the responsibility of the Contractor to do this in a timely manner.
- Any external lighting to be installed to facilitate night-time working or security lighting on the Site during construction activities should be kept to a minimum of that required for security, health and safety purposes and should be positioned and directed in such a manner as to minimise impacts on adjacent areas outside the Site boundary.
- Any temporary construction lighting should be reviewed by the ECoW to determine its potential to disturb nesting birds or roosting bats, and in accordance with:
 - Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011); and
 - Bats and Lighting – Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland, December 2010).
- Additional nests or roosts could become established within the construction Site during construction works, a 'watching brief' must be maintained by the Contractor throughout the construction period. If any nesting birds or roosting bats are encountered during works or if it is suspected that protected fauna may be utilising the construction Site, the Contractor shall cease works in the area immediately and consult with the ECoW.

- Possible methods of reducing and controlling dust emissions which may impact negatively on sensitive ecological receptors during construction are listed in Table 4-1, however this is not an exhaustive list.

4.4.3.3 Poulaphouca Reservoir Special Protection Area

No works are to take place on shoreline area unless there is express permission from the onsite ecologist to do so.

Any works close to shoreline must be limited. Operation of any noisy plant and equipment is to be limited in these areas. Such plant and equipment is to be switched off when not in use.

No storage of materials or equipment is to be carried out on shoreline habitat areas. No refuelling of any kind is to be carried out on shoreline habitat areas.

Dates and duration of works near shoreline areas are to be agreed in advance with the Client) and NPWS and Electricity Supply Board (ESB) (the landowner). These will be agreed when scheduling operations. For example, the hours closest to dawn and dusk are to be avoided for any substantial works.

Areas identified as grazing/foraging habitat for Greylag Geese will be mapped and recorded by the onsite ecologist. Works will be programmed to avoid any unnecessary or avoidable impacts in these areas. If any disturbance/disruption is noted on this species as a result of works, the schedule of works will be amended in consultation with the client and NPWS.

All works near or adjacent to watercourses are to be carried out under ecologist supervision and in accordance with the measures set out below for protection of watercourses.

At the outset of works, Toolbox Talks shall be held for each of the work teams in order to highlight the importance of the designated site, Blessington Lake/Poulaphouca Reservoir, designated as an SPA (Site Code 004063) and as a proposed Natural Heritage Area (pNHA).

Any incidents or accidents that occur that may impact upon the reservoir are to be reported immediately to the project manager and to the onsite ecologist.

4.4.3.4 Bird Species

It is advised all clearance works are conducted outside of the bird breeding season and track clearance in the woodland should take place outside of the breeding season for birds.

Minor clearance, though discouraged, could be permitted within the bird nesting season, March – September, if small patches due to be cleared were surveyed by experienced bird surveyors, during the bird nesting season. Local area clearance should be conducted within 24 hours of bird surveys during the breeding season if no active nests were identified.

Disturbance impacts are to be minimised insofar as possible. This will be achieved by limiting areas of clearance, limiting working times in sensitive areas, and avoiding the use of noisy plant or equipment such as pumps, generators or chainsaws.

Works shall not take place within one hour of dusk or one hour of dawn.

The following measures shall also be put in place:

- Sensitive areas will be identified by the onsite ecology team and particular care will be avoided to minimise noise and vibration in these areas.
- Avoid works or unnecessary movement on the shore.
- Ensure that staff are aware of sensitive areas and these areas should be avoided.
- Plant and equipment should be switched off when not in use.
- The use of temporary noise screens around particularly noisy activities may be required where sensitive areas are identified.
- Working practices and less intrusive plant should be used wherever possible.
- Stationary plant that causes noise (e.g. generators) should be kept away from sensitive areas.
- Activities should be programmed to prevent unnecessary clearance, tracking, movements, and potential disturbance.

- Opportunities to reduce the footprint of works should be identified.
- Acoustic covers to engines to be kept closed when engines are in use or idling.
- All plant should be in good working order.
- Exhaust silencers are securely fitted.
- Ensure delivery times are arranged to suit restrictions.
- Noise monitoring will be undertaken if deemed necessary.

4.4.3.5 Badgers

The following measures shall be followed in any areas identified as ecologically sensitive due to the presence of badger refuges or territories:

- Cordons shall be put in place around active and inactive badger setts. These shall exclude any works activities unless explicitly stated by the onsite ecologist and under supervision of a member of the onsite ecology team.
- No storage of any materials, plant or equipment shall be permitted within this area.
- Defined works areas shall be maintained for any works in the vicinity of badger setts or transit areas.
- Noisy activities and those giving rise to vibrations shall be strictly limited to the provisions set out within the TII 'Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes'. Provisions are set out under the heading 'Guidelines for Site Works in the Vicinity of Badger Setts'. This includes the following:
 - *"No heavy machinery should be used within 30 m of badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) should not be used within 20 m of a sett entrance; light work, such as digging by hand or scrub clearance should not take place within 10 m of sett entrances.*
 - *During the breeding season (December to June inclusive), none of the above works should be undertaken within 50 m of active setts nor blasting or pile driving within 150 m of active setts.*
 - *Following consultation with the NPWS and badger experts, works closer to active setts may take place during the breeding season provided appropriate mitigation measures are in place, e.g. sett screening, restricted working hours, etc".*

4.4.3.6 Otters

The following measures shall be followed in any areas identified as ecologically sensitive due to the presence of otters or their resting places:

- Works on shoreline areas will not be permitted.
- Working hours will avoid dawn and dusk.
- Sensitive areas will be identified by the onsite ecology team and particular care will be avoided to minimise noise and vibration in these areas.
- The onsite ecologist shall ensure that staff are aware of sensitive areas and these areas should be avoided.
- Plant and equipment should be switched off when not in use.

4.4.3.7 Bats

The following measures shall be followed in any areas identified as ecologically sensitive due to the presence of bats or their resting places:

- The location of any potential bat roost locations or suitable habitat areas are to be made known to the Site management.
- A Toolbox Talk is to be held for staff with regard to the potential presence of bat roosts and in particular in relation to the felling of trees.
- No mature trees are to be felled without express permission from the onsite ecologist.

- Any mature trees that may have potential for bat roosting habitat are to be assessed by a bat specialist who will dictate the felling methodology of these.
- While it is not intended that any buildings will be impacted upon by the proposed route, works in the vicinity of (within 50 m) any built structure that has been identified as having bat roost potential are to be carried out under ecologist supervision.
- Noise and vibration are to be limited insofar as possible in the vicinity of any tree or structure that has been identified as potential bat roost habitat.

