

APPENDIX 5-1

OUTLINE CEMP

RIVER PODDLE FLOOD ALLEVIATION SCHEME

Outline Construction and Environmental Management Plan



February 2020

South Dublin County Council

River Poddle Flood Alleviation Scheme

Outline Construction and Environmental Management Plan

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1 INTRODUCTION

This Outline Construction Environmental Management Plan (CEMP) has been prepared for the **River Poddle Flood Alleviation Scheme** by Nicholas O'Dwyer Ltd. on behalf of South Dublin County Council (SDCC) and Dublin City Council (DCC), working in conjunction with the Office of Public Works (OPW). As an Outline, it is the basis for the CEMP that will be prepared and adopted by the appointed contractor. The CEMP is a key construction contract document which ensures all environmental protection and control measures are implemented in full so that no significant adverse impacts to the surrounding environment arise during the construction phase of the Contract.

1.1 Project Description

The Scheme proposes flood protection, flood storage and flood prevention measures at locations along a 6km stretch of the Poddle River from Tymon North, Tallaght to St. Teresa's Gardens and Donore Avenue, and at the National Stadium, South Circular Road, Merchant's Quay, Dublin. It combines main flood storage at Tymon Park and additional flood storage at Ravensdale Park, linear defences along the River where they are required to provide flood protection, new flap valves and culvert screens, and sealing manholes to prevent surcharging during a flood event.

The Flood Alleviation Scheme is designed to provide protection against fluvial or river flooding in a 1 in 100-year flood event (1% Annual Exceedance Probability). The Scheme will provide protection for approximately 921 properties in South Dublin County Council and Dublin City Council. The additional works in the Scheme to address stormwater drainage issues or pluvial flooding will provide protection for an additional 276 properties.

1.2 The CEMP

The CEMP is a live document which will be reviewed throughout the construction period through regular auditing, monitoring and site inspections. This will ensure that the environmental performance of construction activities associated with the Project are subject to continual improvement and will ensure that environmental objectives and targets set out in the Plan are achieved.

The implementation of the CEMP will ensure:

- Compliance with any conditions attached to any planning approval granted for the project;
- Compliance with all relevant environmental legislation and regulations;
- That environmental protection and control measures and any specific mitigation measures are adopted throughout the construction of the proposed development;
- That the environmental risks associated with the construction of a Project of this nature are properly and effectively managed at all times.

1.3 Environmental Policy

An Environmental Policy for the project will be developed by the appointed Contractor. The Environmental Policy, as defined by ISO 14001, is a statement by the organisation of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets. It will be communicated to all employees and sub-contractors via site inductions, "Tool-Box Talks" and will be displayed on various notice boards throughout the construction site.

1.4 Project Contractor's Environmental Management System

The appointed Contractor will be responsible under legislation for minimising and controlling the potential environmental impacts of all Contract activities. The appointed Contractor will either have a certificated Environmental Management System, for example, to ISO 14001:2004 or EMAS, or be working towards such certification. All sub-contractors are expected to work to the principles of their ISO 14001, or equivalent certificate.

2 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

The CEMP is a site-specific plan which ensures that appropriate environmental protection and control measures are followed during the construction phase of any given project.

The CEMP specifies the roles and responsibilities of personnel involved with all aspects of the construction activities relating to a project, identifies the potential environmental risks and impacts and protection measures that will be used to address them and establishes procedures for audits, monitoring and inspections, specific training, record keeping and document requirements.

Construction protection measures or strategies ensure that all reasonable measures are taken to protect the environmental interests that may otherwise be impacted during construction activities associated with a project. Adhering to the CEMP will prevent future prosecution or fines, having to remove or reinstall plant, delays in the project and related costs.

The CEMP addresses the proposed performance criteria, records environmental commitments and establishes the framework to ensure they are implemented. In effect, this CEMP will be a key reference document in that it converts the undertakings and recommendations of the environmental reports submitted as part of the planning application and any conditions of planning set by An Bord Pleanála into a set of actions and commitments to be followed during the construction of the proposed development.

