Contents

Tables

Images

1. Introduction

1.1 Overview

This Construction Environmental Management Plan (CEMP) has been prepared to support Cork County Council's (CCC) application for consent for the proposed pedestrian and cyclist bridge located in Little Island, County Cork (i.e., the Proposed Development).

CCC will have a construction management team which will oversee aspects of the Construction Phase of the Proposed Development.

The contractor (and any subcontractors) appointed by the construction management team will be required to comply with all of the performance requirements set out in the tender documentation including the conditions attached to statutory consents which may be granted by relevant statutory consent authorities.

This document presents an outline construction sequence, supported by possible construction methodologies and techniques that may be adopted during the construction of the Proposed Development. This plan seeks to demonstrate how such works can be delivered in a logical, sensible, and safe sequence, with the incorporation of specific measures to mitigate the potential impact on people, property and the environment.

Nothing stated in this document shall supersede or be taken to replace the items of the Contract, the detailed design description issued with the Contract tender or the conditions of planning.

This CEMP sets out the duties and responsibilities which will be imposed on the contractor in the construction contract. CCC's construction management team will be responsible for ensuring that the contractor complies with all the requirements of this CEMP.

1.2 Purpose

The purpose of this CEMP is to provide a framework for managing and where practicable, minimising negative environmental effects during the construction of the Proposed Development. Construction is considered to include all site preparation, enabling works, materials delivery, materials and waste removal, construction activities and associated engineering works.

This CEMP identifies the minimum requirements with regard to the appropriate mitigation, monitoring, inspection and reporting mechanisms that need to be implemented throughout construction. The appointed contractor will need to comply with all relevant environmental legislation and take account of published standards, accepted industry practice, national guidelines and codes of best practice appropriate to the Proposed Development

This CEMP has been produced as part of the application for consent to ensure compliance with legislative requirements and the EIAR and associated ecological reports that have been prepared for the Proposed Development.

1.3 Approach

This CEMP provides a framework to:

- Describe the programme for environmental management during construction;
- Implement those monitoring and mitigation measures identified in the EIAR and associated ecological reports;
- Outline the principles and minimum standards required during the development of the CEMP (and associated method statements) and throughout construction;
- Identify the relevant roles and responsibilities for developing, implementing, maintaining and monitoring environmental management; and
- Outline the procedures for communicating and reporting on environmental aspects of the Proposed Development throughout construction.

It is intended that this CEMP would be expanded and updated prior to the commencement of any construction activities on site. The CEMP is a dynamic document and will remain up to date for the duration of the Construction Phase. The CEMP may need to be altered during the lifecycle of the Construction Phase to take account of monitoring results, legislative changes, outcomes of third-party consultations etc.

Following appointment, the contractor will be required to develop more specific method statements that are cognisant of the proposed construction activities, equipment and plant usage, and environmental monitoring plan for the Proposed Development. This CEMP should not be considered a detailed Construction Method Statement as it would be the responsibility of the contractor appointed to undertake the individual works to implement appropriate procedures and progress this documentation prior to commencement of construction.

This CEMP outlines the range of potential types of construction methods, plant and equipment which may be used by any contractor appointed to enable their effects to be assessed for the purposes of the planning authority's environmental impact assessment and appropriate assessment prior to determining whether to grant planning permission.

1.4 Structure

This CEMP is structured as follows:

- **Section 1** introduces the Proposed Development and outlines the purpose of the CEMP;
- **Section 2** describes in detail the Proposed Development;
- **Sections 3** describes the construction strategy for the Proposed Development;
- **Section 4** describes construction traffic management for the Proposed Development;
- **Sections 5** describes in detail the measures to be implemented to minimise likely significant negative effects, as far as practicable, during the construction of the Proposed Development.
- **Section 6** sets out the framework and mechanisms through which environmental requirements would be managed; and
- **Section 7** outlines the procedures to be employed during construction to manage environmental aspects.

1.5 Updates to the CEMP

The detailed CEMP is considered a 'live document' that will be reviewed and revised regularly as construction progresses. The process for update, review and approval of the CEMP must be documented in the detailed CEMP to ensure that all revisions can be easily understood, applied and updated.

The contractor is required to update the CEMP to ensure that it:

- Is in accordance with the mitigation measures specified in the EIAR and associated ecological reports and this CEMP;
- Is in accordance with any conditions that may be prescribed as part of the consent(s) for the Proposed Development;
- Aligns with those design and construction details described in the EIAR and associated ecological reports and ensures there is no material change in terms of significant effects on the environment;
- Where practicable, the contractor should seek to identify opportunities for further reducing significant negative environmental effects and to implement best practice in as far as reasonably practicable, i.e., take every reasonable effort to reduce and prevent negative effects, while enhancing benefits; and
- Will have regard to the guidance contained in the handbook 'Environmental Good Practice on Site' published by Construction Industry Research and Information Association (CIRIA, 2015a).

Further, the following plans, and any others considered relevant, will be incorporated into the CEMP by the contractor:

- Construction Traffic Management Plan;
- Noise and Vibration Management Plan;
- Surface Water Management Plan;
- Dust Management Plan; and
- Emergency Incident Response Plan.

It is expected that amendments to the CEMP may be necessary to reflect, inter alia, changes in the project scope, contract scheduling, contractor appointments, environmental management policies, practices or regulations and developments on the site. These reviews and updates are necessary to ensure that environmental performance is subject to continual improvement and that best practice is implemented throughout construction.

2. The Proposed Development

2.1 Site location

The site of the Proposed Development is located in Little Island, Co. Cork, approximately 10km to the east of Cork City. The Proposed Development is a pedestrian and cyclist bridge that will function as an active travel link for pedestrian and cyclists to travel from the Little Island Train station and surrounds to the Eastgate Business Park and further surrounds of Little Island.

Refer to **Image 1** for a site location map.

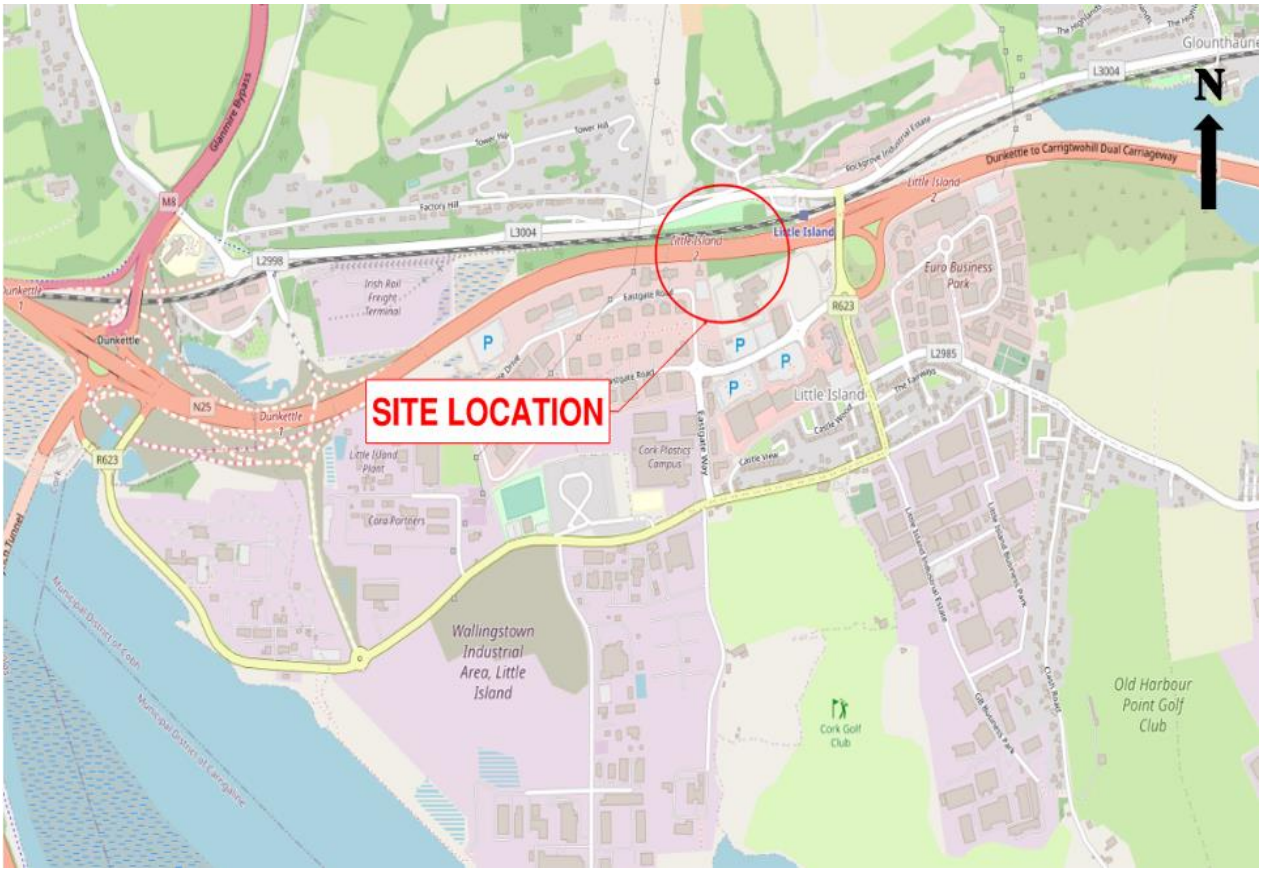

Image 1: Approximate site location. Not to scale. Source: OpenStreetMap

2.2 Proposed Development description

The Proposed Development will include the construction of a new pedestrian and cyclist bridge and associated ramps over the existing N25. The Proposed Development will be located approximately 10km to the east of Cork City and will cross over the N25 and the Cork City to Midleton / Cobh railway line, connecting the Little Island train station, the L3004 Glounthaune Road, the Dunkettle to Carrigtwohill pedestrian and cycle route and Eastgate Business Park in Little Island, Cork. The Proposed Development site is bounded by the L3004 Glounthuane Road to the north and the Eastgate Business Park to the south. When operational, it will function as an active travel link for pedestrians and cyclists to travel from the Little Island Train station and surrounds to the Eastgate Business Park and further surrounds of Little Island.

The Proposed Development will consist of a new pedestrian and cyclist bridge that encompasses a segregated footway and cycleway that will be 5m wide. The proposed crossing will be approximately 460m long and will consist of a combination of different structural forms as follows:

- Northern approach ramp: combination of earthen embankment and elevated ramp structure;
- Irish Rail span: concrete portal frame structures;
- N25 span: steel network arch structure; and
- Southern approach ramp: combination of elevated ramp structure, at grade sections and earthen embankment.

The construction footprint of the Proposed Development, including the construction compounds and bridge assembly area, is approximately 1.7 hectares. The construction footprint of the final works (excluding planting and minor tie in footpaths in the northern park area) is approximately 0.3 hectares.

An extract of the site layout for the Proposed Development is presented in **Image 2**.

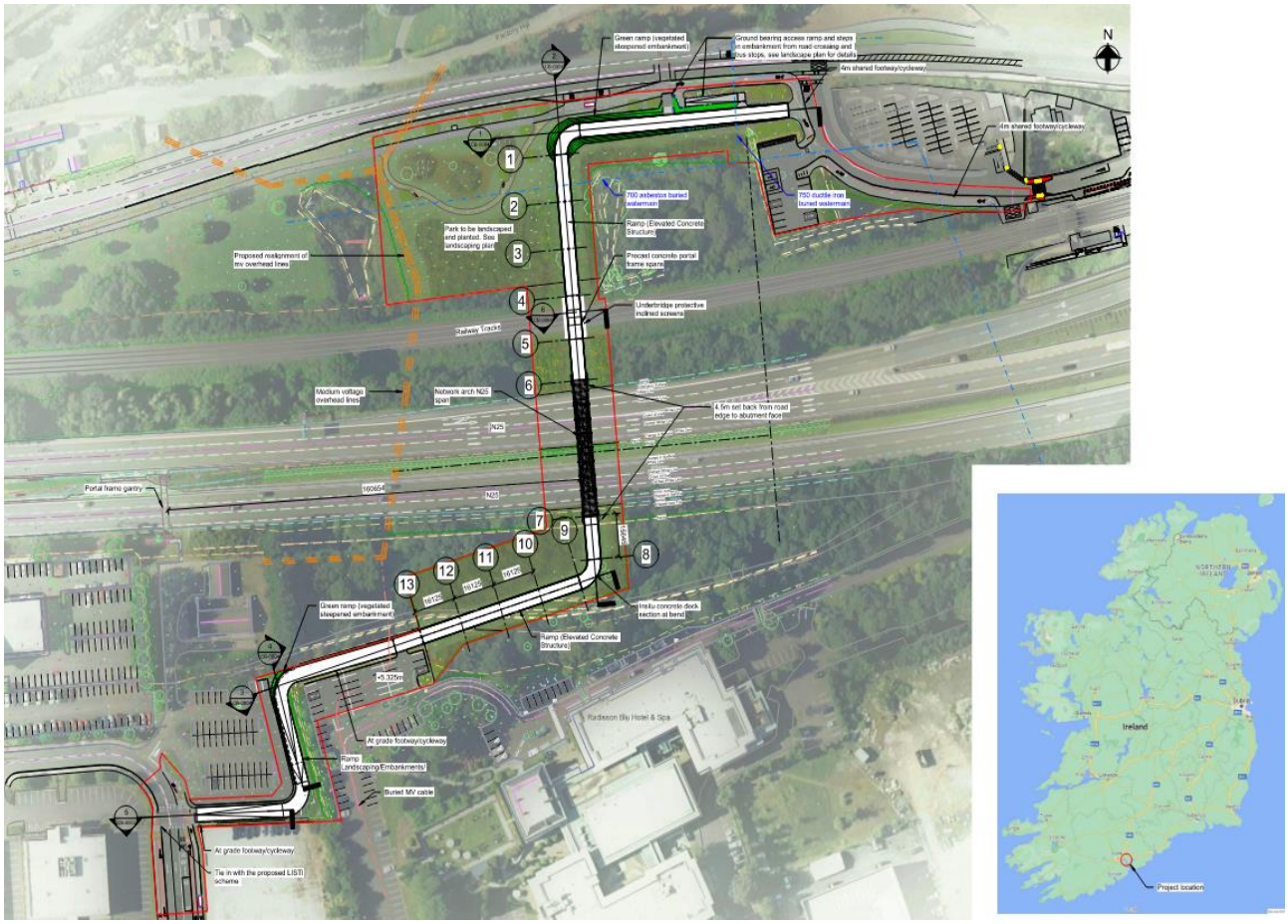

Image 2: Site layout map. Not to scale. Extract from site layout plan drawing – refer to Drawing No. LIPB-ARUP-ZZ-XX-DR-CB-0003 in Volume 3 of this EIAR.

2.3 Key interfaces and elements

The Proposed Development will cross the following areas from north to south:

- Northern park amenity area;
- Cork City to Midleton / Cobh Irish Rail line;
- N25 national road dual carriageway;
- Wooded area, south of the N25; and
- Radisson Blu Hotel and Eastgate Business Park car parks.

The site is bounded by the L3004 Glounthaune Road to the north. Levels at the tie in to the Little Island train station area are approximately +2.5mOD, while levels at the at tie in to the Radisson Blu Hotel car park are approximately 5.2mOD. On the southwest of the site, there is a 1.1m drop in elevation between the Radisson Blu Hotel car park and the adjacent Eastgate Business Park car park (5.5mOD to 4.4mOD).

The proposed crossing main spans (N25 & Irish Rail) consist of a single span steel network arch structure over the N25 and a 2-span precast concrete segmental portal frame structure over the Irish Rail track and adjacent land to the south. The spans of these structures will be approximately 49m (N25) and 2x15m (Irish Rail).

Access ramps to main spans will consist of a combination of reinforced concrete elevated structures, embankments, landscaping and some at grade sections with minor cut or fill. For the northern approach ramp, the lower ramp section will be a steepened slope green embankment transitioning into a reinforced concrete elevated ramp structure for higher sections in a north / south direction. The southern access ramp section between the Radisson Blu Hotel car park and the N25 bridge tie in is proposed to be an elevated reinforced concrete structure due to the sharp fall off in level to the north and east of the Radisson Blu Hotel car park. A retained embankment is proposed on the west side tie-in to the Radisson Blu Hotel car park from the lower Eastgate Business Park car park.

For the northern elevated ramp, a bespoke architectural concrete structure with single circular piers is proposed as the public will have access below the structure. For the southern elevated ramp, a more economical precast prestressed bridge beam structure with two column piers and crossheads is proposed.