4.4.3.8 Habitats and Flora

The following measures shall be followed throughout the entire area of works on the Project:

- Prior to works, the location of the areas identified as Ecologically Sensitive Areas (ESAs) along with the rationale for this designation are to be made known to the project engineer.
- The area of works is to be limited to the minimum in order to avoid loss or damage to existing habitat areas.
- Works are to avoid shoreline areas at all times.
- Where deemed necessary, the works area shall be set out with cordons in order to preclude any damaging activities outside these areas.
- Works are not to take place in adversely wet conditions – e.g. during or immediately after heavy rainfall events. In areas of softer ground mats should be deployed to minimise rutting.
- Works will not enter any areas of standing water unless expressly allowed by a member of the onsite ecology team.
- Clearance of woody vegetation, including scrub is to be limited to winter months.
- Cleared woody material is to be set aside where possible and habitat piles created as directed by the onsite ecologist.
- The felling of trees and their removal from situ should take place under supervision of the ECoW. It will be the ECoW's responsibility to identify and ensure any required mitigation is put in place and adhered to on site.
- Only the existing construction route will be used where timber is to be removed from site to avoid additional damage to habitats and flora.
- Where grassland areas are to be cleared, topsoil is to be set aside and salvaged as directed by the onsite ecology team.

4.4.3.9 Freshwater & Aquatic Habitats

The following measures shall be followed within any works area that is within 10 m of any of the watercourses crossed by the Project. The protection of watercourses from pollution from construction works shall be achieved by avoidance in the first instance.

- There will be no in-stream works without prior agreement with the onsite ecologist and the client. The onsite ecology team will liaise with relevant bodies such as Inland Fisheries Ireland and ESB should such works be required.
- Machinery is to operate from banks and not from within a watercourse channel.
- The area of any earthwork's operation will be kept to a minimum at any one time.
- Works are to be carried out in dry conditions insofar as possible.
- Stockpiles of materials are to be kept 10 m from the edges of any watercourses.
- Silt fencing is to be put in place as directed by the onsite ECoW.
- Silt fencing shall remain in place until ground vegetation has recovered or as directed by the onsite ecologist.
- Machinery used will not be refuelled near the river and no fuels, oils etc. will be stored onsite.
- There can be no storage of hydrocarbons or any polluting chemicals within 50 m of the watercourse or any active/inactive drains connecting to the river.

- There must be no refuelling of vehicles/equipment within 50 m of a river.
- Any diesel or fuel oils stored onsite must be bunded to 110% of the capacity of the storage tank. Design and installation of fuel tanks must be in accordance with best practice guidelines BPGCS005, oil storage guidelines. Drip trays and spill kits must be kept available onsite. Also see Section 4.5.3.2.
- All stationary plant must be placed on drip trays to prevent leaking oils reaching the river or entering groundwater.
- No washings or waste materials of any kind can be directed into the stream.
- Machinery onsite must have pollution control kits on hand in the event of an emergency.
- Machinery will be kept in good order at all times and inspected for drips and leaks when kept onsite.

Additionally:

- The contractor should be referred to the guidelines given by Inland Fisheries Ireland (2016) on working near watercourses.
- The contractor should be referred to the guidelines set out by CIRIA (2006) on the control of water pollution from linear construction projects.

4.4.3.10 Invasive Species

A number of invasive species are known to occur within or close to the route. Invasive alien plant species recorded include Japanese Knotweed (JKW), Giant Knotweed, Cherry Laurel and Snowberry. Further information is available within the EclA prepared for the Project.

An Invasive Species Management Plan will be drawn up by the Contractor to plan and complete measures to control or eradicate these species from the route corridor. The Invasive Species Management Plan will be prepared as part of preconstruction surveys and reporting.

Herbicide treatment of JKW has already begun by the council but signs of re-emergence was recorded within the stand. Further treatment in the coming years will be required to ensure each stand is totally eradicated.

All stands of JKW will be identified on the ground by the Contractor with bunting and signage and an exclusion zone of at least 10 m should be implemented around the stand.

JKW can be easily spread through the transportation of material containing fragments of stems or the movement of soil containing roots or rhizomes. As such all clearance works undertaken near stands of Knotweed stands must be strictly controlled. All site operative should be informed of the presences of Knotweed stands.

To ensure Knotweed is not spread through the site during clearance all machinery should be thoroughly cleaned after working in areas where Knotweed stands have been recorded. Additionally, terram sheeting (or a satisfactory substitute) covered over with gravel or mulch should be laid down along the track to allow machinery to pass over the stands. It is imperative to ensure that plant material does not become stuck in machinery tyres/tracks and spread throughout the site. If over tracking of knotweed is required during construction works relating to the Proposed Development specific handling measures for terram/stone upon removal will be required to be implemented by the Contractor.

Other invasive species on site include Butterfly Bush (*Buddleia* sp.), Snowberry(*Symphoricarpos albus*) and Himalayan Honeysuckle (*Leycesteria formosa*) these should be removed where possible and the spread of these species prevented. The invasive species management plan should also refer to these species and include a treatment plan for these species.

Stand Specific Invasive Species Mitigation for Clearance Works.

The following is an outline for each area of invasive species located within or on the edge of the greenway corridor. An ECoW will have to be present during works within these areas and biosecurity measures must be followed to avoid any spreading of invasive material. The areas will be monitored during the next growing season and any growth treated as required. This monitoring will be extended around the areas of knotweed as a precaution to check for any accidental spreading or further contamination. Herbicidal treatments should be allowed two weeks to take effect.

4.5 Land and Soils

4.5.1 Legislation and Guidance

Legislation and guidelines relevant to the management of the existing land and soils environment of the Site are as follows:

- European Union Water Framework Directive (WFD) (2000/60/EC). The following legislation in Ireland governs the shape of the WFD characterisation, monitoring and status assessment programmes in terms of monitoring different water categories, determining the quality elements and undertaking characterisation and classification assessments:
 - European Communities (Water Policy) Regulations, 2003 (Statutory Instrument (S.I.) No. 722 of 2003);
 - European Communities Environmental Objectives (Surface Water) Regulations, 2009 ('S.I. No. 272 of 2009 as amended'), as amended in 2012 (by S.I. No. 327/2012), 2015 (by S.I. No. 386/2015) and 2019 (by S.I. No. 77/2019); and
 - European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010).
- European Communities Environmental Objectives (Groundwater) (Amendment) Regulations, 2016 (S.I. No. 366 of 2016);
- EC's Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU) (2017);
- EPA's 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' (2003), containing Draft Interim Guideline Values (IGVs) for the Protection of Groundwater; and
- Groundwater Directives (80/68/EEC and 2006/118/EC).