The CEMP also outlines the roles and responsibilities the Principal Contractor are expected to meet. This CEMP, which will be prepared and adopted by the appointed Contractor, will be the practical means by which the Contractor will implement the environmental commitments relating to the construction of the project.

The CEMP objectives are as follows:

- Ensure compliance with legal and contract requirements;
- Ensure construction is undertaken in a manner that complies with the environmental objectives set for the project;
- Control and, where possible, minimise the environmental impacts of the construction works;
- Minimise the risks of causing pollution or a nuisance and associated costs and delays;
- Help prevent project delays, Contractor prosecution and associated costs.

3 SITE INFORMATION/SCHEME DESCRIPTION

3.1 Catchment Area

The River Poddle is some 11.6km in length with a catchment area of approximately 16,400ha. The Poddle rises in the Cookstown area, north of Tallaght village flowing east through Tymon North and into Tymon Park where it passes under the M50 motorway. It flows northeast towards Greenhills/Templeogue and continues through Kimmage and the edge of Crumlin and runs through Mount Jerome into Harold’s Cross. The River then crosses under the Grand Canal and flows under the city centre in a culverted section, discharging to the River Liffey. The confluence of the Poddle and the Liffey is visible at low tide at a grated opening in the Liffey walls at Wellington Quay.

As shown in **Figure 3-1**, the Poddle is a highly urbanised catchment, particularly in the middle and lower reaches where it is culverted and channelled in sections.