2.4 Access strategy

Construction access to the L3004 Glounthaune Road construction compound (north) and Radisson Blu Hotel construction compound (south) will be from the local road network. Access to the local access roads to the construction compounds will be via the N25 dual carriageway using Little Island junction 2 to avoid excessive traffic on the surrounding local road network. It is anticipated construction traffic will use the following routes to access the site from the N25 Little Island junction:

- North construction compound: N25 junction 2, R623 north, L3004 Glounthaune Road west;
- South construction compound: N25 junction 2, R623 south, Eastgate Way, Radisson Blu Hotel local access road; and
- Southwest tie in area: N25 junction 2, R623 south, Eastgate Way, Eastgate Road north.

3. General Construction Strategy

3.1 Duration and phasing

The commencement of construction works for the Proposed Development is subject to obtaining statutory consent, funding and the relevant permits and licences.

Construction is expected to commence in 2025, with the development becoming operational in 2026.

The approach outlined in **Table 1** represents an indicative reasonable scenario as to how the Proposed Development may be constructed, with regards to the terms of sequencing and duration. Whilst the general requirements detailed in this section will be followed, the contractor, when appointed, will ultimately be responsible for the sequencing and implementation of the works in a safe and secure manner and in accordance with all statutory requirements.

It should be noted that trees and vegetation will not be removed between 1st March and 31st August to avoid direct impacts on nesting birds. Tree removal will be carried out in accordance with the Arboricultural Impact Assessment report (refer to **Appendix 8.1** in **Volume 4** of this EIAR).

Table 1: Indicative construction phasing for key activities

Activities	M 1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18
Tender award																		
Bridge fabrication planning and approval																		
Site access, clearance and tree removal. Set up of construction compounds and construction surfacing.																		
Utility diversion																		
Bridge superstructure fabrication and precast concrete element casting (offsite)																		
Northern approach ramp embankment construction																		
Northern approach elevated ramp foundation construction (piling and substructure)																		
Irish Rail structures construction																		
Northern approach ramp elevated section deck construction																		
Southern approach ramp foundation construction (piling and substructure)																		
Southern approach ramp elevated section deck construction																		
N25 bridge foundation and abutment construction																		
N25 span assembly (offline)																		
N25 span erection																		
Ramp and bridge deck finishing (installation of lights, parapets, handrails, surfacing etc.)																		
Construction of southern embankment ramp																		
Tie in footway / cycleway construction and final landscaping / tree planting																		

Note: M1, M2 etc. = Month 1, Month 2, etc.

3.2 Site clearance

Site clearance, including vegetation clearance, will be undertaken within the Proposed Development boundary. Trees and vegetation will not be removed between 1st March and 31st August to avoid direct impacts on nesting birds. Tree removal will be carried out in accordance with the Arboricultural Impact Assessment report (refer to **Appendix 8.1** in **Volume 4** of this EIAR). Trees to be retained will be identified and protected to avoid accidental damage during the construction works.

Site drainage will be provided to collect surface water runoff, which will be directed into a site water treatment facility before being discharged to the local drainage network. Drainage ponds, silt traps and interceptor ditches will be constructed in advance of the main earthworks to collect, treat and discharge all surface water run off during construction. Specific controls / mitigation measures will be put in place to manage runoff and minimise pollution to receiving waterbodies during the Construction Phase. These will be outlined in a Surface Water Management Plan (SWMP) that will be prepared and implemented by the contractor as part as part of the CEMP in advance of the commencement of the construction works.

Two construction compounds and one bridge assembly area will be required for the Proposed Development. Hoarding or fencing (2.4 metres in height as a minimum), which will remain in-situ for the duration of the works, will be erected around the compounds. Site offices and welfare facilities will be installed within the construction compounds.

3.3 Surveys and utilities

Only minor service diversions are required during the Construction Phase. Surface and sub-surface infrastructure services and utilities which may be temporarily affected during the construction works are as follows:

- Surface water drainage;
- Electricity; and
- Water mains.

Any area to be excavated will be subject to utilities surveys, ground penetrating radar (GPR) surveys and cable avoidance tool (CAT) scanning. Service diversions are only anticipated to be require in the northern park amenity area.

Following identification of services with the relevant utility providers including Uisce Eireann, Eir, GNI, BT Ireland, Enet and ESB Networks, the proposed utility diversions / protection measures are as follows:

- The Uisce Eireann 750 diameter ductile iron water main is proposed to be protected via an in situ concrete structure where it passes under the proposed north embankment ramp. Refer to **Image 3**.

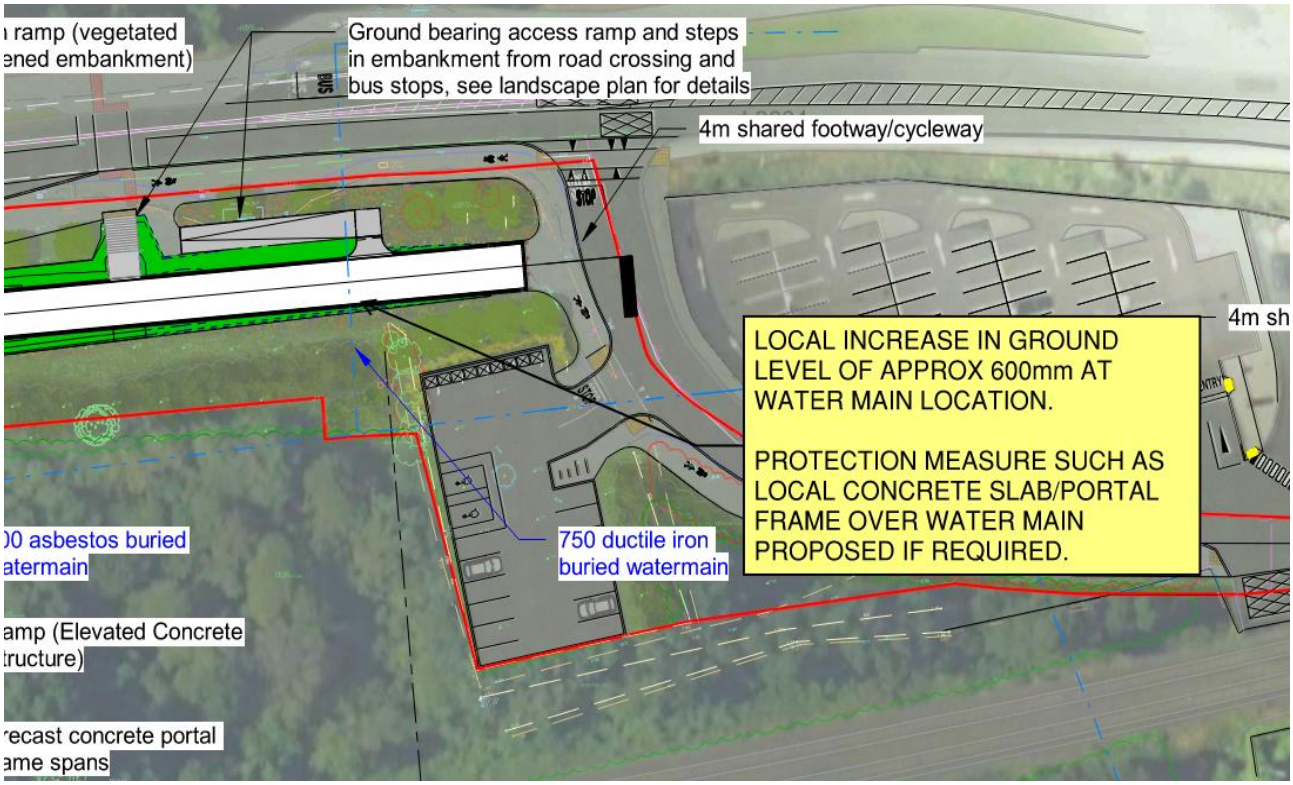

Image 3: Proposed protection measure to water main under north embankment

- Subject to discussions with Uisce Eireann, it is proposed that the 700mm diameter asbestos water main will remain in place with suitable protection measures and easements to allow piling works and bridge assembly / protection works. Refer to **Image 4**.

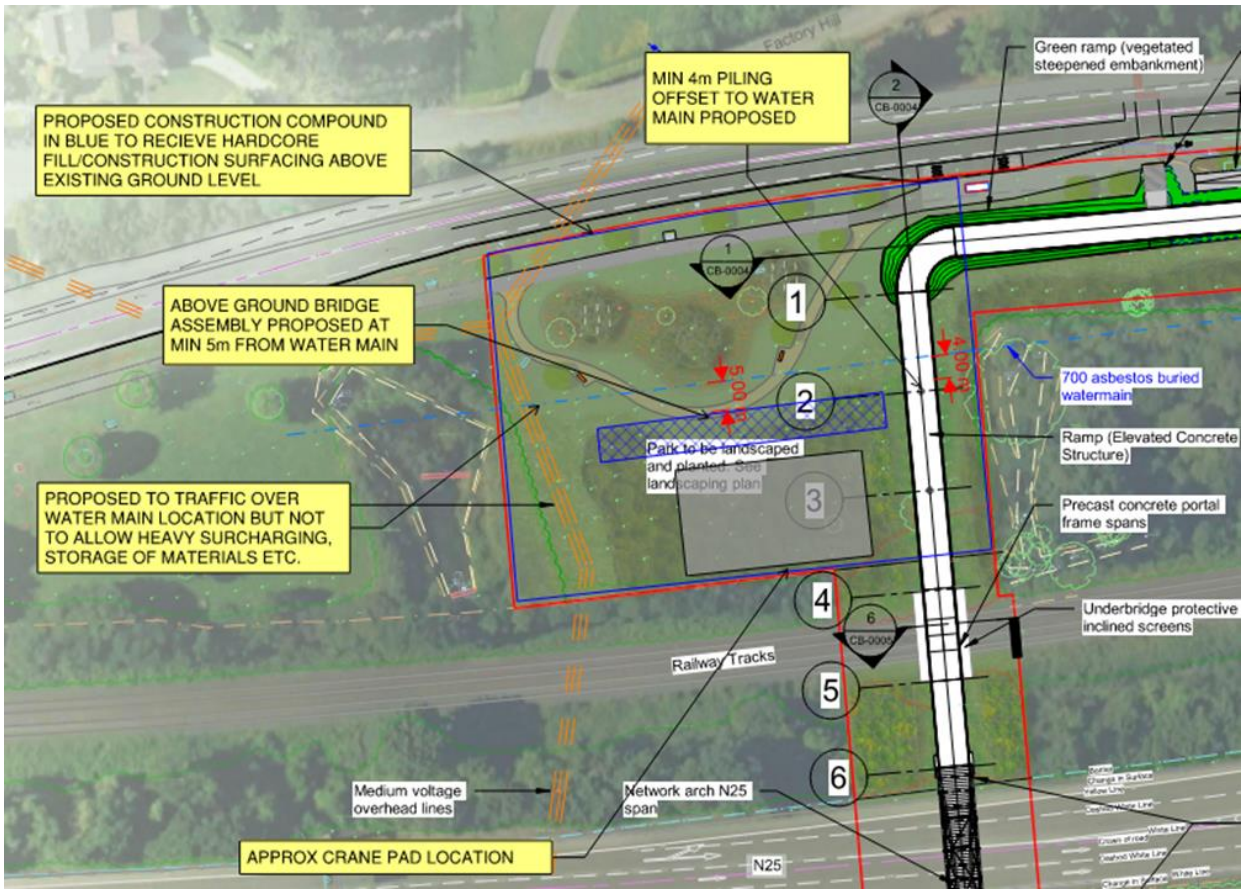

Image 4: Proposed easement to underground water main running through bridge assembly area

- Subject to discussions with ESB, it is proposed that the existing medium voltage overhead lines traversing through the northern amenity park area in a north / south direction be slightly rerouted by moving a single electricity pole and moving connecting overhead lines. This will allow for bridge assembly and erection to take place from the bridge assembly area, with suitable protection measures in place. Refer to **Image 5**.

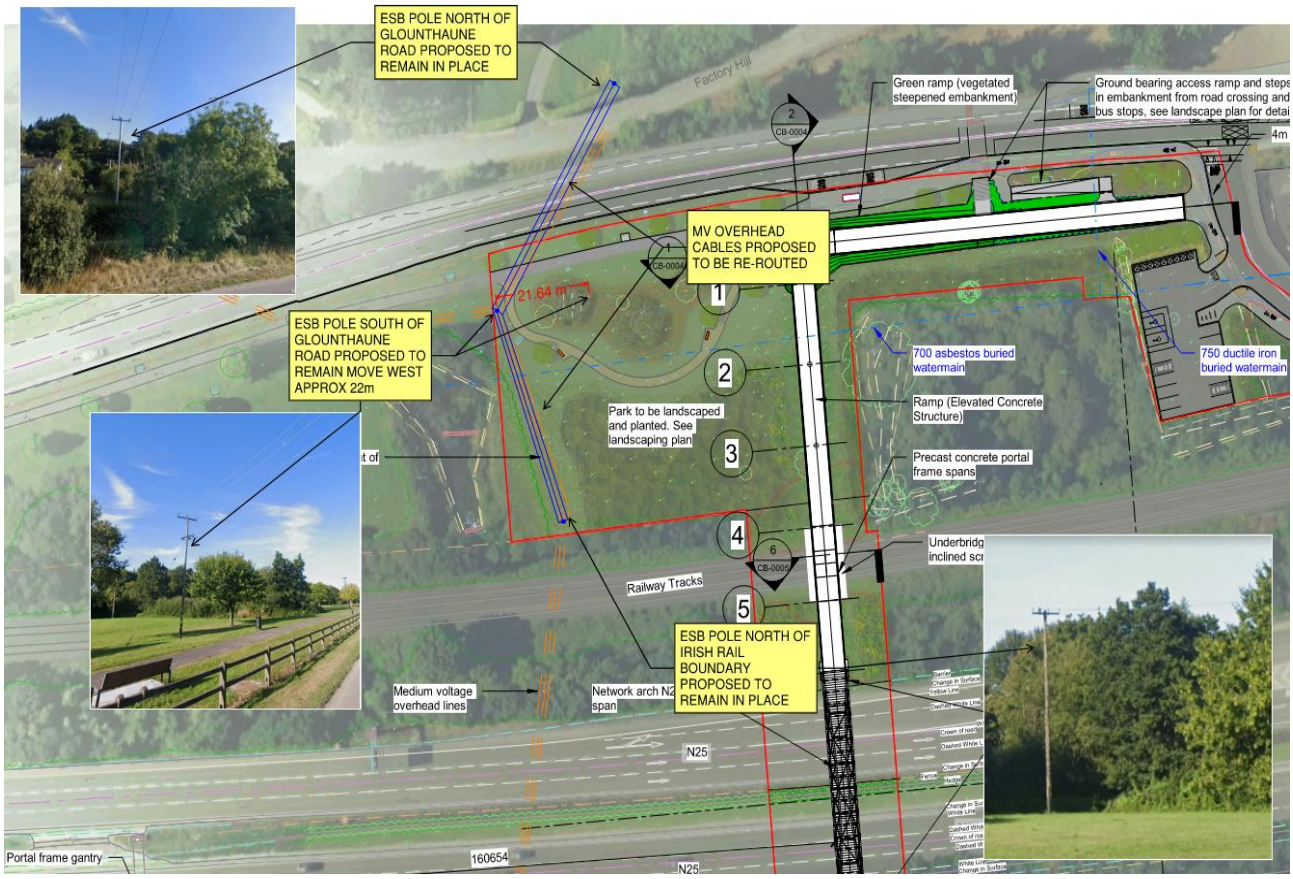

Image 5: Proposed re-routing of ESB MV overhead lines

3.4 Earthworks

It is estimated that approximately 415 tonnes of cleared vegetation will be generated as a result of the Proposed Development.

Excavated material generated as part of the construction works will generally consist of:

- Made ground;
- Topsoil and subsoil; and
- Spoil from piling.

In total, it is estimated that the construction of the Proposed Development will require the excavation of approximately 5,950 tonnes (bulk weight) of material.

It is estimated that approximately 300mm will need to be excavated under the proposed embankments and tie ins at grade footways / cycleways to allow for competent formation layers to be placed. The total amount of material estimated to be generated from these works will be approximately 2,260 tonnes (bulk weight).

Where practicable and subject to the material being suitable for re-use, excavated topsoil will be stored in an appropriately designated area in the bridge assembly area on site for use in the landscaping works. Refer to **Chapter 15**, *Resources and Waste* in **Volume 2** of this EIAR for further details.

In addition to the excavated topsoil, it is estimated that approximately 1,950 tonnes (bulk weight) of piling spoil material and approximately 1,740 tonnes (bulk weight) of excavated material for the pile caps will be generated. This material will be removed from site.

Following the completion of the construction works, it is estimated that approximately 32,400 tonnes of construction surfacing material will be removed from site.