4.5.2 Potential Impacts

The risk of potential negative impacts occurring during the construction phases of the Proposed Development (in the absence of adequate management and mitigation measures) can arise from several activities; for example, weathering and erosion of the surface soils, increased silt levels or pollutants from the construction processes, accidental spills and impacted runoff.

4.5.3 Environmental Mitigation and Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented. The following general control and mitigation measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from the Project.

4.5.3.1 Soil Management Plan

The Contractor shall develop a Soil Management Plan (SMP) outlining its proposal for the management and reuse of excavated materials from the Site, where permitted in accordance with the relevant legislation, and provided that the reuse meets the engineering requirements for material used within the works. The SMP will be required to include details such as:

- Depth and method of topsoil stripping and stockpiling, including separation of topsoil resources of different potential;
- Detail relevant stockpile procedures to track dates of creation, sources of materials, classification, and disposal/recovery information;
- Methods of stripping and stockpiling of higher quality re-useable subsoil (if appropriate);
- Identification of landscaping topsoil requirements and assessment of suitability and availability of onsite resources (if appropriate);
- Detail relevant procedures for the unexpected finds of contaminated materials onsite including measures for the handling, treatment, and management of contaminated materials;
- Means of protection of subsoil from compaction damage and remedial measures (ripping/subsoiling) for reinstatement; and

- Means of erosion control and measures to prevent sediment laden run-off entering watercourses/standing water bodies.

In addition, where the Contractor proposes to maximise the reuse of excavated soil in order to minimise the generation of waste, it shall set out how it proposes to manage and document this reuse to the satisfaction of WCC or its representatives. This shall include the following as a minimum:

- Identification and recording of the location from where the material was excavated;
- Delineation of areas where excavated soil is intended for disposal as waste, and where it is intended for reuse (where permitted);
- Delineation of areas of contaminated and uncontaminated soil (if present);
- Sampling of excavated soil (the number and location of soil samples);
- The proposal for the laboratory to carry out the testing;
- The suite of parameters for which the soil is to be tested;
- The criteria for assessing whether the soil is contaminated or uncontaminated;
- Geotechnical criteria for reuse; and
- The Contractor shall establish the controls necessary to manage the generation, handling, and storage of waste at the Site.

4.5.3.2 Fuel and Chemical Handling

In order to prevent spillages to ground of fuels, and to prevent any consequent soil quality impacts, it will be necessary to adopt mitigation measures during the construction phase, which include:

- Designating a bunded storage area at the contractor's compound for all oils, solvents and chemicals used during construction. Oil and fuel storage tank design will be bunded to a volume of not less than the greater of 110% of the capacity of the largest tank or drum within the bunded area, or 25% of the total volume of the substance which could be stored within the bunded area, with impermeable bases within each contractor's storage area as required. Drainage from the bunded area will be diverted for collection and safe disposal. All containers within the storage area will be clearly labelled so that appropriate remedial action can be taken in the event of a spillage. When moving drums from the bunded storage area to locations along the Project a suitably sized spill pallet will be used for containing any spillages during transit;
- Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in designated areas which will be away from surface water gullies or drains. Spill kit facilities will be provided at the fuelling areas in order to provide for accidental releases or spillages in and around the area. Any used spill kit materials will be disposed of using a licenced hazardous waste contractor in accordance with relevant legalisation;
- Where mobile fuel bowsers are used on the Project, in the event of a machine requiring refuelling outside of the designated area, fuel will be transported in a mobile double skinned tank. Any flexible pipe tap or valve will be fitted with a lock where it leaves the container and locked shut when not in use. The pump or valve will be locked shut when not in use. Each bowser will carry a spill kit and each bowser operator will have spill response training; and
- The Contractor will develop procedures and contingency plans to deal with emergency accidental spills and leaks.

4.5.3.3 Depletion of Natural Resources

Mitigation and monitoring measures to limit potential impacts associated with the use of natural resources throughout the course of the Project are as follows:

- The source of backfill material will be vetted for environmental management status, regulatory and legal compliance status;
- Backfill material will be sourced from suppliers which comply with vetting requirements only;
- Periodic reviews of the backfill supplier's license will be undertaken;
- In the event recycled aggregate is used as backfill, chemical testing will be undertaken to confirm that it is 'clean';

- The waste management plan will include a soil management plan as detailed in Section 4.5.3.1; and
- The waste management plan will be updated and implemented.

4.5.3.4 Control of Concrete and Lime

Mitigation and monitoring measures to limit potential impacts associated with the use of natural resources throughout the course of the Project are as follows:

- Ready-mixed concrete will be brought to Site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated water to the underlying subsoil and groundwater;
- The pouring of concrete will take place within a designated area protected to prevent concrete runoff into the soil media;
- Washout of concrete transporting vehicles will take place at an appropriate facility, offsite where possible. Alternatively, where wash out takes place onsite, it will be carried out in carefully managed designated onsite wash out areas; and
- Wastewater from washing of concrete lorry chutes will be directed into a concrete washout area, lined with an impermeable membrane.

4.6 Water

The following legislation and guidance documents are of relevance to the water quality of the Site:

4.6.1 Legislation and Guidance

Legislation:

- Planning and Development Act, 2000, as amended;
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2009 S.I. No. 272 of 2009 (as amended);
- European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 S.I. No. 366 of 2016;
- European Union (Drinking Water) Regulations 2000. S.I. No. 439 of 2000 (as amended);
- Environmental Protection Agency's Draft Interim Guidelines Values (IGVs) for the Protection of Groundwater, 2003; and
- European Union WFD 2000/60/EC.

Guidance Documents:

- CIRIA guidance documentation C648 'Control of Water Pollution from Linear Construction Projects';
- CIRIA guidance documentation C532 'Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors';
- CIRIA guidance documentation C741 'Environmental Good Practice on Site Guide';
- CIRIA guidance documentation R164 'Design of Containment Systems for the Prevention of Water Pollution from Industrial Accidents'; and
- Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, National Roads Authority (NRA).

4.6.2 Potential Impacts

Development works by their nature have the potential for impact of watercourses and groundwater by way of pollution. The implementation of appropriate control measures (in accordance with a CEMP and best management practices) will reduce the risk of accidents from polluting substances entering surface water and groundwater. Examples include:

- Polluted discharges from Site;
 - Discharge of vehicle wash-down water;
 - Discharge of construction materials, e.g. uncured concrete;
 - Uncontained spillage of wastewater effluent;
 - Uncontrolled sediment erosion and contaminated silty runoff;
 - Refuelling facilities, chemical and waste storage or handling areas;
- Changes to the existing drainage network including interception and redirection of natural and artificial watercourses (e.g. drainage channels); and
- Increased runoff from cleared and capped areas (relative to greenfield values).