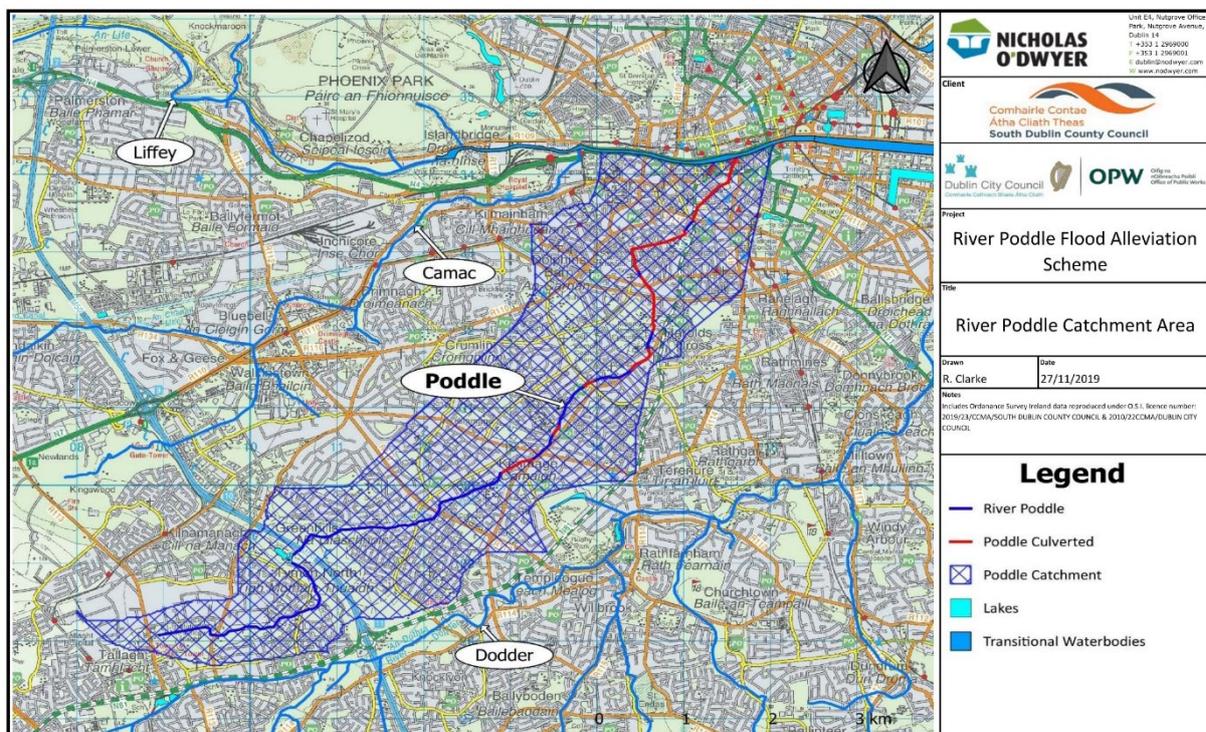


Figure 3-1: River Poddle Location

3.2 Overview of Proposed Scheme

The proposed River Poddle Flood Alleviation Scheme is designed for the 1% Annual Exceedance Probability (AEP) flood event (also known as the “100-year flood”) with 60% blockage in the major culverts and 40% blockage in all other culverts, with an allowance for freeboard in accordance with the OPW guidance. The Scheme combines flood defences along the River channel with main flood storage in Tymon Park and additional flood storage at Whitehall Park and Ravensdale Park. The proposed works are described generally as follows:

- **Raised earthen flood embankments** along the upper reach of the River in Tymon North (west of the M50) and Tymon Park (east of the M50) to provide flood protection. The embankment at Tymon Lake in Tymon Park will be constructed to provide the main flood storage in the Scheme and a **flow control structure** at Tymon Lake will control flows downstream in a flood event.
- An **integrated constructed wetland** in Tymon Park to improve water quality.
- New, replacement or reinforced **flood walls** to provide flood protection in residential areas in the middle reach of the River at Whitehall, Kimmage and Perrystown; at Wainsfort Manor Crescent, Terenure; to the rear of properties on Fortfield Road south of Kimmage Crossroads, Kimmage; at the end of St. Martin’s Drive in Kimmage; and at Mount Argus Close in Harold’s Cross.
- **Channel realignment and regrading** in Whitehall Park to provide clearance between the River and adjacent properties for flood protection.
- **Rehabilitating or replacing manholes** in the public roads in the junction of Ravensdale Park and Poddle Park, Kimmage; and in the vicinity of Saint Teresa’s Gardens and Donore Road, and at the rear of the National Stadium, South Circular Road in Merchant’s Quay.
- **Proposed ancillary works and associated development** includes drainage channel clearance and removal of trees where required for the works; rehabilitating or installing culvert screens in locations as required; installing flap valves in all culverts draining to the River; biodiversity enhancements including installation of floating nesting platforms in Tymon Lake in Tymon Park, Tallaght; and landscape mitigation and restoration at Tymon Park, Tallaght; Whitehall Park, Templeogue, and Ravensdale Park and St. Martin’s Drive, Kimmage including public realm improvements, biodiversity enhancements and tree planting and landscaping.
- **Temporary works** include establishing a main construction compound in Tymon Park with access off Limekiln Road, Tallaght which will be in operation for the entire duration of the works; and temporary works / set down areas at Wainsfort Manor Crescent, Terenure and Ravensdale Park and St. Martin’s Drive, Kimmage which will be in use for the duration of the works to be carried out in these locations. Other temporary works include stockpiling of excavated earth in designated areas of Tymon Park, Tallaght; temporary channel crossings in Tymon Park (west and east of the M50), Tallaght; and channel diversions at Tymon Park, Tallaght and

Whitehall Park, Templeogue to enable the works along the River channel to be carried out.

3.3 Construction of The Proposed Scheme

The flood alleviation scheme proposed consists of a series of physical interventions along and adjacent to the route of the Poddle River from the Upper catchment in Tallaght to the lower catchment at Harold's Cross. The proposed anticipated construction methodology is summarised under the following headings:

- Site Access
- Temporary Works Compounds
- Temporary Access Tracks
- Temporary River Crossings
- Material stockpiling
- Tree Removal
- Earthen Embankments
- Flow Control Structure
- Integrated Constructed Wetland
- Channel Re-Alignment
- Flood Defence Walls
- Footbridge Replacements
- Sealing Manholes
- Works Areas Reinstatement and Landscape Mitigation

3.3.1 Site Access

For the most part, works areas will be accessed from public property or public roads. Access to private property may be required in locations where walls have to be replaced. The preference is to undertake these works from the bank opposite where there is sufficient space and where workers can operate machinery safely.