Surplus excavation material will be removed off site by a waste collection permit holder and delivered to an authorised waste facility (i.e., a facility which holds a Certificate of Registration, Waste Facility Permit or Waste Licence). Where feasible and subject to testing, this material is likely to be used as a by-product in construction, provided the material itself and its proposed end use complies with the provisions of Article 27 of the European Communities (Waste Directive) Regulations, 2011. A review will be undertaken by the contractor for suitable construction projects for reuse of this material in accordance with Article 27, e.g., projects requiring materials specified in Transport Infrastructure Ireland Series 600 Specification for Earthworks.

In the event that an Article 27 declaration is not feasible for all or part of the surplus excavation material, it will be delivered for recovery or disposal to a facility authorised in accordance with the Waste Management Act, 1996.

Should excavated material containing hazardous substances be discovered as part of the Proposed Development, this will be delivered to a facility authorised to accept hazardous wastes in accordance with the terms of an Industrial Emissions Licence or Waste Licence or exported from Ireland for treatment, recovery or disposal in accordance with current industry practice and the provisions of the Waste Management (Shipments of Waste) Regulations, 2007 S.I. No. 419 of 2007.

The contractor will further develop and implement the mitigation measures as outlined in the Construction Resource and Waste Management Plan (CRWMP) which is included as **Appendix 15.3** in **Volume 4** of this EIAR.

3.5 Foundations

Foundations for all structures, except for the embankments, are proposed to be bored reinforced concrete piles. Piling methods such as Cased Auger Piles or Continuas Flight Auger piles proposed.

The foundations for the Proposed Development will consist of:

- Northern steepened slope reinforced earth embankment ramp, with green vegetated finish;
- North elevated ramp structure: 3 no. piers / pile groups (shares one support with portal frame structure);
- Precast portal frame structures: 2 no. piers / pile groups (shares one support with N25 northern abutment). Piles and abutments adjacent to the rail track are to be set back a minimum of 4.5m from the nearest running rail in accordance with the Irish Rail Standard ‘Requirements for Track and Structures Clearances I-PWY-1101’ (Irish Rail, 2010);
- 25 main span: 2 no. piled abutments, Piles and abutments adjacent the highway are to be set back a minimum of 4.5m from the road edge as per TII requirements;
- South elevated ramp structure: 6 no. piers / pile groups (shares one support with N25 southern abutment); and
- Northern steepened slope reinforced earth embankment ramp, with green vegetated finish.

3.6 Landscaping Works

Landscaping is described in more detail in **Chapter 8**, *Landscape and Visual*. Landscaping will generally comprise the following:

- Reinstatement of the northern park amenity area with additional compensatory tree and vegetation planning;

- Provision of additional amenity footpaths; and
- Reinstatement of wooded area below and surrounding Irish rail spans, and the southern wooded area, including compensatory planting of new trees and vegetation surrounding the structure.

4. Construction Traffic Management

4.1 Site access

All construction works will be undertaken in a clearly delineated site area which will have specific entry and exit points for construction related traffic onto the public road network. All access points will be temporary and used solely during the Construction Phase.

Where works are to be undertaken adjacent to the existing roads, temporary traffic barriers will be erected to separate the construction works from the public, to create a safe working space for the contractor and to clearly define the areas within which construction will be undertaken.

All site access routes will be connected to the existing local road network. Minor road works may occur such as the removal of existing kerbs, paving and a small amount of excavation prior to the replacement of paving and realigned kerbs within the Eastgate Business Park, the Little Island train station area and the L3004 Glounthaune Road.

Site access to the northern construction compound will be via the existing car park entrance off the Little Island train station access road.

Site access to the northern bridge assembly area will be via a temporary access directly off the L3004 Glounthaune Road.

Site access to the southern construction compound will be via the western end of the Radisson Blu Hotel car park, which is accessibly from Eastgate Way and the Radisson Blu Hotel local access road. The southern construction compound will be located in a dedicated area of the car park, with parking restrictions and management measures implemented within the car park as necessary to ensure that the functioning of the car park is maintained and to avoid any site parking overspill issues (refer to Section 4.3.1).

4.2 Closures

Traffic management and temporary lane / carriageway closures are expected to be required during the Construction Phase. The below temporary management measures and closures are expected. These will be confirmed during the Construction Phase subject to the contractors proposed construction methodology:

- Site clearance: overnight traffic management on N25 junction 2 eastbound off ramp slip lane to allow site clearance;
- N25 span north abutment construction: temporary lane closure of localised section of the eastbound hard shoulder and off ramp slip lane, and surrounding traffic management to allow access and exit from the construction area, and to enable the construction of the N25 span north abutment. This is expected to be in place for 6 – 10 weeks;
- Irish Rail south portal frame span construction: overnight lane closures and traffic management on N25 junction 2 eastbound off ramp slip lanes and adjacent traffic lanes to facilitate erection of south span of the precast concrete portal frame structure over Irish Rail land. It is expected that a single eastbound lane can remain open;
- N25 span steelwork erection: weekend closure of the N25 to allow for steelwork erection of the N25 span; and
- Irish Rail portal frame structures: weekend closure of Irish Rail track in agreement with Irish Rail to allow for construction of the precast concrete portal frame structures.

4.3 Construction Traffic Mitigation

4.3.1 Construction Phase

Construction traffic will be limited to certain routes and times of day, with the aim of keeping disruption to existing traffic and residents to a minimum. To minimise disruption to the local areas, construction traffic volumes will be managed through the following measures:

- During peak hours, ancillary, maintenance, and other site vehicular movements will be discouraged;
- Daily construction programmes will be planned to minimise the number of disruptions to surrounding streets, nearby residents to the north of the Proposed Development, train passengers and nearby businesses such as the Radisson Blu Hotel to the south of the Proposed Development, by staggering HGV deliveries to site;
- HGV routes to and from the site will be developed in agreement with CCC and with the objective of minimising the impact in the local area for residents, train users and businesses;
- Parking restrictions and management measures at the Radisson Blu Hotel and Eastgate Business Park car parks will be reviewed and implemented as necessary in agreement with the local businesses and CCC to ensure that the functioning of the car parks is maintained and to avoid any site parking overspill issues; and
- The contractor will be required to promote travel by sustainable modes of transport – refer to **Section 4.3.4**.

4.3.2 Working hours

The timing of construction activities, core working hours and the rate of progress of construction works are a balance between efficiency of construction and minimising nuisance and significant effects.

The core construction working hours for the Proposed Development will be:

- 7am – 7pm: Monday to Friday; and
- 8am – 2pm: Saturday.

Similarly, deliveries of materials to site will generally be between the hours of 7am to 7pm, Monday to Friday, and 8am to 2pm on Saturdays.

The construction shift times will ensure construction traffic will have limited impact on the peak periods of 7.30am to 8.30am and 5.15pm to 6.15pm as it is envisaged most construction staff will arrive to work before 7am and leave after 7pm.

Due to the specific nature of some construction activities, or to mitigate disruption to the local environment, there may be a requirement for working outside these hours. Should this be required, it will be agreed in advance with CCC and scheduling of such works will have regard to nearby sensitive receptors.

4.3.3 Construction Traffic Management Plan

A Construction Traffic Management Plan (CTMP) will be developed by the contractor when updating this CEMP and presented to CCC for approval prior to commencement of the construction works. The CTMP will contain detailed temporary traffic management drawings for each construction stage and will include the mitigation measures described in this section.

4.3.4 Mobility management

In accordance with the Cork County Development Plan 2022-2028 (CCC, 2022) a Mobility Management Plan (MMP) will be prepared by the contractor for its workforce to encourage access to the site by means other than by private car. The following section identifies some of the measures the contractor is likely to provide as part of the Mobility Management Plan. The MMP will form part of the CTMP in the updated CEMP and will be agreed with CCC prior to works beginning on site.

Walking: The pedestrian environment surrounding the site is considered to be good with footpaths provided on the L3004 Glounthaune Road and within the Eastgate Business Park, adjacent to the construction works areas.

Cycling: Cycle parking spaces will be provided on the site for construction staff. The Dunkettle to Carrigtwohill cycle route is also located adjacent to the Proposed Development.

Car Sharing: Car sharing among construction staff should be encouraged, especially from areas where construction staff may be clustered. The contractor will aim to organise shifts in accordance with staff origins, hence enabling higher levels of car sharing. Such a measure offers a significant opportunity to reduce the proportion of construction staff driving to the site and will minimise the potential traffic impact on the surrounding road network.

Public Transport: The site is reasonably well served by public transport. The closest bus stops are located directly adjacent to the proposed site on the L3004 Glounthaune Road, approximately 40m from the site. The closest railway station is Little Island, approximately 100m from the proposed site. The contractor will issue an information leaflet to all staff as part of their induction on site highlighting the location of the various public transport services in the vicinity of the construction site, including bus and rail routes that operate in the vicinity of the site.

5. Site Management

5.1 Health and Safety

The primary aim of planning for safety on the site is ensuring the safety of people involved in and affected by the development. This includes pedestrians, road users, neighbours, site staff and visitors to site.

The following are examples of some site-specific issues that will have to be addressed during the construction of the Proposed Development:

- Working at height for construction of all elevated structures;
- Managing crane movements to limit lifting over live roadways;
- Working on potentially unstable and steep ground in wooded areas surrounding Irish Rail tracks and south of the N25;
- Work on or adjacent to Irish Rail track and N25 dual carriageway requiring vehicular and pedestrian traffic management and potential track / road closures;
- Managing site clearance and excavation works and the materials generated;
- Identifying, storing and handling of hazardous and contaminated materials;
- Protecting existing roadways against damage in areas where excavations are proposed adjacent to roadways;
- Identifying, diverting, maintaining and connecting to existing live services; and
- Maintaining existing public and operational access routes.

The contractor will be required to ensure all health and safety and security requirements are provided for in co-ordination with CCC. A CTMP will be prepared and implemented by the contractor with the objective of protecting the public in the vicinity of the working areas during the Construction Phase of the works.

All construction staff and operatives will be inducted into the security, health and safety and logistic requirements on site prior to commencing work.

Contractors will be required to progress their works with reasonable skill, care and diligence, and to proactively manage the works in a manner most likely to ensure the safety, health and welfare of those

carrying out construction works, all other persons in the vicinity of the working areas and interacting stakeholders.

Contractors will also have to ensure that, as a minimum, all aspects of their works and project facilities comply with legislation, good industry practice and all necessary consents.

The requirements of the Safety, Health and Welfare at Work Act 2005 (Government of Ireland, 2005), the Safety, Health and Welfare at Work (Construction) Regulations, 2013 (Government of Ireland, 2013), as amended, (the "Regulations") and other relevant Irish and EU safety legislation will be complied with at all times.

As required by the Regulations, a Health and Safety Plan will be formulated which will address health and safety issues from the design stages through to completion of the construction and maintenance phases. This plan will be reviewed and updated as required, as the development progresses.

In accordance with the Regulations, a 'Project Supervisor Design Process' has been appointed and a 'Project Supervisor Construction Stage' will be appointed for the construction stage by CCC.

The Project Supervisor Construction Stage will assemble the Safety File as the project progresses.

5.2 Working Hours

As outlined in Section 4.3.2, construction operations on site are proposed to be between the hours of 7am to 7pm, Monday to Friday, and 8am to 2pm on Saturdays. Similarly, deliveries of materials to site will generally be between the hours of 7am to 7pm, Monday to Friday, and 8am to 2pm on Saturdays.

It may be necessary to undertake certain activities outside of the core construction working hours such as the installation of the main span over the N25, which is anticipated to take place during an overnight or a weekend road closure.

Any construction works outside of the core construction working hours will be agreed in advance with CCC and scheduling of such works will have regard to nearby sensitive receptors.

5.3 Public Relations

The site is located near a number of residences and local businesses. The contractor will be required to ensure that all agents, sub-contractors and suppliers act in a manner to minimise disruption to the surrounding locality.

Keeping people informed of site operations will help create and maintain good relationships, fostering a co-operative atmosphere. A Liaison Manager will be appointed by the contractor, whose responsibility would include:

- Regular briefings with CCC, local neighbour and business representatives on progress and issues;
- Liaison with CCC and emergency services as appropriate;
- Liaison with A Garda Síochána, particularly in relation to traffic movements and permits; and
- Preparation of reports for the site meetings on neighbourhood issues.

5.4 Hoarding and Fencing

Following possession of the site, the contractor will erect suitably robust hoarding and / or Heras fencing around the perimeter of the site. This will provide separation of the construction works from the adjacent roadways, footpaths and buildings. Hoarding and / or fencing in the vicinity of the railway line will be erected in agreement with Irish Rail.

The plan alignment of the hoarding and / or fencing may not remain constant for the entire works and is likely to change to meet the requirements and constraints of construction sequence.

If it is required to remove an existing secure site boundary it shall be replaced with hoarding. The hoarding will typically take the form of standard plywood hoarding to a height of 2.4m, as illustrated in **Image 6**.

IBEX and / or Heras fencing, or alternate hoarding / fencing and the existing boundary may also be used in places. Controlled access points to the site, in the form of gates or doors, will be kept locked in any time that these areas are not monitored (e.g., outside working hours). The hoarding will be painted, well maintained and may contain graphics portraying project information.

Image 6: Example of suitable hoarding

5.5 Site Security

The contractor will be responsible for the security of the site for the duration of the works. All reasonable precautions will be taken to prevent unauthorised access to the site, the works and adjoining property. Adequate safeguards will be put in place to protect the site, the works, products / materials and plant from damage, theft and trespass.

As part of their site security responsibilities, the contractor will be required to:

- Install and maintain adequate site hoarding to the site boundary with adequate controlled access and egress points;
- Always maintain site security;
- Ensure restricted access is maintained to the works; and
- Monitor and record all deliveries to site and materials / waste taken off site.

All staff will be made fully aware of their individual responsibilities regarding safety and security and will undertake their work in accordance with such guidelines. All staff and operatives will be fully inducted into the security, health and safety and logistic requirements on site.

5.6 Construction Compound and Material Storage

Construction compounds will be the primary locations for the storage of materials, as well as plant and equipment. No stockpiling will be permitted in any other areas, aside from the bridge assembly area. Surplus excavation material will be removed off site by an authorised waste contractor to an appropriately licensed / permitted waste facility.

The proposed extent of the construction compounds and the bridge assembly area is outlined in **Image 7**.

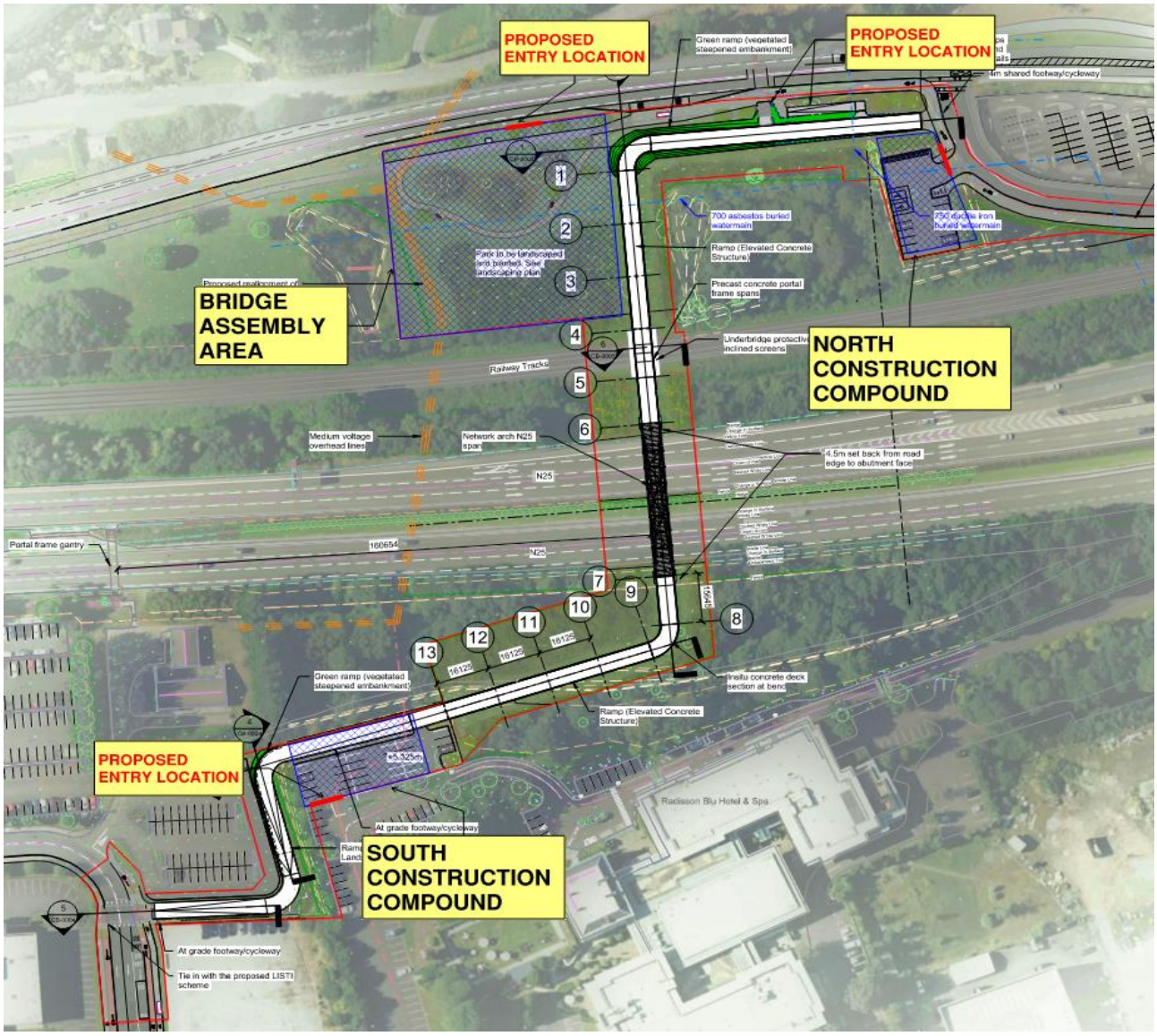

Image 7: Proposed construction compounds and bridge assembly area

For the site clearance and earthworks, the contractor will require the use of the construction compounds for the storage and segregation of hazardous and non-hazardous excavated material. For the bridge assembly works, the contractor will again require the use of the construction compounds for material storage.