4.6.3 Environmental Mitigation and Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented.

In addition to the mitigation measures outlined in Section 4.5.3 the following mitigation and general control measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from the Project:

- The Contractor shall ensure that mitigating measures, planning consent and in the documents listed in Appendix C, WCC's requirements, and any updated or new supplementary environmental reports are included in the CEMP.
- Materials and equipment to implement the spill response and control plan must be available adjacent to all watercourses (for example, spill kits, booms). These should be in clearly marked response points, which can be accessed by all staff. They must be checked on a daily basis to ensure that all required materials are in place. All staff onsite must be aware of these items and be trained on procedures to implement in the case of a spill. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation.
- Mobile bowzers, tanks and drums will be stored in secure, impermeable storage areas.
- Bunded storage provided for potentially hazardous materials (i.e. oils, hydraulic fluids, greases, solvents, chemicals, and paints) used during the works. Oil and fuel storage tank design will be bunded to a volume of not less than the greater of 110% of the capacity of the largest tank or drum within the bunded area, or 25% of the total volume of the substance which could be stored within the bunded area, with impermeable bases within each contractor's storage area as required.
- Hazardous materials will be stored in designated appropriately bunded areas, which will be at least 50 m from watercourses with nearby drains to be protected as appropriate.
- A plant maintenance programme will be implemented.
- Plant will be refuelled in designated refuelling areas where possible.
- All water runoff from designated refuelling areas shall be channelled to an oil interceptor or an alternative treatment system prior to discharge.
- Tracked machines and static equipment may be refuelled locally by an onsite mobile bowser over secondary containment.
- Drip trays will be used during refuelling operations if performed outside of a contained area and spill kits will be carried in the fuel bowser vehicle. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation.

- Refuelling of rubber tyre vehicles will only to be carried out at designated refuelling areas using appropriate funnels or fuel nozzles.
- Leaking or empty fuel drums shall be removed from Site immediately and disposed of via an appropriately licensed waste disposal contractor.
- The Contractor will develop an emergency response plan will be followed in the event of spills and leaks.
- Materials and equipment to implement the spill response and control plan must be available adjacent to all watercourses (for example, spill kits, booms). These should be in clearly marked response points, which can be accessed by all staff. They must be checked on a daily basis to ensure that all required materials are in place. All staff onsite must be aware of these items and be trained on procedures to implement in the case of a spill. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation.
- Ready-mixed concrete will be brought to the Site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated water to the underlying subsoil and groundwater.
- Washout of concrete transporting vehicles will take place at an appropriate facility, offsite where possible, alternatively, where wash out takes place onsite, it will be carried out in carefully managed designated onsite wash out areas.
- Wastewater from washing of concrete lorry chutes will be directed into a concrete washout area, lined with an impermeable membrane.

4.6.3.1 Managing Runoff and Silty Water

The following mitigation measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from runoff associated with the Project:

- Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.
- Consider, and document, control measures to minimise the release of mobilised sediment which results, despite the erosion control measures.
- To prevent runoff from entering adjacent watercourses, a range of measures will be implemented. The measures will differ based on the location and constituents of stockpiles, but will include the following:
 - Stockpiling of excavated material shall be managed such that the potential contamination of down slope natural drainage systems is mitigated and minimised;
 - Stockpiles will be kept to a minimum, to control erosion areas of exposed ground. Stockpiles shall be minimised to reduce silty runoff and located well away from watercourses, drains and dewatering points;
 - Consideration shall be given to groundwater level and ground saturation to prevent excessive overland flow and associated scouring and mobilisation of suspended solids. The area to be stripped shall be kept to a minimum and phased during the planning and construction phase to reduce the amount of land exposed;
 - Material stockpiles will be located at least 50 m from the SPA, with nearby drains to be protected as required; and
 - Creation of bunded stockpile areas, silt fences, cut-off ditches and silt traps.

4.7 Noise and Vibration

4.7.1 Legislation and Guidance

The following legislation and guidance documents are of relevance to the noise and vibration of the Site:

Legislation

- Environmental Protection Agency Act 1992 (Noise) Regulations 1994;
- The recommendations in British Standards Institution BS 5228: (2009+A1:2014), 'Code of practice for noise and vibration control on construction and open sites';
- European Communities (Construction Plant and Equipment) Permissible, Noise Level Regulations, 1988 (S.I. No. 320 of 1988) (as amended);
- European Communities (Environmental Noise) Regulations 2018 (S.I. No. 549/2018); and
- European Communities (Noise Emission by Equipment for use Outdoors) Regulations 2001 (S.I. No. 632 of 2001) (as amended);

Guidance Documents

Unless otherwise specified, the Contractor shall ensure that all activities associated with the works are carried out in accordance with best practice for the management and control of noise and vibration from construction sites as per:

- The recommendations in British Standards Institution BS 5228: (2009+A1:2014), 'Code of practice for noise and vibration control on construction and open sites',
- CIRIA guidance document C741 'Environmental Good Practice on Site Guide' (2015);
- NRA's 'Guidelines for the Treatment of Noise and Vibration in National Road Schemes' (2004); and
- NRA's 'Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes' (2014).

4.7.2 Potential Impacts

Noise and vibration impacts may arise from a wide variety of sources during construction and to varying degrees during the course of the works, depending upon the stage of construction (i.e. ground works, etc.). Due to the nature of the activities undertaken on a linear construction site such as the Project, there is the potential for the generation of noise and vibration levels above those currently experienced in the surrounding environment.

The Contractor shall identify potential sources of noise and vibration from selected plant and equipment and from activities that will be carried out during the works. This shall also include off-site noise and vibration generation from road traffic directly associated with the works (e.g. deliveries to the Site, waste transportation from the Site, etc.).

4.7.3 Environmental Mitigation and Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented. The following mitigation and general control measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from the Project.

4.7.3.1 General Measures

This section prescribes the mitigation measures necessary for the Contractor to minimise and monitor noise and vibration impacts and effects associated with the Project.

- The Contractor shall comply with mitigation measures that may be provided in a planning consent, the documents listed in Appendix C, WCC's requirements, and any updated or new supplementary environmental reports made available to the Contractor as necessary.
- The Contractor shall select construction plant with low inherent potential for generation of noise and/or vibration.

- The Contractor shall be responsible for implementing noise and vibration mitigation onsite related to construction activities. The Plan shall apply to all works carried out by the Contractor and any sub-contractors under its control.
- It will be necessary for the Contractor to liaise with WCC to ensure that noise and vibration during construction is effectively managed. This will include communicating details of the various phases of work, demonstrating how good site practices will be adopted in order to mitigate construction noise and vibration impacts.
- The Contractor shall designate an Environmental Manager/Responsible Person (i.e. CEMPC) who, amongst a range of other responsibilities, will liaise with environmental advisors, relevant authorities/environmental bodies and the local community as required with respect to noise and vibration impacts during the construction phase.
- The Contractor will highlight through method statements and/or risk assessment specific activities that will create significant noise and vibration levels. Contractors will demonstrate how they will mitigate/manage these emissions. Where significant noise or vibration levels are expected, this will be communicated with any affected parties.