The following construction management measures will be implemented at the two construction compounds and the bridge assembly area:

- Any containers of potential polluting materials such as fuels and oils will be stored in appropriately bunded containment areas designed to retain spillages;
- All bulk fuel storage will be integrally bunded or kept within a bunded area; and
- A designated bunded refuelling area on an impermeable surface will be provided.

Spill kits and hydrocarbon absorbent packs will be stored at the two construction compounds and the bridge assembly area, as well as in the cabin of each vehicle. All operators will be fully trained in the use of this equipment.

The contractor is responsible for obtaining all necessary permissions from relevant statutory bodies, including local authorities, for the disposal of water off site. Standing water should be cleared as soon as is practicable or treated with an approved product at least once a week.

The contractor is to ensure that there is no hazardous build-up of water and is to provide for temporary disposal of rainwater from the site during the works. Any water that is potentially contaminated is to be

treated on site by way of sediment / filtration tanks and comply with a waste disposal licence obtained by the contractor from the local authority.

5.7 Cranage

The construction works will require the use of several mobile cranes on site. The cranes will be required for the moving of building materials on site such as formwork for concrete, reinforcement, precast concrete, steelwork, plant and general construction materials. The contractor will develop a crane management plan to limit lifting operations over live roadways and the rail line. Proposed details of crane set up locations to achieve maximum coverage of the site are presented below.

For the northern elevated ramp sections, the spans can be lifted into place using mobile cranes sited at a close distance to the structure. Due to the open nature of the amenity park area, this is possible and will reduce the need for major crane pads. A suitable crane for the lifting of the northern spans is expected to be a Liebherr LTM 1750-6.1 800 tonne mobile crane, or similar. Refer to **Image 8** for further details.

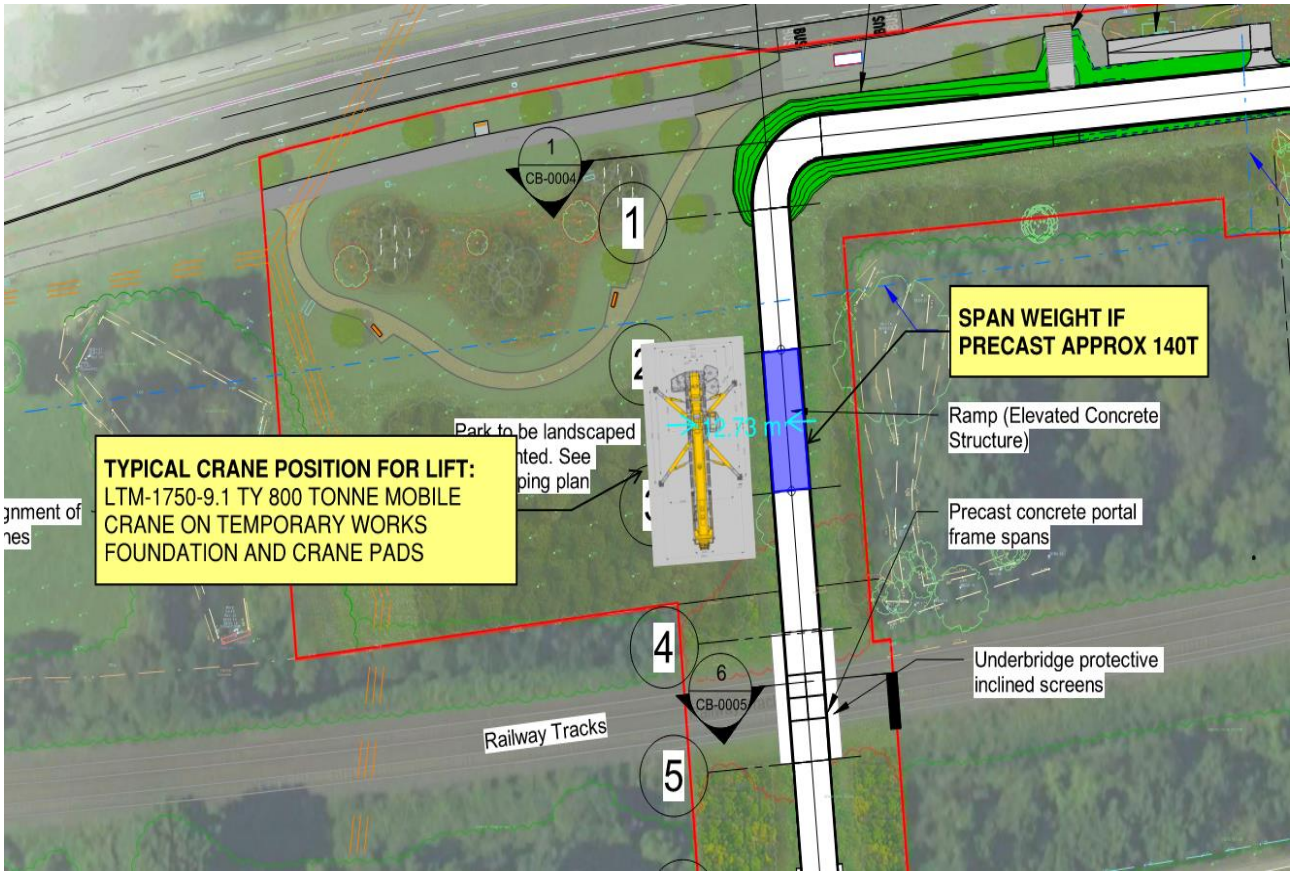

Image 8: Proposed methodology for erection of north elevated ramp superstructure for precast deck option

Due to the uneven nature of the terrain surrounding the southern elevated ramp, a rough terrain crane is anticipated to be used for lifting of the bridge beams into position. Crane pads or a build-up of hardcore is expected to be required at the craning positions. A suitable crane is the Liebherr LTR 1100-2.1 100 tonne rough terrain crane or similar which is available from Irish suppliers. Refer to **Image 9** for an indication of the lift radia and crane pad positions.

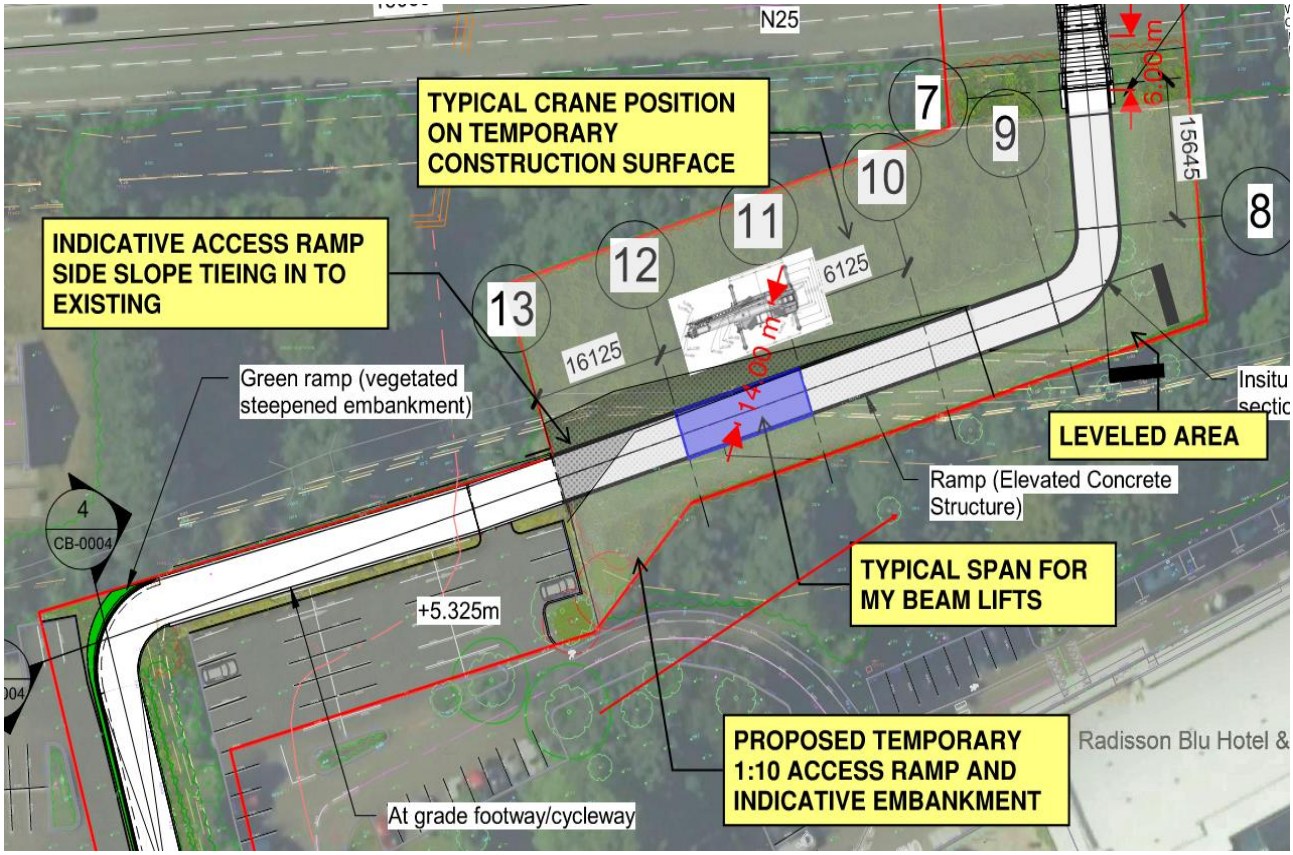

Image 9: Proposed methodology for erection of southern elevated ramp precast concrete bridge beams

The portal frame will be assembled in its final position during a temporary track closure in agreement with Irish Rail. Sections will be joined together via in-situ concrete stitches as per the supplier details. Components are designed to be lifted into place by mobile cranes. The crane size to be used will be confirmed by the contractor. However, it is anticipated to be placed on the same temporary works crane pad as that used for the first lift of the N25 bridge. For the roof sections of the south portal frame span, it is expected that the crane will be located on the N25 northern carriageway. This will require an overnight partial closure of the N25 eastbound carriageway. It is expected that it will be possible for a single lane to remain open with suitable traffic management measures in place.

As such, it is expected that the crane required will be the same crane as that required for the N25 bridge lift. A suitable crane is the Liebherr LTM 1750-9.1 800 tonne mobile crane TY variant. This crane is available from local suppliers. It is proposed that the erection of the Irish Rail spanning portal frames be completed prior to the erection of the N25 steel bridge to allow for these spans to be used as an intermediate support position for the N25 span during the craning operation. Refer to **Image 10** for further details.

Following assembly of the N25 steel network arch bridge structure on temporary supports and following construction of the northern ramp and portal frame structures (without parapets fitted), it is proposed that a large mobile crane (LTN 1750-9.1 TY 800 tonne crane or similar) is set up on a temporary works crane pad adjacent to the Irish Rail boundary in the bridge assembly area. This crane is proposed to lift the bridge structure onto a temporary seating position on the northern elevated ramp and portal frame structures.

Following the initial lift, the crane is proposed to be repositioned to the northern edge of the N25 carriageway during an overnight closure of the N25 at this location. A second lift will then take place to lift the structure into its final position. The proposed crane is available from local suppliers. The two-stage lift of the N25 structure and crane pad positions is illustrated in **Image 11**.

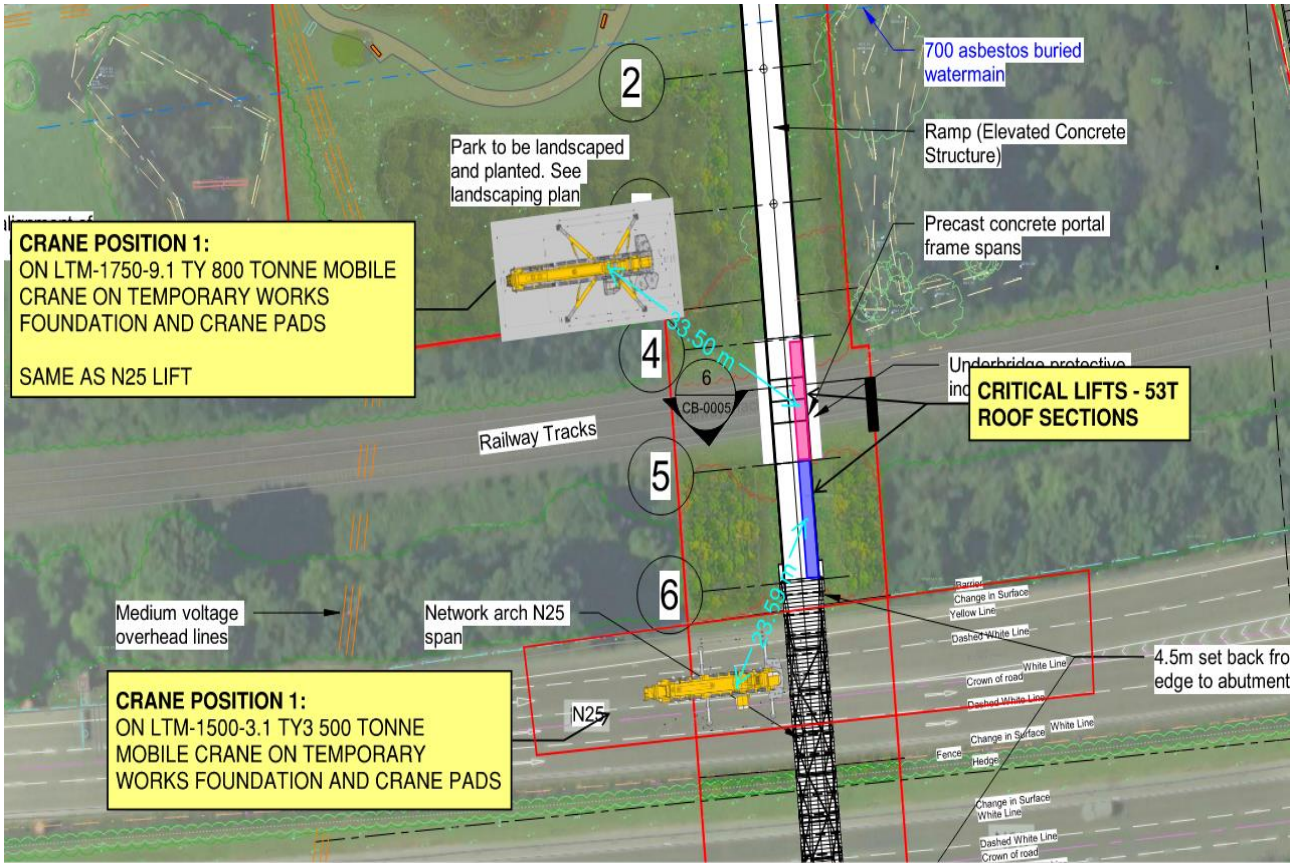

Image 10: Proposed methodology for erection of precast portal frame elements of railway spans

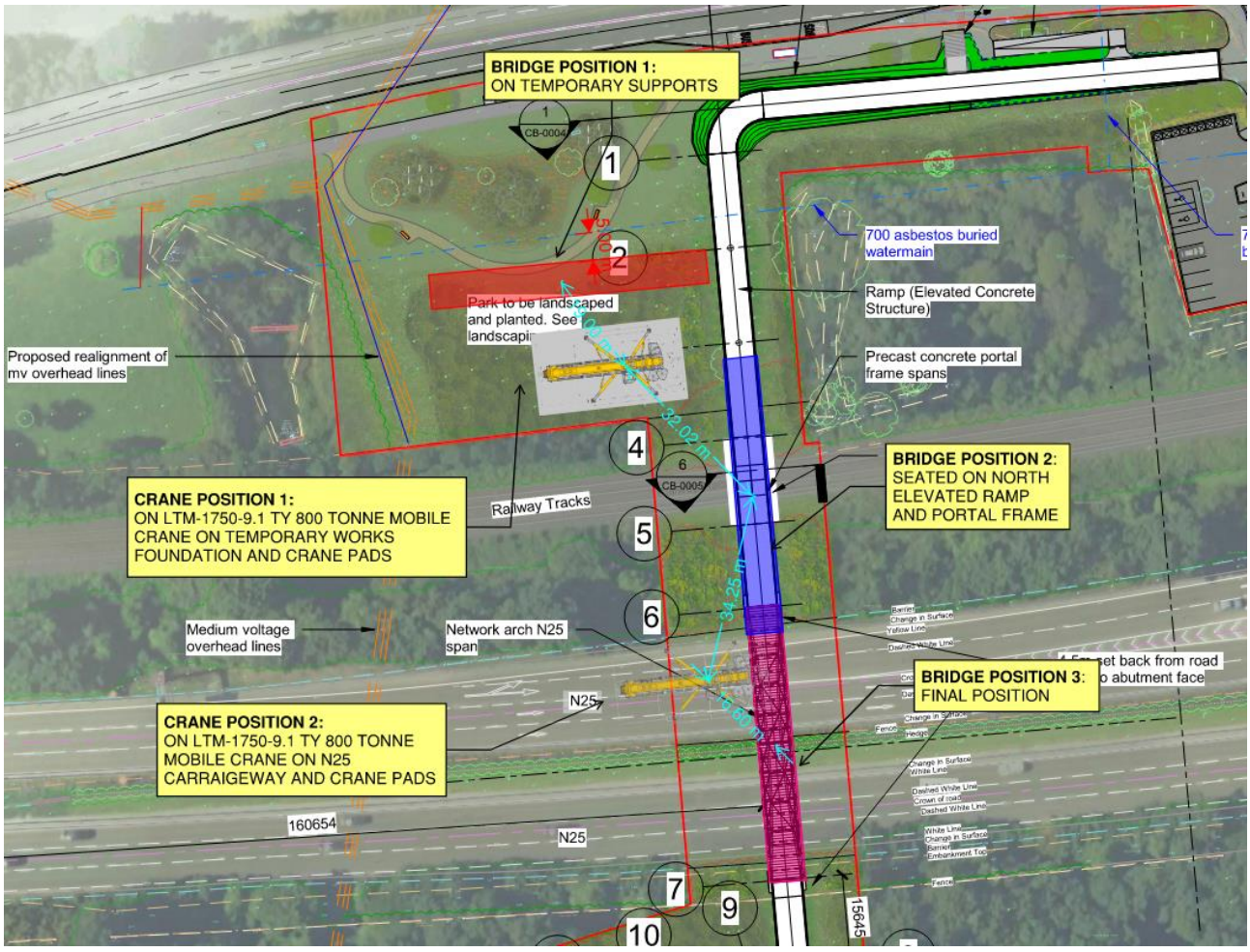

Image 11: Proposed methodology for bridge lift 1 using LTN1750-9.1 TY

5.8 Dust

A dust minimisation plan will be prepared and implemented by the contractor for the Construction Phase.

The adoption of mitigation measures will vary throughout the construction works depending on the type of activities being undertaken and the prevailing weather conditions at the time. For instance, additional mitigation such as damping down of earth mounds on site would be undertaken if the prevailing weather conditions are dry and windy.

The key aspects of controlling dust are listed below. In summary, the measures which will be implemented will include:

- During very dry periods when dust generation is likely, construction areas will be sprayed with water;
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators and other plant equipment, will be controlled by the contractor through regular servicing of machinery;
- Vehicle speeds will be limited in the construction site;
- Wheel-wash facilities may be provided, if required. Wheel-wash facilities will have rumble grids to remove excess mud from wheels. These facilities will be located at the exit from the construction compounds and away from sensitive receptors, where possible;
- Surrounding roads used by trucks to access to and egress from the site will be cleaned regularly using an approved mechanical road sweeper. Roads will be cleaned on a daily basis, or more regularly, as required;
- Areas where materials will be handled and stockpiled will be designed to minimise their exposure to wind – all temporary stockpiles shall be kept to the minimum practicable height with gentle slopes;
- Material drop heights from plant to plant or from plant to stockpile will be minimised; and
- Where practicable, truck loads will be covered when carrying material likely to generate dust.

The following measures shall also be implemented to minimise off-site dust impacts:

- Provision of hoarding around the site;
- Covering of all trucks exiting the site with tarpaulin;
- Locating plant likely to generate emissions away from sensitive receptors; and
- Any stockpiled material will be covered / dampened during periods of dry weather to prevent the spreading of dust.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Staff training and the management of operations will ensure that all dust suppression methods are implemented and continuously inspected.

5.9 Wheelwashing / Road Sweeping

Wheel-wash facilities may be provided, if required. Should these facilities be provided, the contractor shall ensure, where appropriate:

- Enough wheel wash facilities are provided at each egress point from the site;
- The wheel wash must be kept in place and used throughout the critical dirt generating activities of the construction works; and
- Water supplies servicing the wheel wash will be from recycled sources, where possible. All waters shall be drained through appropriate filter material prior to discharge.

Should wheel-wash facilities not be provided, it will be ensured that surrounding roads used by trucks to access to and egress from the site will be cleaned regularly using an approved mechanical road sweeper. Roads will be cleaned on a daily basis, or more regularly, as required.

The contractor will also endeavour to mitigate the risk of blockage of local gullies and drains due to construction materials and will carry out drain clearing as required.

5.10 Noise and Vibration

A Noise and Vibration Management Plan (NVMP) will be prepared for the Construction Phase of the Proposed Development. The contractor is required to follow and implement where required, the procedures set out in the NVMP. The contractor will have responsibility for managing construction noise and vibration in accordance with the procedures outlined in the NVMP. Where required, appropriate mitigation measures shall be implemented to minimise significant impacts at receptor locations.

A noise and vibration monitoring programme will be implemented for the duration of the construction works. Noise and vibration monitors shall be maintained and operated as per the methods set out in the NVMP.

Construction noise should not exceed the threshold values outlined in **Table 2** at nearby noise sensitive receptors, or further limits if imposed by the local authority or specified in the NVMP.

Table 2: Construction noise threshold for significant effect at noise sensitive receptors (BS5228-1+A1:2014)

Time period	Day and times	Threshold value ($L_{Aeq,T}$) dB
Day	Weekdays 07:00 – 19:00 Saturday 07:00 – 13:00	65
Evening	Weekday 19:00 – 23:00 Saturday 13:00 – 23:00 Sunday 07:00 – 23:00	55
Night	All days 23:00 – 07:00	45

For residential receptors and other medium sensitivity receptors, a negative vibration effect has been defined as a peak particle velocity (PPV) of 0.3 mm/s or higher during the daytime. The onset of a significant negative vibration effect has been defined as a PPV of 1.0 mm/s or higher in the daytime. It is likely that residential receptors are more sensitive to vibration at night and therefore a significant negative vibration effect is likely to occur at a PPV of 0.3 mm/s or higher during the night time periods.

In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels are controlled to those specified for human annoyance (i.e., 1.0 mm/s) then it is highly unlikely that buildings will be damaged by construction vibration.

The contractor shall be required to assess and monitor vibration levels during critical work activities to identify any risks of vibration impacts at nearby sensitive receptors in accordance with the procedures outlined in the NVMP.

5.11 Road and Footpath Maintenance

In addition to the waste management measures listed above, the following measures will be taken to ensure that the site and surrounding roads and footpaths are kept clear, tidy and well maintained:

- A regular programme of site tidying will be established to ensure a safe and orderly site; and
- In the event of any fugitive solid waste escaping the site, it will be collected and removed to storage on site, and subsequently disposed of in the appropriate manner.

If the existing roads or footpaths around the site are damaged as a result of the construction works, the contractor will carry out repairs to same.

5.12 Services and Lighting

5.12.1 Services and utilities

During the construction works, the working areas will be powered from the existing electrical network in the area or diesel generators where an electrical supply is not available.

5.12.2 Lighting

Site lighting will typically be provided by tower mounted 1000W metal halide floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;
- Motion sensor lighting and low energy consumption fittings is recommended to be installed to reduce usage and energy consumption; and
- Lighting will be positioned and directed as not to unnecessarily intrude on adjacent buildings, ecological receptors and structures used by protected species, nor to cause distraction or confusion to passing motorists.

5.13 Welfare Facilities

Welfare facilities will be provided, as appropriate, for construction staff and site personnel such as toilets, site offices etc. The construction compounds will be used as the location for worker welfare facilities. The contractor will be required to ensure that the sanitary facilities for site personnel are maintained and effluent storage is regularly emptied and disposed of appropriately.

5.14 Reinstatement of Works Areas on Completion

All working areas and access routes will be reinstated as work proceeds during construction. All plant, equipment, materials, temporary infrastructure and vehicles will be removed at the earliest opportunity.

6. Environmental Management Framework

6.1 Overview

As part of the environmental management framework, contractors will be required to comply with all relevant environmental legislation and take account of published standards, accepted industry practice, national guidelines and codes of practice appropriate to the Proposed Development. Due regard should be given to the guidance and advice given by ISO14001 standard (ISO, 2015) and CIRIA guidance (CIRIA, 2002; 2015a; 2015b).

The contractor will be required to develop and implement an Environmental Management System (EMS) that follows the principles of ISO14001. Further, the contractor's EMS should include an environmental policy, operational, monitoring and auditing procedures to ensure compliance with all environmental requirements and to monitor compliance with environmental legislation and the environmental management provisions outlined in the relevant documentation.

6.2 Responsibilities

6.2.1 Employer / employer's representative

Procurement of the appointed contractor(s) by the CCC (the employer for the construction works), will involve the determination that the appointed contractor is competent to carry out the works, including the effective implementation of the mitigation measures.

The appointed contractor will be required to plan and construct the Proposed Development construction works in accordance with the employer's requirements, and CCC will employ an employer's representative team with appropriate competence to administer and monitor the construction contract for compliance with the employer's requirements.

6.2.2 The contractor

The contractor(s) appointed will be responsible for the organisation, direction and execution of environmental related activities during the detailed design and construction of the Proposed Development. The contractor is required to undertake all activities in accordance with the relevant environmental requirements including the consent documentation and other regulatory and contractual requirements.

6.2.3 Site manager

A site manager will be appointed by the contractor to oversee the day-to-day management of working areas within the site and ensure that effective, safe, planned construction activities are delivered on an ongoing basis to the highest standards. The site manager will be a suitably qualified, competent and experienced professional that will oversee site logistics, communicate regularly with construction staff, accommodate project-specific inductions for staff on site and ensure that all work is compliant with the relevant design standards and health and safety legislation.

6.2.4 Environmental manager

An environmental manager will be appointed by the contractor to ensure that the CEMP is effectively implemented. The environmental manager will be a suitably qualified, competent and experienced professional that would perform the necessary tasks, review environmental procedures and consult with the members of the construction team and stakeholders as requited. The environmental manager will be responsible for:

- Updating, maintaining and implementing the CEMP;
- Establishing, implementing, and maintaining the EMS in line with ISO 14001;
- Conducting regular weekly environmental inspections as specified in the contract and checking adherence to the CEMP;
- Ensuring that construction occurs in accordance with the relevant environmental requirements and that such compliance is adequately recorded and documented;
- Completing a site inspection and compiling an environmental compliance list as agreed and specified in the CEMP;
- Attending site and stakeholder meetings as required;
- Keeping up-to-date with relevant environmental best practice and legislative changes;
- Liaising with the relevant staff to prepare method statements and relevant plans for all activities where there is a risk of environmental damage;
- Having a detailed level of knowledge on all aspects of environmental information associated with the Proposed Development;
- Ensuring all personnel have undertaken adequate environmental inductions, awareness briefings and training (including sub-contractors);

- Dealing with environmental complaints; and
- Managing and responding to environmental incidents and ensuring that all incidents are recorded and reported in an appropriate manner.

6.2.5 Liaison manager

A Liaison Manager will be appointed by the contractor and will be responsible for managing such tasks as the following:

- Briefing residents / neighbours on progress and issues, as necessary;
- Liaison with CCC and emergency services, as appropriate;
- Liaison with An Garda Síochána, particularly in relation to traffic movements and permits, where necessary.

6.2.6 Environmental specialists engaged by the contractor

To fulfil its obligations under the CEMP and to support its environmental manager, the contractor will be responsible for engaging suitably qualified and experienced professionals including, where necessary, the following (i.e., depending on the scope of the contract) competent experts:

- Project archaeologist;
- Project ecologist;
- Noise and vibration specialist;
- Land, soils and contamination specialist(s); and
- Water specialist.

6.3 Communication Process

6.3.1 Community and stakeholder engagement

The contractor will take all reasonable steps to engage with stakeholders in the local community, focusing on those who may be affected by the construction works including residents, businesses, community resources and specific vulnerable groups.

Communication with the local community and other relevant stakeholders shall be undertaken at an appropriate level and frequency throughout construction. Where communications are related to environmental issues, the environmental manager will be informed and engaged with, as appropriate.

6.3.1.1 Community liaison

CCC recognises the importance of effective community liaison to reduce nuisance to residents, to ensure public safety and welfare and to help ensure the smooth running of construction activities. Important issues in ensuring good relations are:

- Providing information for the public during the Construction Phase (particularly nearby sensitive receptors);
- Providing the correct points of contact and being responsive; and
- Ensuring good housekeeping in all aspects of the operations.

A ‘good neighbour’ policy will be implemented, as far as possible. Key aspects of this policy include:

- Early implementation of the policy, i.e., from the commencement of construction;
- Reduction of nuisance factors;

- Maintaining access to neighbouring premises and businesses;
- Clear and concise information; and
- Undertaking timely liaison with stakeholders.

6.3.2 Advance notice of works

The contractor will ensure that residents, businesses, occupiers, general users of the area and stakeholders are informed in advance of construction activities that may affect them. Relevant obligations and procedures in relation to advance notice of works will be identified in the updated CEMP.

All notifications will detail the nature, estimated duration and working hours. All notifications will include a project-specific contact number to which any enquires can be directed. The contractor will be responsible for preparing and issuing the notifications subject to the relevant approval and consents.

The contractor in consultation with CCC and statutory stakeholders will decide whether to arrange any further targeted consultation with the public or relevant stakeholders in advance of specific construction activities on a local basis.

6.3.3 Emergency contacts

As outlined in Section 7.4.2.1, an emergency contact list will be established and made available to all construction staff employed. The contact list shall be displayed prominently on site as well as at suitable locations where construction activity is being carried out around working areas. The contact list will include key environmental representatives that may need to be contacted in the event of an incident.

6.3.4 Enquiries and complaints

The contractor will establish a process for handling all enquiries including complaints. All enquiries will be recorded and a log will be maintained to include details of the response and action taken. This will be available upon request for inspection to CCC. All enquiries, whether a query or a complaint, will be dealt with in a timely manner.

The environmental manager will be immediately informed of any environmental-related issues that have been raised. Where appropriate, the environmental manager would be responsible for informing CCC, relevant stakeholders and statutory bodies.

7. Environmental Management Procedures

7.1 Training, Awareness and Competence

The contractor (and their subcontractors) will be selected with due consideration of relevant qualifications and experience. The contractor will be required to employ construction staff with appropriate skills, qualifications and experience appropriate to the needs of the works to be carried out during construction. A site induction will be provided to all construction staff before they commence work on site. Where appropriate, the contractor will identify specific training needs for the construction workforce and will ensure that appropriate training requirements are fulfilled.

The contractor will establish an environmental training and awareness programme and ensure that all personnel receive adequate training prior to the commencement of construction activities. A baseline level of environmental awareness will be established through the site induction programme. Key environmental considerations and objectives will be incorporated into this induction. Specifically, site inductions will cover the following as a minimum:

- Introduction to the environmental manager;
- Description of the CEMP and consequences of non-compliance;

- The requirements of due diligence and duty of care;
- Overview of conditions of consents, permits and licences;
- Requirements associated with community engagement and stakeholder consultation;
- Identification of environmental constraints and notable features within the site; and
- Procedures associated with incident notification and reporting including procedures for dealing with damage to the environment.

Nobody will work on site without first receiving environmental induction. Signed records of environmental training will be established, maintained and made available to the employer's representative.

Site briefings and talks would be carried out on a regular basis to ensure that construction staff have an adequate level of knowledge on environmental topics and community relations and can effectively follow environmental control procedures throughout construction.