4.7.3.2 Methods of Work and Noise Reduction

- The following noise control measures shall be employed onsite as a minimum:
 - All equipment shall be maintained in good mechanical order and fitted with the appropriate silencers, mufflers or acoustic covers where applicable; all plant and vehicles used in the works shall have exhaust silencers in good working order and diesel plant shall be fitted with effective air intake silencers. All ancillary pneumatic percussive tools shall be fitted with mufflers or silencers as recommended by the manufacturer;
 - Stationary noise sources shall be located as far away as possible from residential noise sensitive receptors (NSR), and where necessary acoustic barriers shall be used to shield them; and,
 - Any machinery which is in intermittent use shall be shut down in intervening periods of non-use or where this is impracticable, it shall be throttled back to a minimum.
- Site staff shall be informed about the need to minimise noise and shall be supervised to ensure compliance with the noise control measures adopted.

4.7.3.3 Noise and Vibration Limits

With regard to Noise limits (unless otherwise agreed with WCC), the construction phase noise guidance as provided in the NRA's Guidance document: 'Guidelines for the treatment of Noise and Vibration in National Road Schemes' will be adhered to. Table 4-2 details these recommended limits:

Table 4-2 NRA Maximum Permissible Noise Levels at the Facade of Dwellings during Construction

Day & Times	Noise Levels dB(A)	
	L _{Aeq} 1 hour	L _{Amax}
Monday to Friday 07:00 to 19:00 hrs	70	80
Monday to Friday 19:00 to 22:00 hrs	60	65
Saturday 08:00 to 16:30 hrs	65	75
Sundays and Bank Holidays 08:00 to 16:30 hrs	60	65

With regard to the potential for vibration damage during construction and demolition, the NRA recommends that vibration from road construction activities be limited to the values set out in Table 4-3. These should be adhered to at all times during the construction phase of the Project.

Table 4-3 Typical Allowable Vibration during Road Construction in Order to Minimise the Risk of Building Damage

Frequency:	Less than 10 Hz	10 to 50 Hz	50 to 100 Hz and above
Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property to the source of vibration:	8 mm/s	12.5 mm/s	20 mm/s

4.7.3.4 Monitoring Requirements

- The Contractor shall be responsible for compliance with any noise and vibration levels as prescribed in this Outline CEMP or the requirements of WCC, including any ongoing monitoring required in this regard.
- Monitoring is necessary in order to highlight any potential noise nuisance arising from the works. In order to minimise and effectively respond to situations that may cause nuisance, real time measurements are necessary to permit immediate remedial actions to be taken.
- The Contractor shall develop a monitoring plan that demonstrates compliance with applicable regulation, conditions, and best management practices. This monitoring plan shall:
 - Describe how the Contractor proposes to carry out monitoring, including equipment, locations, baselining of existing noise levels and validations techniques.
 - Include information on the frequency of monitoring and the method and frequency of providing monitoring results to the Client.
- All operators of noise monitoring equipment shall be trained and competent to undertake the measurements.
- Prevailing weather conditions (including wind direction and speed, air temperature, incidence of precipitation and degree of cloud cover) shall be recorded with each set of monitoring results. Wind speed and direction shall be recorded daily using a portable anemometer and compass.
- The requirement whether or not to undertake vibration monitoring will be agreed with WCC.

4.8 Traffic Management

This section prescribes the mitigation and general control measures necessary for the Contractor to minimise impacts upon construction operatives, the local community, residents, and landowners directly affected by the works and associated traffic, travel management and vehicle usage.

This section provides an overview of the likely routing of construction vehicles, based on a most likely scenario of construction. It should be noted that the impacts of the construction will be temporary.

4.8.1 Legislation and Guidance

Guidance for the temporary control of traffic at construction works to facilitate the safety of the public during the works is provided below:

- Safety, Health & Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013);
- Traffic Signs Manual Chapter 8 Temporary Traffic Measures and Sign Roadworks (2009), UK Department for Transport (UK Dft); and
- Department of Transport (Dft) 'Traffic Management Guidelines' (2019).

4.8.1.1 Site Access Route

A number of construction site access points are proposed (Figure 4-1)¹.

¹ Note: Some of access points are subject to third party approval.



Figure 4-1 Construction Access Points

4.8.1.2 Construction Haul Routes

Details on haul routes to be included in the CEMP by the Contractor within the upon finalisation of routes between WCC and local landowners.

4.8.1.3 Construction Parking

Details on parking to be added to the CEMP by the Contractor when construction access points are finalised. Some construction access point could occur through private lands and would be subject to discussions with landowners.

4.8.2 Environmental Mitigation and Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented. The following mitigation and general control measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from the Project.

4.8.2.1 Traffic Management Plan

The Contractor shall be required to establish a traffic management system:

- Planning and controlling the movement of vehicles, plant and non-motorised users that are present within the boundaries of the Site, planning and controlling access and egress to working areas, access to and egress from the Site and on the adjacent road network; and,
- Ensure that safety of construction operatives, motorised and non-motorised users are not compromised.

This shall be achieved by effective implementation of traffic mitigation measures plus those contained below within this Outline CEMP. The purpose of such traffic management mitigation measures is to outline measures to manage the expected construction traffic activity during the construction period and it will be the contractor's responsibility to enact the mitigation measures in advance of any works.

4.8.2.2 Traffic Management Measures

Construction debris particularly site clearance, spoil removal and dirty water run off can have a significant impact on footpaths and roads adjoining a construction site, if not adequately dealt with.

The Contractor shall establish the control measures necessary to manage all traffic activity associated with its works. In identifying the appropriate controls, the Contractor shall conduct a Traffic Risk Assessment prior to implementation of traffic management measures. The traffic management measures should enable Site-based staff to manage all these risks efficiently and effectively.

In terms of general traffic management measures, typical controls will include barriers defining footways and safety zones to prevent construction vehicles encroaching on pedestrian areas, segregated pedestrian routes (where appropriate), temporary warning signs erected to highlight particular hazards, including Site accesses and temporary traffic management measures. Control measures may also include those considered within other sections of the CEMP (i.e. noise and dust control). Below is a list of the proposed traffic management measures to be adopted during the construction works. Please note that this is not an exhaustive list, and that it will be the appointed contractor's responsibility to prepare a detailed construction management plan.