7.2 Meetings

CCC and / or the employer's representative will arrange regular monthly meetings to discuss environmental matters and ensure effective coordination to be attended by:

- CCC;
- The employer's representative;
- Contractor (including site manager);
- Environmental manager; and
- Environmental Specialists – engaged by either CCC and / or the contractor.

The environmental manager will be responsible for arranging and holding monthly meetings and site walk overs with the employer's representative. The environmental manager will develop and distribute minutes of the monthly meetings and distribute them accordingly.

7.3 Monitoring, Inspections and Audits

For the duration of the contract(s), the environmental performance of the contractor will be monitored through site inspections and audits. Monitoring, inspections and audits shall be specified in the contract and are likely to be a combination of internal inspections and independent external audits that may be either random or routine.

Records of all inspections carried out will be recorded on standard forms and all actions should be closed out in a reasonable time. The updated CEMP will include further details of inspection procedures.

7.3.1 Monitoring

Mitigation and monitoring will be carried out in accordance with the relevant environmental requirements so that construction activities are undertaken in a manner that does not give rise to significant negative effects. Suitable monitoring programmes will need to be developed, implemented, documented and assessed.

The results of all environmental monitoring activities would be reviewed by the environmental manager on an ongoing basis to enable trends or exceedance of criteria to be identified and corrective actions to be implemented as necessary. The contractor will be required to inform the employer's representative of any exceedances of criteria.

7.3.2 Inspections

Regular weekly inspections of construction activities will be carried out by the environmental manager to ensure all necessary environmental measures relevant to the construction activities are being effectively implemented by construction staff, ensuring legal and contractual conformity.

The weekly inspections would be appropriately documented by the environmental manager and copies of these records and any action required to be undertaken should be made available to the employer's representative.

Each month, one of the weekly inspections will include a review of environmental documentation and records. The monthly inspection will be recorded on a standard form and reported to the employer's representative within five days of the inspection taking place. This standard form will address the following as a minimum:

- Summary of compliance / non-compliance with the CEMP;
- Results and interpretation of the monitoring programme;
- Key issues noted in inspections and / or audits;
- Summary record of non-conformities, incidents and corrective actions;
- Summary of environmental complaints and queries received in relation to environmental matters; and
- Summary record of environmental training undertaken by staff.

Inspection and review documentation will be amended to the monthly environmental compliance report that will be submitted to the employer's representative by the contractor – refer to Section 7.5.1.

7.3.3 Audits

CCC will arrange for independent environmental audits to be carried out by a third-party during construction. External audits provide the opportunity for an independent auditor to advise on compliance with applicable environmental regulatory requirements, the efficacy of the environmental management approaches used, and recommendations for reducing identified environmental risks (if considered appropriate).

Further, regulatory and statutory bodies may undertake site visits to monitor compliance with legislative and regulatory requirements. These site visits may occur randomly throughout the construction period. The contractor will facilitate these visits and the environmental manager will be available to provide information as required and deal with any issues that may arise during, or because of, these visits.

Planned and documented audits aimed at evaluating the conformance of the EMS would also be carried out by the environmental manager. The environmental manager will establish a schedule for internal audits and this inspection calendar will be made available to the employer's representative. These environmental audits will be scheduled at least once every three months.

Standard forms for reporting and audit items will be prepared and will include but not be limited to the following activities:

- Review of environmental documentation to establish if relevant requirements are being achieved and if continual improvement is occurring;
- Site inspection and interviews with onsite personnel; and
- Reporting with recommendations.

For any environmental nonconformities found, the auditor will prepare a corrective actions report to describe and record the findings of the non-conformance. The verification of previous corrective actions reports should be also recorded.

Upon completion of an audit, the auditor will review all corrective actions reports and prepares an audit report to summarise:

- Corrective action requests raised;
- Previous corrective action requests closed; and
- Observations made during the audit.

The environmental manager will be entitled to participate in all audits. Notwithstanding this, the employer's representative shall produce and provide the contractor with a copy of each audit report within five working days of the audit. Each audit report will detail the findings from the auditor, specify non-conformances identified and outline the proposed corrective action.

7.4 Incident Response

7.4.1 Corrective actions

7.4.1.1 Overview

Corrective actions are measures to be implemented to rectify any non-conformances (i.e., exceedance of criteria or targets) identified during monitoring, inspections and / or audits.

In the first instance, an investigation should be undertaken by the environmental manager to identify the cause of any non-conformances. Remedial measures shall be identified by the environmental manager, in agreement with the employer's representative, and implemented as soon as practicable to prevent further exceedances. If necessary, the appropriate statutory authority and stakeholders will be notified.

Where new or amended measures are proposed, the relevant CEMP will be updated accordingly by the environmental manager and the employer's representative should be informed at the earliest opportunity.

7.4.1.2 Corrective action reports

As previously mentioned, a corrective actions report is prepared on foot of any non-conformances identified during environmental monitoring, inspections and / or audits on site. The corrective actions report will describe in detail the cause and effect of a non-conformance on site and describe the recommended corrective action that is required to remedy it.

An appropriate timeline for closing out the corrective actions will be identified by the contractor as well as arrangements for the environmental manager verifying the corrective actions report and informing appropriate authorities and stakeholders in a timely manner.

7.4.2 Emergency incidents

7.4.2.1 Overview

Emergency incidents are those occurrences that give rise to significant negative environmental effects including but not limited to the following:

- Any malfunction of any mitigation measure and / or environmental protection system;
- Any emission that does not comply with the requirements of the contract;
- Any circumstance with the potential for environmental pollution; or
- Any emergency that may give rise to environmental effects (e.g., significant spillages or fire outbreak).

An emergency contact list will be established and made available to all construction staff employed. The contact list shall be displayed prominently on site as well as at suitable locations where construction activity is being carried out around working areas. The contact list will include key environmental representatives that may need to be contacted in the event of an incident.

7.4.2.2 Spill control measures

Every effort will be made to prevent pollution incidents associated with spills during the construction of the Proposed Development. The risk of oil / fuel spillages will exist on the site and any such incidents will require an emergency response procedure.

The following steps provide the procedure to be followed in the event of an oil / fuel spill occurring on site:

- Identify and stop the source of the spill and alert people working in the vicinity;

- Notify the environmental manager immediately giving information on the location, type and extent of the spill so that they can take appropriate action;
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident;
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill;
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses and/or sensitive habitats;
- If possible, clean up as much as possible using the spill control materials;
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited;
- The environmental manager shall inspect the site as soon as practicable and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring; and
- The environmental manager will notify the appropriate stakeholders such as CCC, National Parks and Wildlife Service, Department of Environment Climate and Communications, and Department of Housing, Local Government and Heritage and / or the EPA.

Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be reported, recorded and investigated in accordance with the procedures described in Section 7.4.

7.4.2.3 Emergency incident response plan

A set of standardised emergency response procedures will govern the management of emergency incidents. The contractor will be required to detail emergency incident response procedures and to develop an Emergency Incident Response Plan.

The emergency incident response plan will contain emergency phone numbers and the method of notifying local authorities, statutory authorities and stakeholders. Contact numbers for key personnel will also be included therein. Contractors will be required to adhere to and implement these procedures and ensure that all staff and personnel on site are familiar with the emergency arrangements.

In the case of work required in an emergency, or which if not completed would be unsafe or harmful to workers, the public or local environment, CCC will be informed as soon as reasonably practicable of the reasons and likely duration. Examples may include where the ground needs stabilising if unexpected ground conditions are encountered, concrete pouring taking longer than anticipated due to delayed deliveries or equipment failure.

In the event of an emergency incident occurring, the contractor will be required to investigate and provide a report including the following, as a minimum:

- A description of the incident, including location, the type and quantity of contaminant and the likely receptor(s);
- Contributory causes;
- Negative effects;
- Measures implemented to mitigate adverse effects; and
- Any recommendations to reduce the risk of similar incidents occurring.

The contractor will consult with the relevant statutory authorities, stakeholders and relevant parties such as the Health and Safety Authority, the Fire Authority, the Ambulance Service, the EPA, utilities companies and CCC when preparing and developing response measures. Further, if any sensitive receptor is impacted, the appropriate environmental specialists will be informed and consulted with accordingly.

Any response measures will be incorporated into an updated emergency incident response plan that should be disseminated accordingly to construction staff, CCC and the employer's representative.

7.4.2.4 Emergency access

The contractor will be required to maintain emergency access routes throughout construction and identify site access points for each working area.

This should be developed in partnership with the emergency services and documented as part of the emergency incident response plan.

7.4.2.5 Extreme weather conditions

The contractor will consider the effects of extreme weather events and related conditions during construction. The contractor will use a short to medium range weather forecasting service from Met Eireann or other approved meteorological data and weather forecast provider to inform short to medium term programme management, environmental control and mitigation measures.

All measures deemed necessary and appropriate to manage extreme weather events will be considered and will specifically cover training of personnel and prevention and monitoring arrangements for staff. As appropriate, method statements will also consider extreme weather events where risks have been identified, e.g., construction works adjacent to public roads and business premises.

7.4.3 Unexpected discoveries

Appropriate procedures will be put in place in the event of encountering unexpected archaeological or cultural heritage assets or subsurface contamination during intrusive ground works. Appropriate procedures will be developed as part of the CEMP and the environmental manager will ensure that specialists (e.g., archaeologist) are facilitated to ensure management in accordance with industry best practice and effective compliance with the relevant legislation. All unexpected discoveries will be reported to the appropriate authorities and documented in an appropriate manner.

7.5 Reporting

7.5.1 Environmental compliance report

The contractor will be required to submit a monthly report to the employer's representative for review and approval. The report shall address the following as a minimum:

- Summary of compliance with the CEMP including identification of any non-conformances;
- Interpretation of the results of ongoing monitoring;
- Detailed description of any issues and / or non-conformances identified during inspections and / or audits;
- Record of incidents and corrective actions (including corrective actions reports, as appropriate);
- Synopsis of environmental complaints received / queries raised by stakeholders; and
- Records of environmental training undertaken (as appropriate).

7.5.2 Incident investigation reports

The contractor will inform the employer's representative of all emergency incidents immediately and prepare an initial report within 24 hours setting out the details of the incident and cause(s) if known. The contractor will be required to complete the environmental incident report and any further documentation requested by the employer's representative in relation to the incident within 7 days of the incident occurring. The contractor will respond to all comments made by the employer's representative on any incident.

The environmental incident report will contain details of the incident including the location, known and suspected causes and weather conditions. It will define the scale and effects (short, medium, long term, temporary / permanent), as well as required corrective actions and mitigation / remediation / compensation measures (as appropriate).

7.5.3 Environmental records

Records of all environmental documentation will be maintained including monitoring, test results, method statements and plans. All records will be kept up to date and be made available for audits, inspections and periodical reporting. The contractor will maintain the following environmental records (as a minimum) that will be made available for inspection to the employer's representative and the relevant authorities, if required:

- Management plans;
- Records of environmental incidents;
- Monthly environmental reports;
- Records of environmental training;
- Register of environmental complaints;
- Corrective action reports;
- Environmental inspection and audit reports;
- All monitoring data;
- Waste and chemical inventories; and
- Health and safety records.

7.6 Construction Phase Mitigation and Monitoring

7.6.1 Traffic and Transportation

The following mitigation measures are proposed:

- Overnight traffic management on N25 junction 2 eastbound off ramp slip lane to allow site clearance;
- Blocking a small area of only one lane on the eastbound off ramp for access for construction of the N25 span northern abutment for 6-10 weeks;
- Overnight lane closures and traffic management on N25 junction 2 eastbound off ramp slip lanes and adjacent traffic lanes to facilitate erection of south span of the precast concrete portal frame structure over Irish Rail land. It is expected that a single eastbound lane can remain open;
- Overnight / weekend closure of the N25 to allow for steelwork erection of the N25 span;
- Weekend closure of Irish Rail track in agreement with Irish Rail to allow for construction of precast concrete portal frame structures;
- Provision of a temporary bus service covering the same route and stops, in order to reduce the impact of the closure of the Irish Rail track on a weekend, in consultation with Irish Rail and Bus Eireann.
- A temporary road widening and right turn pocket will be provided along the L3004 Glounthaune Road for right turning construction traffic to / from construction compound 1;
- Overnight partial closure of N25 for maintenance repainting of bridge soffit in a sequential fashion for 6-10 nights;
- Provision of adequate parking spaces in the construction compounds during the Construction Phase should be ensured; and
- Parking restrictions and management measures at the Radisson Blu Hotel and Eastgate Business Park car parks will be reviewed and implemented as necessary in agreement with the local businesses and Cork County Council (CCC) to ensure that the functioning of the car parks is maintained and to avoid any site parking overspill issues.

A CTMP will be developed by the contractor when updating this CEMP and presented to CCC for approval prior to commencement of the construction works. Refer to Section 4.3.3.

The effectiveness of the CTMP will be continually monitored to ensure that impacts on traffic flows and road users on the surrounding public road network are minimised and additional mitigation measures are introduced, as required. The monitoring regime will consider all modes of traffic, including pedestrians, cyclists and public transport.

A Mobility Management Plan will be prepared by the contractor for its workforce to encourage access to the site by means other than by private car. Refer to Section 4.3.4.

7.6.2 Landscape and Visual

The following mitigation measures are proposed:

- Temporary site hoarding will be erected around areas that adjoin public or private land that may be impacted by the works. This includes the:
    - North, east and western site boundary with the L3004, access road to Little Island Railway Station and public green space respectively; and
    - Boundaries with the existing public car park at East Gate Road and The Radisson Blu Hotel car park.
- Additional protective fencing will be erected at the boundary of proposed works areas to protect retained landscape, planting, features etc. The remaining trees along the railway line embankments, N25 road corridor and the woodland block between the N25 and Radisson Blu Hotel will be protected with fencing in accordance with BS5837:2012: Trees in relation to Design, Demolition and Construction (BSI, 2012) and TII's Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes (TII, 2006). Refer to the Arboricultural Impact Assessment with accompanying tree clearance and tree constraints plans by Heritage Tree Care Ltd., for details of existing trees and tree groups to be removed, retained and the specification of protection measures (see **Appendix 8.2** in **Volume 4** of this EIAR). All necessary measures will be taken to avoid non-native, invasive species establishing in the area;
- Site machinery will only operate within the Proposed Development area;
- Storage of materials and temporary stockpiling will only be permitted at the bridge assembly area and construction compounds located at the north and southern ends of the Proposed Development site;
- Construction works will use the optimum number and arrangement of pile foundations, support columns and bridge abutments to minimise the impact of Construction and Operational Phase impacts on the landscape, particularly existing trees and woodland blocks;
- Locating, arranging and designing construction and assembly zones so that they use existing hard standing areas and / or minimise construction within existing landscape areas which will require removal and subsequently reinstatement as landscape; and
- Design and construction that minimises the requirement for future access under the structure and within woodland / landscape areas, thereby minimising potential disturbance to reinstated landscape areas.

The works will be monitored continuously to ensure the adequate protection of trees, built heritage features, amenity and public realm areas.

Any construction works within close proximity to the retained trees are advised to be undertaken in accordance with approved method statements prepared by the construction contractor under the direct supervision of a qualified consultant Arboriculturist. Therefore, during the construction works, a professionally qualified Arboriculturist is recommended to be retained by the principal contractor or site manager to monitor and advise on any works within the root protection area (RPA) of retained trees to ensure successful retention and planning compliance.

Copies of the Tree Clearance and Tree Constraints / Plans included with the Arboricultural Impact Assessment prepared by Heritage Tree Care Ltd. (refer to **Appendix 8.1** in **Volume 4** of this EIAR) and

BS5837:2012: Trees in relation to Design, Demolition and Construction (BSI, 2012), should be kept available on-site during development. All works are to be carried out in accordance with these documents.

On the completion of the construction works, all trees and vegetation retained are to be reviewed by the project Arboriculturist and any necessary remedial tree surgery works required to promote health and safety are to be implemented.

7.6.3 Biodiversity

7.6.3.1 General

All construction staff, including all sub-contracted workers, will be notified of the sensitive nature of onsite habitats, the Kilcoolishal Stream and nearby designated sites, and will also be made aware that no construction waste of any kind (rubble, soil, etc.) is to be deposited in these protected areas and that care must be taken with liquids or other materials to avoid spillage.

All personnel involved with the Proposed Development will receive an onsite induction relating to construction and operations and the environmentally sensitive nature of habitats on and adjacent to the Proposed Development site and to re-emphasise the precautions that are required as well as the precautionary measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in pollution risks and preventative measures.

All staff and subcontractors have the responsibility to:

- Understand the importance of mitigating pollution onsite, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;
- Respond in the event of an incident to avoid or limit environmental impact;
- Report all incidents immediately to the project manager;
- Monitor the workplace for potential environmental risks and alert the site manager if any are observed; and
- Co-operate as required, with site inspections.