- Clear signage of any temporarily diversions to existing motorised and non-motorised routes (including pedestrians and cyclists).
- Warning signs/advanced warning signs will be installed at appropriate locations in advance of the construction access locations.
- Maintain access for non-motorised users to community assets with minimal disruption as far as is possible, where diversion are required non-motorised users should be considered and facilitated to continue their journey with minimal disruption as far as possible. This should include provisions for vulnerable non-motorised users such as the elderly and school children.
- Road closures and restrictions should be planned in agreement with the appropriate stakeholders including WCC.
- Minimise journeys to and from the Site by the workforce, sub-contractors, suppliers, and anyone else who is likely to visit the Site regularly.
- Provide protection from traffic hazards that may arise as a result of the construction activities and journeys to and from the Site.
- Manage potential adverse impacts on the public road network and ensure network performance is maintained at an acceptable level.
- Plan deliveries to the Site.
- Ensure that the roads and footways in the vicinity of the construction Site are kept clear of debris, soil, and other material.

- Construction and delivery vehicles will be instructed to use only the approved and agreed means of access; and movement of construction vehicles will be restricted to these designated routes.
- Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on trucks carrying dust producing material.
- Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds within the Site.
- Parking of Site vehicles will be managed and will not be permitted on public road, unless proposed within a designated area that is subject to traffic management measures.
- A road sweeper will be employed to clean the public roads adjacent to the Site of any residual debris that may be deposited on the public roads leading away from the construction works.
- Onsite wheel washing will be undertaken for construction trucks and vehicles to remove any debris prior to leaving the Site and to remove any potential debris on the local roads.
- All vehicles will be suitably serviced and maintained to avoid any leaks or spillage of oil, petrol, or diesel. Spill kits will be available onsite. All scheduled maintenance carried out off Site will not be carried out on the public road. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation.
- Safe and secure pedestrian facilities are to be provided where construction works obscure any existing pedestrian footways. Alternative pedestrian facilities will be provided in these instances, supported by physical barriers to segregate traffic and pedestrian movements, and to be identified by appropriate signage. Pedestrian facilities will cater for vulnerable users including mobility impaired persons.
- Use of sustainable modes of transport (i.e. use of public transport, encouraging cycling).
- The health and wellbeing of the workforce.
- Identify sensitive areas (e.g. schools and homes).
- Measures aimed at avoiding disruption and inconvenience to local residents and businesses.
- Safety of vulnerable users (i.e. children, the elderly).
- Take into account other developments whose activities could affect the Project.

The mitigation measures identified above will contribute to ensuring there will not be any significant environmental degradation in the vicinity of the Project. Furthermore, it is in the interest of the construction programme that deliveries, particularly concrete deliveries are not unduly hampered by traffic congestion, and as a result continuous review of haulage routes, delivery timings and access arrangements will be undertaken as construction progresses to ensure smooth operation.

The Contractor shall comply with mitigation measures that may be set out in planning consent documents, the documents listed in Appendix C, WCCs Requirements, and any updated or new supplementary environmental reports made available to the Contractor as necessary.

Advice on the preparation of Green Travel Plans can be found in 'The Essential Guide to Travel Planning' published by the Department for Transport (DfT). Advice on the preparation of traffic mitigation measures can be found in the fourth edition of CIRIA's 'Environmental good practice on Site guide' (C741) (2015).

4.8.2.3 Traffic Management Measures Implementation and Monitoring

The traffic management measures shall be implemented from the work start date and shall be monitored on a regular basis to ensure that they are being adhered to and targets are being met. Every effort shall be made to ensure the safety of the local road users is maintained.

The Contractor shall implement and adhere to the conditions set out by WCC.

4.9 Waste

4.9.1 Legislation and Guidance

The following legislation and guidance documents are of relevance to the noise and vibration of the Site:

Legislation:

- Directive 2008/98/EC on waste (Waste Framework Directive);
- The Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, 2010 amended;
- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of Annex II to Directive 1999/31/EC;
- European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC);
- Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC);
- EPA's European Waste Catalogue and Hazardous Waste List (2002);
- Waste Management Act 1996 (S.I. No. 10 of 1996) as amended by the Waste Management (Amendment) Act 2001; and
- Litter Pollution Act 1997 and Regulations.

Guidance documents

- EPA's 'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-hazardous', (2015);
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction Demolition Projects, Department of Environment, Community and Local Government;
- CIRIA guidance document C741 'Environmental Good Practice on Site Guide' (2015); and
- NRA's 'Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan'.

4.9.2 Potential Impacts

During the construction phase a range of waste materials will be generated. It is not envisaged that there will be a need to remove large quantities of excavated material from within the Site. It is therefore considered that there will not be a significant amount of waste generated from the construction of the Project.

4.9.3 Environmental Mitigation and Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented. The following mitigation and general control measures should be followed as a minimum to ensure no significant adverse direct and indirect effects on the environment arise from the Project.

4.9.3.1 Waste Management Plan

The Contractor shall be responsible for developing the Waste Management Plan (WMP) related to its construction activities. The Plan shall apply to all works carried out by the Contractor and any subcontractors under its control. In preparing the plan, the Contractor shall consider any measures set out in any planning consent document, the relevant legislation, and industry best practice. The WMP will be submitted for consultation and approval by WCC (or as outlined in the planning conditions).

In developing the plan, the Contractor shall also consider the requirements of WCC.

Certain uncontaminated materials (soil) excavated from the Site during the works may be reused in the works, and therefore would not require disposal/recovery as waste. In developing the WMP, the Contractor shall consider the reuse of materials where practicable, where permitted under the relevant waste legislation, and where the material meets the engineering requirements.

4.9.3.2 Waste Management Strategy

The Contractor shall establish a system for the management of wastes in accordance with the Waste Management Hierarchy. This hierarchy outlines that waste prevention and minimisation are the first priority in managing wastes, followed by waste reuse and recycling. Disposal of waste shall only be considered as a last resort.

- Prevention;
- Minimisation;
- Reuse;
- Recycling; and
- Disposal.

4.9.3.3 Waste Identification and Classification

The Contractor shall establish a procedure to identify and classify all waste arising at the Site in accordance with the List of Waste (LoW) Code. The Contractor shall ensure that the waste materials generated during the works are clearly identified as either hazardous or non-hazardous wastes, with reference to the guidance from the Environmental Protection Agency (Paper Tool of the Procedure for the Identification of the Hazardous Components of Waste) where required and shall establish designated waste storage areas for the different types of waste that may arise.

For each waste stream identified by the Contractor, and for each additional waste stream that may arise during the course of the works, the Contractor shall identify the following:

- The appropriate LoW Code;
- A suitable Waste Collection Contractor in possession of a valid Waste Collection Permit for the collection of the particular waste within County Wicklow;
- That the waste recovery or disposal site, (including the transfer station where the waste may be transferred to upon leaving the Site) is in possession of a valid Waste Facility Permit or Waste License, as appropriate; and
- The recovery or disposal method for the waste.

Only Contractors in possession of a valid Waste Collection Permit shall collect wastes from the Site. The Contractor responsible for the waste shall ensure that the Waste Collection Contractor:

- Is permitted to collect the particular waste;
- Is permitted to collect waste within County Wicklow;
- Uses a waste collection vehicle identified on the Waste Collection Permit; and
- Transfers the waste to a licenced waste facility identified on the Waste Collection Permit.

Prior to the commencement of the Project, the Contractor shall ensure the following information is provided:

- Transfer notes for controlled waste and consignment notes for hazardous waste must include an accurate description of the type, quantity, and containment of waste; Standard Industrial Classification; the LoW Number; and details of the waste carrier, who must be licensed;
- Sufficient information must be provided to ensure that the waste disposal operator is aware of the potential hazards of the substance;
- The Trade Contractor should also ensure that returns for consignment notes are collected and retained; and
- All documentation must be retained for a minimum of two years for transfer notes and three years for consignment notes and be available for inspection.

The Logistics Contractor and all Trade Contractors removing waste directly from Site must provide the following documentation:

- Waste forecast;
- Licence documentation for all waste carriers removing waste and for all waste destinations receiving waste (to be approved before use);
- Recycling rates from facilities being used;
- Waste consignment notes (for a minimum of three years) for all hazardous waste. These must include the following:
 - Consignment note code;
 - Details of the site that the hazardous waste is removed from;
 - Details of waste disposal site;
 - Waste producer details if different to site details;
 - Description of the waste (written description, LoW code and SIC number);
 - Details of process that has generated this waste;
 - Specific details of the waste quantity, chemical/biological components, physical form, and hazardous properties
 - Any special handling requirements; and
 - Signature of consignor once completed.
- Waste transfer notes (for a minimum of two years) for all non-hazardous waste. These must include the following and should be reported:
 - Accurate description of the waste type (written description, LoW code and SIC number);
 - Quantity and containment of waste;
 - Location, time, and date of the waste transfer;
 - Names of both persons involved in the waste transfer;
 - Details of the waste carrier and facility, both must be licensed; and
 - Waste carrier's registration number.

The Contractor shall advise WCC or its representatives in advance if it proposes to act as the Waste Collection Contractor, subject to agreement. In the event that the Contractor acts as the Waste Collection Contractor, it shall ensure that it has the relevant Waste Collection Permit(s) in place prior to commencement of the Project.

4.9.3.4 Documentation of Waste

The Contractor shall develop a Waste Documentation System within the overall documentation system for the works. The documentation to be maintained in relation to wastes includes the following (where applicable):

- The names of the agent(s) and the transporter(s) of the wastes;
- The name(s) of the person(s) responsible for the ultimate recovery or disposal of the wastes;
- The ultimate destination(s) of the wastes;
- Written confirmation of the acceptance and recovery or disposal of any hazardous waste consignments;
- The tonnages and LoW Code for the waste materials;
- Details of any rejected consignments;
- The Waste Transfer Forms for hazardous wastes transferred from the Site;
- The Transfrontier Shipment of Waste forms for hazardous wastes transferred abroad;
- The Certificates of Recycling, Reuse or Disposal for all wastes transferred from the Site;

- The results of any analysis conducted on wastes; and
- The results of any analysis conducted on excavated soil.

The Contractor shall provide a report of all waste arising at the Site to include the information set out above. Information on the management of waste at the Site shall be made available to the Client or its representatives upon request. The original documentation relating to the management of waste shall be maintained at the Site.

Waste Audits and monitoring should be carried out at regular intervals through the life of the Project.

4.9.3.5 Litter or Debris

- The Contractor shall be required to maintain a tidy site as far as practicable and shall be required to dispose of materials in a controlled and responsible manner. These measures should assist in reducing the potential for adverse impacts on surface waters arising from construction activities.
- Areas of hard standing and surface roads shall be swept regularly to prevent the build-up of material which could be washed into watercourses.
- A high standard of housekeeping will be maintained at all times and waste materials will be stored in waste bins or skips only.

Appendix A Contractor Method Statements

To be added by the appointed Contractor

Appendix B Environmental Risk

This procedure has been developed in order to define the criteria used to:

- Identify the environmental impacts and aspects associated with work activities;
- Identify a procedure for assessing the significance of environmental impacts and aspects; and
- Develop an environmental aspect register specific to Site construction works.

B.1 Scope

This document applies to all activities associated with Site construction works including the activities of its staff, contractors, and subcontractors.

B.2 Responsibilities

The Environmental Coordinator has the responsibility for ensuring the Register of Environmental Aspects and Impacts is reviewed on a monthly basis and updated as necessary.

B.3 Procedure – Environmental Aspect Identification

The procedure for developing an aspects register is as follows:

- Representatives from relevant functional areas should be co-ordinated to participate in the identification and assessment process to ensure affectivity.
- The environmental aspects associated with all construction works shall be documented in the aspect evaluation table.
- The impact associated with each aspect shall then be listed. Impacts can range from global impacts such as an increase in greenhouse gases to local impacts such as change to local air quality as a consequence of works.
- For each aspect, a rank order is assigned in respect of:
 - Likelihood of Occurrence (L);
 - Severity of Consequences (S).
- To obtain an overall significance rating factor (C), the values for (L) and (S) are multiplied, $C = L \times S$.
- Table 4-4 and Table 4-5 detail the criteria for assessing Likelihood of Occurrence (L) and the Severity of Consequences (S).
- An aspect with a score of 9 or greater (post-control measure) is considered to be a significant environmental risk and must be controlled.

Table 4-4 Rating (L) the Likelihood of Occurrence

Rating value	1	2	3	4	5
	Never/cannot occur	Unlikely to occur	Likely to occur once/twice	Possibility of a number of occurrences	Highly likely

Rating (S) the Severity of Consequences takes into account the following six categories:

- Legislative and regulatory compliance;
- Community/employee sensitivity;
- Impact on air, land, or water;
- Cost to organisation;
- Potential for resource depletion; and
- Accident and emergency situations.