7.6.3.2 Water quality

Details of water quality mitigation measures are outlined in Section 7.6.9.

7.6.3.3 Noise

Details on noise and vibration mitigation measures are outlined in Section 7.6.4.

7.6.3.4 Lighting

Lighting associated with the site works could cause disturbance / displacement of fauna. If of sufficient intensity and duration, there could be impacts on reproductive success.

During construction, lighting mitigation measures will follow *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010).

Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;
- Where possible, construction lights will be switched off when not in use; and
- Lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the

potential impact on woodland on the southern and northern boundary of the N25. There will be no directional lighting focused on these sensitive habitats and cowling and focusing lights downwards will minimise light spillage.

Core construction works will take place during hours of daylight to minimise disturbance to any nocturnal mammal species.

7.6.3.5 Protection of habitats

The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the 1st March to the 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Site clearance including vegetation clearance will be undertaken within the Proposed Development. Trees and vegetation will not be removed between 1st March and 31stAugust, to avoid direct impacts on nesting birds. Tree removal will be carried out in accordance with the Arboricultural Impact Assessment (refer to **Appendix 8.1** in **Volume 4** of this EIAR). Trees to be retained will be identified and protected to avoid accidental damage during the Construction Phase.

Site drainage will be provided at the construction compounds to collect surface water runoff, which will be directed into the existing local drainage network. Surface water or contaminants within the site compounds will not be released from the site to any waters or the bed and banks of any waters (including ground water).

To prevent incidental damage by machinery or by the deposition of spoil during site works, woodland, hedgerow, tree and scrub vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. Tree protection measures are included in Arboricultural Impact Assessment (refer to **Appendix 8.1** in **Volume 4** of this EIAR). The project ecologist will specify appropriate protective fencing where required.

The streambed and banks of the Kilcoolishal Stream will be reprofiled / reinstated once the construction works are complete – refer to Section 7.6.9.

Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete.

7.6.3.6 Invasive species

Prior to the commencement of construction works an invasive species survey will be undertaken within the Proposed Development boundary by a competent expert to determine if invasive species listed under Part 1 of the Third Schedule of S.I No. 477 of 2011 have established in the area in the period between pre-planning and post consent. In the event that invasive species are identified within the works area, a site-specific Invasive Species Management Plan (ISMP) will be developed and implemented by a competent specialist on behalf of the contractor.

In addition, in order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011), biosecurity measures will be implemented throughout the Construction Phase to ensure that the introduction and translocation of invasive species is prevented. The appointed project ecologist will carry out a toolbox talk which will identify invasive species and will also implement biosecurity measures such as the visual inspection of vehicles for evidence of attached plant or animal material prior to entering and leaving the works area. Stringent biosecurity measures will be implemented throughout the works. The best practice principles of Check-Clean-Dry guidance of the Non-Native Species Secretariat (NNSS, 2017), IFI biosecurity protocols (IFI, 2010) and Waterways Ireland Marine Notice No. 39/2017 shall be followed during these works to ensure that invasive non-native species are not introduced into the Proposed Development site.

Japanese Knotweed

Japanese Knotweed was recorded within the Proposed Development site. The following site hygiene and mitigation measures will be followed during construction to ensure that Japanese Knotweed is effectively removed from the site and is not spread outside of the site during construction works.

Site Hygiene at Contaminated Areas

- Understand the potential extent of the rhizome (root) system underground – up to seven metres horizontally and three metres vertically;
- Where possible, the contaminated area will be avoided and fenced off, or the extent of the rhizomes clearly marked;
- If possible, the use of machinery with tracks will avoid contaminated areas. Movement of machinery between contaminated and non-contaminated areas must be controlled and adequate power washing measures implemented;
- Areas where contaminated soil is to be stockpiled on site will be clearly identified and marked out;
- Designated entry and exit points will be identified for personnel on foot and for small mobile equipment. A delineated access track, to be maintained free of Japanese Knotweed, will be established through the site to minimise the spread of Knotweed species by permitted vehicles accessing the site;
- Vehicles, including footwear and tools, leaving the site will be inspected for any plant material and washed down (using a pressure washer) in a dedicated vehicular wheel wash down facility, which will drain into a contained area within the site. Particular care is required with tracked machines;
- Vehicles used in the transport of contaminated material will be visually checked and washed down into a contained area before being used for any other work, either in the same area or on a different site;
- Only vehicles required for essential works, including site investigation works, will be brought on site and the number of visits minimised as much as practicable;
- Material gathered in the dedicated wash down contained areas will be appropriately disposed of off-site;
- For any subsoil or topsoil entering the site, the supplier will be required to provide an assurance that it is free of Japanese Knotweed;
- All site personnel will be made aware of measures to be taken and will be informed of the requirements of the ISMP; and
- Site hygiene signage, in relation to the management of invasive species, will be erected.

Management options

In addition to the possible advance treatment works and pre-construction survey, when the works areas become available to the contractor for enabling works, areas identified as requiring specific invasive species treatment will be demarcated and the designated control measures implemented at the earliest possible stage to reduce the risk of spread within the Proposed Development site or beyond.

There are a number of management options that may be implemented to control and prevent the spread of invasive species. These are presented in the sections below.

Those involved in the application of herbicides / pesticides will be competent to do so and, consequently, will have sufficient training, experience and knowledge in the area of herbicides / pesticides application.

All staff involved in the application of herbicides / pesticides will have received appropriate training, which may include achieving competency certification in the safe use of herbicides / pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area. The following management options will be used i.e., chemical control and / or excavation and chemical treatment onsite:

Chemical treatment

The control of Japanese Knotweed will require the use of herbicides, which can pose a risk to human health, to non-target plants or to wildlife. To ensure the safety of herbicide applicators and of other public users of the site, it is essential that a competent and qualified person carries out the herbicide treatment. A qualified and experienced contractor will be employed to carry out all treatment work.

The contractor will follow the detailed recommendations of the following documents for the control of invasive species and noxious weeds:

- Chapter 7 and Appendix 3 of the TII Publication: The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010);
- Best Practice Management Guidelines for Japanese Knotweed (Invasive Species Ireland, 2015); and
- Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges (National Parks and Wildlife Service, 2008).

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

Chemical treatment involves the application of an herbicide to invasive species plant such as Japanese Knotweed stands without any excavation or removal of the plant material. The preferred types of herbicides to be used in the treatment of Knotweed are Glyphosate and 2,4-D Amine.

If herbicide is applied as the treatment option, it may need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective.

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

The most effective time to apply Glyphosate is from July to September (or before cold weather causes leaves to discolour and fall). The majority of herbicides are not effective during the winter dormant stage because they require living foliage to take up the active ingredient.

Reapplication rates will depend on site specific considerations including the extent of the infestation, its location, and the time of year treatment commences. Details of the proposed chemical treatment plan will be included in the updated ISMP based on the proposed work programme.

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

In the case of Japanese Knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment will be required usually within ten days, before the internal vascular system is no longer capable of translocating the herbicide to the root system.

While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf under surface as Japanese Knotweed possesses many stomata openings on the leaf under surface. Dead stems can be cut, removed and burned on / off site in accordance with the relevant legislation.

The stem injection method is sometimes used for Japanese Knotweed control. This treatment requires a higher concentration of the active ingredient than is used in foliar applications. It involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into each of the canes approximately 20-30cms from the base of each cane (between the 1st and 2nd nodule).

Subsequently, approximately 10ml of herbicide mix is injected into each cane at a ratio of 5:1 through the use of a specialist stem injection tool. The application of glyphosate-based products by injection is most effective when applied in the early Autumn (mid to late Sept). Regrowth will occur in subsequent years, albeit much less vigorously, which will require follow up treatment at the appropriate time of year. Spot treatment will be required each year until no regrowth is observed.

To ensure that the use of herbicides does not contravene legislation, the contractor must comply with Circular Letter NPWS 2/08 *Use of Herbicide Spray on Vegetated Road Verges* (NPWS, 2008) on dealing with the application on to non-target areas.

Excavation and chemical treatment on-site

This option employs both physical and chemical methods of treatment. This method is employed in situations where treatment of invasive species, in particular Japanese Knotweed, is required to be completed in a relatively short timeframe. Generally, digging up the rhizomes and re-cultivating it stimulates plant growth and will result in more successful herbicide application and management.

In summary, this management method requires cutting and killing of the surface plant. The cut material must be left on top of plastic sheeting until dried out and subsequently monitored for any sign of regrowth. Storage of cut material should not take place within flood risk zone of a river. The cut material should not be placed in a green waste recycling bin. Once dried out, the material should be burned on site in accordance with the relevant legislation. The surface of the affected area should be raked with tines to remove crowns and surface material, and in order to break up the rhizomes, bringing them to the surface, which will stimulate leaf production. This will make the plant more vulnerable to herbicide treatment. The more rhizomes that are brought to the surface, the more growth will occur, allowing for a more successful treatment. An excavator can be used to scrape the surface crowns and rhizomes into a pile and then to cultivate the ground to stimulate rhizomes to produce a higher density of stems for treatment. Reapplication of herbicide may be required for up to five years after initially application, subject to the site-specific management plan.

Buddleia, Wild Clematis and Winter Heliotrope

It is noted that the amber list species Buddleia, Wild Clematis and Winter Heliotrope were also recorded at the Proposed Development site. There is no statutory obligation to remove these species. However, should it be concluded that they should be removed, the following treatment methods are recommended. These species are straightforward to control using a mixture of mechanical removal and herbicide treatment.

Buddleia

Buddleia favours disturbed sites, where physical grubbing of plants can provide ideal conditions for the germination of seeds. Therefore, care needs to be taken to ensure re-vegetation of controlled areas is undertaken swiftly. The branches of Buddleia are capable of rooting as cuttings, so care should also be taken to ensure material is disposed of in a manner to avoid this risk.

As mature plants occur within the proposed works area, the preferred method of treatment is cutting back to a basal stump or grubbing out followed by chemical treatment. Herbicide applications will consider sensitive receptors such as watercourses and locally important habitats such as woodland and must only be applied in line with manufacturers recommendations.

Recommended practice for the application of herbicides requires cutting back of plants to a basal stump during active growth (late spring to early summer) which is then treated (brushed on) immediately with a systemic weed killer mix (Starr *et al.*, 2003). Foliar application of triclopyr or glyphosate may be adequate for limited infestations of younger plants but should be followed up at 6 monthly intervals until the supervising ecologist can certify that the plant is no longer extant within the works area.

Best practice biosecurity measures should be implemented for works in proximity to the stream and drainage ditches. All wet gear or machinery which has previously come into contact with watercourses should be checked for any silt or mud, plant material or animals. It then should be cleaned and finally dried. Disinfectant or hot water (over 65ºC) should be used to clean all equipment followed by a 24 hour drying period. This should be adopted as standard practice in all freshwaters.

Wild Clematis

Wild Clematis is straightforward to control using a mixture of mechanical removal and herbicide treatment. Alternative methods of control are discussed below.

This species can be controlled by both mechanical control and herbicides, though typically its control relies on a combination of both i.e., cut-stump application.

Small seedlings can be readily pulled by hand. Larger stems have to be cut, the roots grubbed out and the material placed off the ground so it cannot take root again.

A number of chemicals have been used effectively against Wild Clematis in New Zealand, including glyphosate, though control invariably takes more than one year (New Zealand Department of Conservation 2005). Control should be undertaken during active growth. For mature plants, the vines should be cut back to ground level or waist height in winter or spring and the subsequent re- growth can be then foliar sprayed. This method will avoid impacting on the host plant the vine may be covering.

For larger specimens, the plant can be cut at the base with a straight horizontal cut. Herbicide is then applied immediately to the wound with a paint brush, eye dropper or small squeeze bottle. On larger stems it is only necessary to wipe herbicide around the outer rim of the cut. The plants should be left in situ until they are dead. Where plants are not killed in a single application, wait until re growth before re spraying.

Triclopyr can also be used as a foliar spray or as a spot treatment. This should be applied in summer during active growth before senescence, when it is not very hot or during drought. Following control, regular monitoring will be required with appropriate follow-up to deal with re-growth or new seedling germination over a period of 2–3 years.

Winter Heliotrope

Physical control

Due to the extensive rhizome network, physical removal of winter heliotrope is really only practical on a limited scale. Where mechanical means can be employed, it should be possible to deal with larger infestations but due to the potential for regeneration from fragments of roots, it may be best to tackle its control using a combination of excavation with follow-up treatment by herbicides. As with other plants with the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant. Other means of disposal include burial of material at a depth of at least 2m, incineration or disposal to licensed landfill. There is no evidence that the material would withstand composting though this approach would probably only be suitable for limited infestations.

Chemical control

An application of a glyphosate-based herbicide after flowering in February to March is recommended by Cornwall Nature Reserves (2008), though the Royal Horticultural Society (2008) recommends spraying in mid-summer or later but before the foliage begins to die back.

7.6.3.7 Bats

During the site works, general mitigation measures for bats will follow Marnell *et al.* (2022), Kelleher and Marnell (2006) and NRA (2005). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats or prevent avoidable effects resulting from significant alterations to the immediate landscape. All mitigation measures including detailed method statements will be agreed with the National Parks and Wildlife Service (NPWS) prior to commencement of works, which could affect any bat populations on site.

Mature and immature trees will be removed prior to construction. Although mature trees with the potential to be of significant value as bat roosts are absent from the site, the following precautionary measures will be implemented during the removal of semi-mature and mature trees:

- The project ecologist will work with the contractor to ensure that trees earmarked for retention are adequately protected;
- Tree-felling will ideally be undertaken in the period September to late October / early November. During this period, bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken;
- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees

for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted;

- Tree will be retained where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety;
- Treelines outside the Proposed Development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage;
- During construction directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused on watercourses or boundary habitats and focusing lights downwards will be utilised to minimise light spillage; and
- If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS.

Construction lighting mitigation measures will follow recommendations outlined in Bat Conservation Ireland (2010) and Bat Conservation Trust (2018).

7.6.3.8 Birds

Where practicable, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the Proposed Development site boundary. If works are carried out during the breeding season, a pre-construction survey will be carried out by the project ecologist and if birds are detected, appropriate mitigation measures will be implemented.

7.6.3.9 Common frog

As a precautionary measure, a visual search of the drainage ditches and the Kilcoolishal Stream will be carried out in the days prior to commencement of construction works and any frogs will be removed to alternative habitats elsewhere within the landholding. This will be carried out under licence from the NPWS and under supervision of the project ecologist.

7.6.4 Noise and Vibration

Good industry standards, guidance and practice procedures will be followed in order to minimise noise and vibration effects during construction. The following provisions, although not exhaustive, will be adhered to where practicable throughout the construction programme:

- Vehicles and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers, maintained in good and efficient working order and operated in such a manner as to minimise noise emissions. The contractor will ensure that all plant complies with the relevant statutory requirements;
- Machines in intermittent use will be idling or throttled down to a minimum when not in use;
- Compressors will be fitted with properly lined and sealed acoustic covers which will be kept closed whenever in use. Pneumatic percussive tools will be fitted with mufflers or silencers;
- Equipment which breaks concrete, brickwork, or masonry by bending, bursting, or "nibbling" will be used in preference to percussive tools. Where possible, the use of impact tools will be avoided where the site is close to occupied premises;
- Rotary drills and bursters activated by hydraulic, chemical, or electrical power will be used for excavating hard or extrusive material;
- Wherever possible, equipment powered by mains electricity will be used in preference to equipment powered by internal combustion engine or locally generated electricity;
- No part of the works nor any maintenance of plant will be carried out in such a manner as to cause unnecessary noise except in the case of an emergency when the work is absolutely necessary for the saving of life or property or the safety of the works;

- Plant will be maintained in good working order so that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum;
- Noise emitting machinery which is required to run continuously will be housed in a suitable acoustically lined enclosure; and
- During the Construction Phase, the appointed contractor will carry out noise and vibration monitoring at representative noise and vibration sensitive receptors to evaluate and inform the requirement and / or implementation of noise and vibration management issues. Noise monitoring will be conducted in accordance with ISO 1996-1 (ISO, 2016) and ISO 1996-2 (ISO, 2017). The selection of monitoring locations will be based on the nearest representative noise and vibration sensitive receptors to the working area.

It is recommended that an acoustic barrier be installed as mitigation for all working areas, which will reduce noise levels overall by 10 dB.

7.6.5 Air Quality

Details of air quality mitigation measures are outlined in Section 5.8.

7.6.6 Climate

The following mitigation measures are proposed:

- The Proposed Development will use low carbon construction materials, such as recycled aggregate, where practicable;
- Where practicable, opportunities for materials reuse will be incorporated within the extent of the Proposed Development;
- Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport; and
- The Proposed Development will minimise wastage of materials due to poor timing or over ordering on site thus helping to minimise the embodied carbon footprint of the Proposed Development.

7.6.7 Archaeology, Architectural and Cultural Heritage

Licenced archaeological monitoring of all ground works will be undertaken during construction. If features of archaeological significance are identified, further mitigation will be required following consultation with the County Archaeologist and National Monuments Service. Such features will be fully resolved to professional standards of archaeological practice either by preservation *in situ* or preservation by record, as outlined in Policy and Guidelines on Archaeological Excavation (Department of Arts, Heritage, Gaeltacht and the Islands, 1999).

7.6.8 Resources and Waste

Waste generated during the Construction Phase will be carefully managed in accordance with the waste hierarchy which gives precedence to prevention, minimisation, reuse and recycling over energy recovery and finally disposal to landfill.

A Construction and Resource Waste Management Plan (CRWMP) is included in **Appendix 15.3** in **Volume 4** of this EIAR. This plan meets the requirements of the Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects (EPA, 2021). The contractor will be obliged to develop, implement and maintain the CRWMP during the Construction Phase.

The following measures will be implemented during construction, where practicable, by the appointed contractor, to ensure the maximum quantity of material is reused in the Proposed Development, to comply with the provisions of the Waste Management Acts, 1996, as amended, and to contribute to achieving the objectives set out in the Waste Action Plan for a Circular Economy (DECC, 2020):

- Where waste generation cannot be avoided, waste disposal will be minimised;

- Opportunities for reuse of materials, by-products and wastes will be sought throughout the Construction Phase of the Proposed Development;
- Possibilities for reuse of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use;
- Where non-hazardous excavation material cannot be reused within the Proposed Development works, material will be sent for recycling or recovery, where practicable;
- Excavations of made ground will be monitored by an appropriately qualified person to ensure that any hotspots of possible contamination are properly identified, with the contaminated material segregated and disposed of appropriately. Any potential contaminated material identified will be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage. Care will be taken to ensure that the hotspot does not cross contaminate clean soils elsewhere throughout the site;
- If encountered, any potential asbestos during the Construction Phase will be managed using standard health and safety measures as outlined in 'Asbestos-containing Materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement' (HSA, 2013). This document states that *"removal of asbestos from contaminated soil will require a specialist asbestos contractor for any friable asbestos to be removed"* and *"a risk assessment by an independent competent person should determine the most appropriate control measures and remediation strategies"* (HSA, 2013);
- Only a suitably experienced contractor shall be used to carry out the excavation works. During construction, they shall employ standard practices to manage risk from contaminated soils. These will be determined by the contractor depending on their construction practices but are likely to include the use of gloves, dust masks and potentially disposable overalls. These and other appropriate measures will minimise the exposure of site workers and members of the public;
- The site will be maintained to prevent litter and regular litter picking will take place throughout the site;
- 'Just-in-time' delivery will be used, where practicable, to minimise material wastage;
- Paints, sealants and hazardous chemicals will be stored in secure, bunded locations;
- All staff on-site will be trained on how to minimise waste (i.e., training, induction, inspections and meetings);
- Materials on-site will be correctly and securely stored;
- Where possible, recyclable material will be segregated and removed off site to a permitted / licensed facility for recycling. Waste stream colour coding and photographs will be used to facilitate segregation;
- On-site municipal waste arising swill be source separated at least into dry mixed recyclables, biodegradable and residual wastes;
- Waste bins, containers, skip containers and storage areas will be clearly labelled with waste types which they should contain, including photographs as appropriate;
- Segregated skips will be used within a designated waste segregation area to be located in the on-site construction compound (particularly for hazardous, inert waste and general waste);
- The appointed contractor will record the quantity in tonnes and types of waste and materials leaving the site during the Construction Phase. The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material which is recovered, which is recycled and which is disposed of;
- Waste generated on-site will be removed as soon as practicable following generation for delivery to an authorised waste facility;

- The appointed contractor will ensure that any off-site interim storage facilities for excavation material have the appropriate waste licences or waste facility permits in place;
- Where Article 27 notifications are required in relation to the Proposed Development, the appointed contractor will complete and submit these Article 27 notifications to the EPA for by-product reuse; and
- The relevant appropriate waste authorisation will be in place for all facilities that wastes are delivered to (i.e., EPA Licence, Waste Facility Permit or Certificate of Registration).

7.6.9 Water

The employment of good construction management practices will minimise the risk of adverse impacts on water quality, the hydrological regime and flood risk. All construction activities will be undertaken in accordance with the guidance 'Environmental Good Practice on Site' (CIRIA, 2015a) and 'The control of water pollution from construction sites' (CIRIA, 2001).

The following standard measures will be implemented during the construction of the Proposed Development:

- Earthworks operations will be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding;
- Run-off will be controlled to minimise the water effects in outfall areas;
- All concrete mixing and batching activities will be in areas away from watercourses and drains;
- Collection systems will be used to prevent any contaminated drainage entering surface water drains, watercourses or groundwater, or draining onto the land;
- The use of cleaning chemicals will be minimised;
- Good housekeeping (site clean-ups, use of disposal bins, etc.) will be implemented on the site;
- Careful consideration will be given to the location of any fuel storage facilities. All vehicles and plant will be regularly inspected for fuel, oil and hydraulic fluid leaks. Suitable equipment to deal with spills will be maintained on site;
- Where dewatering may be required, it will be overseen and approved by a qualified hydrogeologist and treated appropriately in a site water treatment facility before being discharged to the local drainage network. No outfall will be permitted into the existing watercourse;
- Where possible, soil excavation will be completed during dry periods;
- No materials will be stored in floodplains or in areas which would impede flood flow paths (northern side); and
- To prevent the accidental release of hazardous materials (fuels, cleaning agents, etc.), all hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil / diesel storage tanks will be used on the site during the Construction Phase of the project. Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the Proposed Development.

The following addition measures will be implemented for the protection of the Kilcoolishal Stream:

- Works in the vicinity of the stream will be carried out in the summer months, when water levels and flows within the stream are minimal. In the eventually that the stream is not dry, construction works to the section of the Kilcoolishal stream crossing the construction boundary (approximately 28m) will be bunded on either side with earthen bunds and silt screens. Water would be over pumped in the flow direction. Environmental control measures will be implemented during construction in line with standard guidelines (i.e., 'The Control of Water Pollution from Construction Sites' (CIRIA, 2001) and "The Control of Water Pollution from Linear Construction Projects' (CIRIA, 2006)) for best practice measures for controlling water pollution. The Report for Screening for Appropriate Assessment submitted as part of the planning application concluded that the proposed project, in the absence of mitigation, and either alone or in - combination with other plans and / or projects, does not have the potential to significantly

affect any European Site, in light of their conservation objectives. The environmental control measures which will be implemented relate to the minimisation of localised potential impacts;

- Apart from the area of the Kilcoolishal Stream directly affected by the bridge construction (i.e., Irish Rail portal frame), a buffer strip of 10m will be implemented around the stream with no works taking place in this area. Where this is not possible, in particular for the construction of the Irish Rail portal frame, the streambed and stream banks of the Kilcoolishal Stream in this location will be reprofiled and reinstated following construction and the bunds and silt traps removed;
- No plant or tools will be washed in the stream, should it contain water; and
- Spill kits will be permanently on hand and kept close to the works areas. Staff will be trained in how to use the spill kits correctly.

The following monitoring activities will be undertaken for the Construction Phase:

- Visual monitoring will be undertaken as part of the regular site audits during the construction of the Proposed Development to ensure that existing surface water runoff is draining from the site and is not exposed to any contaminants;
- The contractor will be required to ensure that the sanitary facilities for site personnel are and effluent storage is regularly emptied and disposed of appropriately;
- The contractor will be required to ensure that the water supply to the site is maintained and is free of contaminants; and
- The contractor will be required to monitor the weather forecast to inform the programming of earthworks and stockpiling of materials so as to minimise the risk of flooding.

7.6.10 Land, Soils, Geology and Hydrogeology

The Proposed Development will be constructed in accordance with the relevant design standards by means of good practice measures under appropriate engineering supervision.

7.6.10.1 Earthworks management

These mitigation measures relate to the following potential impacts:

- Loss of topsoil;
- Loss of solid geology;
- Earthworks haulage; and
- Effect on the surrounding ground.

Excavated topsoil will be stockpiled using appropriate methods to minimise the effects of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff. Any surplus suitable material excavated that is not required elsewhere for the Proposed Development, will be reused for other projects where possible, subject to appropriate approvals / notifications or removed off site to a suitable licensed facility.

In order to reduce the compaction and erosion of topsoil outside the areas of direct construction, haul routes will be along predetermined routes within the Proposed Development and deliveries will be along predetermined routes outside the Proposed Development. Where compaction occurs due to truck movements and other construction activities on unfinished surfaces, remediation works will be undertaken to reinstate the ground to its original condition. Where practical, compaction of any soil or subsoil which is not part of the works or to remain in-situ within the Proposed Development will be avoided.

The contractor will ensure that any topsoil or subsoil is assessed for re-use within the Proposed Development, ensuring the appropriate handling, processing and segregation of the material. Where practical, the removal of soil from the Proposed Development will be avoided. All earthworks will be undertaken in accordance with TII Specification for Road Works (SPW) Series 600 Earthworks (TII, 2013)

and project specific earthworks specifications ensuring that all excavated material and imported material is classified using the same methodology so as to allow maximum opportunity for the reuse of materials on site.

7.6.10.2 Contaminated land management

These mitigation measures relate to the following potential impacts:

- Excavation of potentially contaminated land;
- Mobilisation of contamination into aquifers; and
- Mobilisation of contamination into environmentally sensitive sites.

Excavations in made ground will be monitored by an appropriately qualified person to ensure that any potential hotspots of encountered contamination are properly identified, segregated and disposed of appropriately. Any identified hotspots will be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage. Care will be taken to ensure that the hotspot does not cross contaminate clean soils elsewhere throughout the site.

In areas with the potential to encounter asbestos containing materials the following measures will apply:

- During construction, the potential risk to site users and member of the public from contaminated dust will be managed using standard health and safety measures as outlined in the Health and Safety Authority (HSA) guidance document, Asbestos-containing Materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement (HSA, 2013). This document states that *"Removal of asbestos from contaminated soil will require a specialist asbestos contractor for any friable asbestos to be removed"* and *"A risk assessment by an independent competent person should determine the most appropriate control measures and remediation strategies."*;
- Control measures for the Construction Phase will be devised based on a risk assessment carried out by the contractor prior to the commencement of the construction works and will be specific to the construction methods. Such methods could include the prompt removal of excavated soils to avoid stockpiling on site of material or dampening down of soil to prevent dust generation. In the rare instances where stockpiles are required, they will not be allowed in the areas which are identified as public interfaces; and
- Only suitably experienced contractors shall be used to carry out the excavation work. During construction, they shall employ standard practices to manage risk from contaminated soils. These will be designed by the contractor dependent on his construction practices and are likely to include the use of gloves, dust masks and potentially disposable overalls. These and other appropriate measures will minimise the exposure of the site workers and member of the public.

If a potential soil and water pollution are identified, this will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel wash and dust suppression on site roads, and regular plant maintenance. CIRIA provides guidance on the control and management of water pollution from construction sites in their publication 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA, 2001).

Any dewatering in areas of contaminated ground will be designed to minimise the mobilisation of contaminants into the surrounding environment. Where dewatering in such areas is unavoidable, the water will be adequately treated prior to discharge. Good construction management practices will be employed to minimise the risk of transmission of hazardous materials as well as pollution of adjacent watercourses and groundwater.

7.6.10.3 Spills from temporary storage of hazardous substances

These mitigation measures relate to the following potential impacts:

- Loss of topsoil;
- Excavation of potentially contaminated land;

- Mobilisation of contamination into aquifers; and
- Mobilisation of contamination into environmentally sensitive sites.

Good construction management practices, as outlined in the CIRIA guidance 'Control of Water Pollution from Construction Sites – Guidance for consultants and contractors' (CIRIA, 2001) will be employed by the appointed contractor to minimise the risk of transmission of hazardous materials as well as pollution of adjacent watercourses and groundwater. The construction management of the site will take account of these recommendations to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Measures to be implemented to minimise the risk of spills and contamination of soils and waters include:

- Employing only a competent and experienced workforce, and site-specific training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;
- Ensure that all areas where liquids (including fuel) are stored, or cleaning is carried out, are designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access;
- The location of any fuel storage facilities shall be considered in the design of the construction compounds and bridge assembly area. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded;
- Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire Construction Phase;
- All concrete mixing and batching activities will be located in areas away from watercourses and drains;
- Potential pollutants to be adequately secured against vandalism;
- Provision of proper containment of potential pollutants according to codes of best practice;
- Thorough control during the entire Construction Phase to ensure that any spillage is identified at early stage and subsequently effectively contained and managed; and
- Spill kit to be provided and to be kept close to the storage areas. Staff to be trained on how to use spill kits correctly.

An emergency incident response plan will be implemented by the appointed contractor, which will identify the actions to be taken in the event of a pollution incident. Refer to Section 7.4.2.

7.6.10.4 Management of concrete during piling

These mitigation measures relate to the following potential impacts:

- Loss of topsoil;
- Effect on the surrounding ground;
- Mobilisation of contamination into aquifers; and
- Mobilisation of contamination into environmentally sensitive sites.

During the Construction Phase, concrete levels and volumes used will be monitored and compared against theoretical estimates to understand potential losses.

Before and during piling, it is proposed to monitor groundwater pH at the available groundwater monitoring points (trial wells and boreholes with standpipe installations). This will highlight any potential impacts on groundwater and surface water quality during piling. Where a change from baseline pH is identified, appropriate measures can then be adopted which may include an alternative grout / cement mix to limit migration or the use of temporary casing. The groundwater monitoring will utilise monitoring locations installed during the project specific ground investigation that are located outside the footprint of the

Proposed Development. These monitoring locations will be maintained during the Construction Phase of the Proposed Development.

Where ground bearing foundations are being constructed, the formation will be inspected for potential features that may result in concrete losses. Appropriate earthwork details, developed during detailed design phases, will be applied to limit losses.

7.6.10.5 Monitoring

Soil, groundwater and surface water verification testing shall be carried out by the contractor during the Construction Phase to confirm the findings of the risk assessment.

7.6.11 Material Assets

The contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and that all services and utilities are maintained, unless this has been agreed in advance with the relevant service provider and local authority. Where connections are required, the contractor will apply to the relevant utility company for a connection permit and adhere to their requirements.

All works near existing services and utilities will be carried out with ongoing consultation with the relevant utility company or local authority and will follow any requirements or guidelines they may have.

8. References

Bat Conservation Ireland (2010). Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers.

British Standards Institution (BSI) (2012). BS5837: 2012: Trees in Relation to Design, Demolition and Construction.

BSI (2014) BS 5228-1. Code of practice for noise and vibration control on construction and open sites.

Cork County Council (CCC) (2022). Cork County Development Plan 2022-2028.

Construction Industry Research and Information Association (CIRIA) (2001). Control of water pollution from construction sites. Guidance for consultants and contractors (C532).

CIRIA (2001). The Control of Water Pollution from Construction Sites.

CIRIA (2002). Brownfield development sites: ground-related risks for buildings (X263).

CIRIA (2006). The Control of Water Pollution from Linear Construction Projects.

CIRIA (2015a). Environmental Good Practice on Site (fourth edition).

CIRIA (2015b). Coastal and marine environmental site guide (second edition) (C744).

Department of Environment, Climate and Communications (DECC) (2020). A Waste Action Plan for a Circular Economy - Ireland's National Waste Policy 2020-2025.

Department of Arts, Heritage, Gaeltacht & the Islands (1999). Policy & Guidelines on Archaeological Excavation.

Environmental Protection Agency (EPA) (2021). Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.

Health and Safety Authority (HSA) (2013). Asbestos-containing Materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement.

Inland Fisheries Ireland (IFI). (2010) Biosecurity Protocol for Field Survey Work.

International Standards Organisation (ISO) (2015). ISO 14001:2015 Environmental management systems - Requirements with guidance for use.

Invasive Species Ireland (2015). Best Practice Management Guidelines for Japanese Knotweed.

Irish Rail (2010). Requirements for Track and Structures Clearances. I-PWY-1101.

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

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

Marnell, F., Kelleher C. & Mullen, E. (2022). Bat Mitigation Guidelines for Ireland. Volume 2.

Kelleher, C. & Marnell, F. (2006). Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25.

National Parks and Wildlife Service (NPWS) (2008). Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges.

Non-Native Species Secretariat (NNSS) (2017). Check-Clean-Dry. Available from: https://www.nonnativespecies.org/what-can-i-do/check-clean-dry/ [Accessed: June 2023]

National Roads Authority (NRA) (2005). Guidelines for treatment of bats during construction of National Road Schemes. National Road Authority

NRA (2006). Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes.

Transport Infrastructure Ireland (TII, previously NRA) (2010). The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads.

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