Table 4-5 Rating (L) the Severity of Consequences

Rating value	1	2	3	4	5
	Unlikely to have an impact on any of the previous categories	May have a low impact on some of the previous categories	May have a moderate impact on three or more of the previous categories	Likely to have a moderate to major impact on most of the previous categories	Likely to have a major impact on all of the previous categories

Ref.	Work Activity	Environmental Aspect	Environmental Impact before Controls	Initial Risk Level (without controls)	Risk Control Measures: Design action taken, record of decision process including option considered, design constraints and justification for options/actions not taken	Residual Risk Level (with controls)	Is there a "significant" residual risk to be passed on? (Y/N)	Actions necessary to control the risk – comments, recommendations	Responsibility	Status (Active/Closed)

Appendix C Example List of Relevant Legislation and Guidance (to be updated by Contractor)

Area	Publication
Advanced Works	<ul style="list-style-type: none"> Control of Water Pollution from Construction Site. Guidance for consultants and contractors (C532), CIRIA. Environmental good practice on site guide (C741), CIRIA. National Monuments Legislation (1930-1994). Department of Arts, Heritage, Gaeltacht and the Islands. (1999). Policy Guidelines on Archaeological Excavation. Dft. (2008). The Essential Guide to Travel Planning, Department for Transport.
Air Quality and Climate	<ul style="list-style-type: none"> Planning and Development Act, 2000 (as amended) Air Quality Standards Regulations 2011 (S.I. No. 180/2011). Technische Anleitung zur Reinhaltung de Luft (TA Luft) Regulations (2002). CAFE Directive 2008/50/EC. EPA. (2010) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4), Environmental Protection Agency. EPA. (2019). Air Quality in Ireland 2019: Indicators of Air Quality, Environmental Protection Agency. Holman et al., (2014) 'Guidance on the Assessment of Dust from Demolition and Construction', IAQM. NRA. (2011). 'Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes', National Roads Authority.
Cultural Heritage	<ul style="list-style-type: none"> National Monuments Act, 1930 (as amended). Planning and Development Act, 2000 (as amended). Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. Department of Arts, Heritage, Gaeltacht and Islands. (1999). Framework and Principles for the Protection of the Archaeological Heritage'. Department of Arts, Heritage and the Gaeltacht. (2011). Architectural Heritage Guidelines, Guidelines for Planning Authorities'. Department of the Environment, Heritage and Local Government. (2009). Government Policy on Architecture 2009 – 2015.
Biodiversity	<ul style="list-style-type: none"> EU Birds Directive 2009/147/EEC. EU Habitats Directive 92/43/EEC. European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (as amended). Planning and Development Act 2010 (as amended). Wildlife Act 1976 (as amended). Inland Fisheries Act 1959 (as amended). Local Government (Water Pollution Act) 1977 (as amended). Flora (Protection) Order, 2015 (S.I. No. 356/2015). Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. Kelleher, C. & Marnell, F. (2006). Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. EC. (2019). Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC, European Commission. IFI. (2016). 'Guidelines on protection of fisheries during construction works in and adjacent to waters, Inland Fisheries Ireland. CIRIA. (2006). Control of Water Pollution from Linear Construction Projects: Technical Guidance (C648), Construction Industry Research and Information Association. CIRIA. (2006). Control of Water Pollution from Linear Construction Projects: Site Guide (C649), Construction Industry Research and Information Association.
Water	<ul style="list-style-type: none"> European Union WFD 2000/60/EC. Local Government (Water Pollution Acts) 1977 (as amended). Inland Fisheries Act 1959 (as amended). European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2009 S.I. No. 272 of 2009 (as amended); European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 S.I. No. 366 of 2016; European Union (Drinking Water) Regulations 2000. S.I. No. 439 of 2000 (as amended);

Area	Publication
	<ul style="list-style-type: none"> • IFI. (2016). Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters, Inland Fisheries Ireland. • CIRIA. (2015). Environmental good practice on site guide (Fourth Edition (C741), Construction Industry Research and Information Association. • CIRIA. (2014). Containment systems for the prevention of pollution (C736F), Construction Industry Research and Information Association. • CIRIA. (2006). Control of Water Pollution from Linear Construction Projects: Technical Guidance. (C648)', Construction Industry Research and Information Association. • CIRIA. (2006). Control of Water Pollution from Linear Construction Projects: Site Guide (C649), Construction Industry Research and Information Association. • NRA. (2007). Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, National Roads Authority.
Noise and Vibration	<ul style="list-style-type: none"> • Environmental Protection Agency Act 1992 (Noise) Regulations 1994. • European Communities (Construction Plant and Equipment) Permissible, Noise Level Regulations, 1988 (S.I. No. 320 of 1988) (as amended). • European Communities (Environmental Noise) Regulations 2018 (S.I. No. 549/2018). • European Communities (Noise Emission by Equipment for use Outdoors) Regulations 2001 (S.I. No. 632 of 2001) (as amended). • NRA. (2005). Guidelines for the Treatment of Noise and Vibration in National Road Schemes, National Roads Authority. • BS 5228: 1992, Noise and vibration control on construction and open sites. Code of practice for noise and vibration control applicable to piling operations. • BS 5228: 2009, Code of practice for noise and vibration control on construction and open sites, Part 1: Noise and Part 2: Vibration. • BS 6472: 2008, Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting. • BS 7385:1993, Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration. • CIRIA. (2015). Environmental good practice on site guide (Fourth Edition (C741), Construction Industry Research and Information Association. • Berglund et al., (2003). Guidelines for Community Noise, World Health Organisation (WHO). • NRA. Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, National Roads Authority. • WCC. (1998). Noise Action Plan (2018-2023), Wicklow County Council.
Traffic Management Plan	<ul style="list-style-type: none"> • CIRIA. (2015). Environmental good practice on site guide (Fourth Edition (C741), Construction Industry Research and Information Association. • NRA. (2007). Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, National Roads Authority. • Dft. (2019). Traffic Management Guidelines, Department for Transport, • UK Dft. (2008). The Essential Guide to Travel Planning, UK Department for Transport
Waste Management Plan	<ul style="list-style-type: none"> • Eastern Midlands Region Waste Management Plan 2015 – 2021. • EPA. (2015). 'Waste Classification, List of Waste & Determining if Waste is Hazardous or Nonhazardous', Environmental Protection Agency. • Department of Environment, Community and Local Government. (2006). Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects. • Environmental Good Practice on Site (C962), CIRIA. • European Waste Catalogue (EWC) Codes. • NRA. (2007). Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, National Roads Authority. • Clean Technology Centre. (2004). Paper Tool of the Procedure for the Identification of the Hazardous Components of Waste.
Working Hours/Periods	<ul style="list-style-type: none"> • Environmental good practice on site guide (C741), CIRIA

Appendix D Figures

Figures are to be added by the appointed Contractor to the final CEMP. Several figures were produced as part of the Ecological Impact Assessment and the Appropriate Assessment and Natura Impact Assessment and these should be reviewed by the Contractor and any Sub-contractors.

Appendix E Waste Licence

To be added by the appointed Contractor