3.3.2 Temporary Works Compounds

The primary construction compound will be located within Tymon Park with an entrance off Limekiln Road (**Drawing No. 08140**) which will be in place for the entire duration of the works (24 months). The entrance to the works compound off Limekiln Road will be created by removing a section of the block wall and fence. Some trees will be required to be removed for the compound. The main works compound will have a surface created by stripping topsoil and subsoil, laying down geotextile material and then laying a working surface of crushed stone. The excavated soils will be stored at the site for subsequent use in reinstatement. The compound will have site offices, welfare facilities, and car parking. It will be fenced with a 2.4m high chainlink fence and hoarding. Only materials and plant necessary for the works will be stored there. Oils, lubricants, solvents, fuel, *etc* may be stored in banded areas on site.

Works / set down areas will be established at Wainsfort Manor Crescent, Ravensdale Park and St. Martin's Drive. These will be fenced, temporary compounds without offices to securely store machinery and some materials.

3.3.3 Temporary Access Tracks

Temporary access tracks through Tymon North and Tymon Park have been carefully designed to avoid sensitive habitats and ecological features. In some cases, these routes make use of existing pedestrian and vehicular accesses which will be widened and constructed as necessary making a firm base as with the works compounds. Pedestrians and park users will be diverted with signage and fencing as required.

Before construction commences any works areas that overlap with public roads and footpaths will be isolated with security fencing and construction hoarding. Every effort will be made to ensure the public can continue to enjoy public areas, considering health and safety of the workers and public.

3.3.4 Temporary River Crossings

The works to create the embankments in Tymon North and Tymon Park will require river crossings at strategic locations of a width of 4m to 6m. The riverbank will be partially graded back to an angle of approximately 45 degrees over a 6m length of both banks. A layer of geotextile membrane will then be placed along the regraded bank profile, and a 6 to 8m length of precast concrete pipe (750 to 900mm diameter) will then be placed in the channel and backfilled using crushed virgin rock up to a level of just below top of bank. When works are complete the backfill and pipe will be removed from river and the banks will be reconstructed by compacting.

3.3.5 Material Stockpiling

The top layer of soil (approximately 200m depth) contains valuable ecological material that will be saved separately from subsoils and will be used to reinstate the parks and green areas and allow for natural restoration and establishment of plants. Stockpiles of this material are to be stored in banks no more than 1m high.

All materials excavated from the works areas will be stockpiled as close to the area where they are to be re used in landscape restoration in order to minimise on-site haulage and double handling. Areas for material storage have been assigned in consideration of sensitive habitats and ecological features and use of the parks and green spaces in the Scheme.

Stockpiles of other material will be formed no more than 2m in height and will be sealed using the back of an excavator bucket or tracked upon by a tracked excavator to ensure the stockpile does not become saturated and therefore difficult to handle when being reinstated into the works. All stockpiles will be clearly defined, fenced and signed to ensure no cross contamination of other materials to be stockpiled. It is estimated that approximately 3,000m³ will be temporarily stockpiled at Tymon Park for re-use.

An estimated 5,000m³ of material is to be excavated and reused elsewhere on site or locally. The excess material from the excavation works will be used as bulk fill, embankments or landscaping where possible. It is estimated that 50% of the material will be required for the embankments and landscaping and the remainder will be taken off site for disposal at an agreed licensed area. All material removed from site will be disposed of in accordance with relevant waste management legislation. Where material cannot be

reused on site, it will be exported to co-ordinate deliveries of imported fill with a load of unsuitable material requiring removal from site in order to minimise traffic movements.

3.3.6 Tree Removal

Individual trees and tree groups which are impacted by the proposed development have been identified through a specially commissioned tree survey. The findings of the tree survey are illustrated in the tree classification, tree constraints and tree removal and protection areas drawings, along with records of the number and species of trees affected by the Scheme in the surveyed areas. The findings of the tree survey are reported in the **Tree Survey and Arboricultural Impact Assessment** contained in **EIAR Volume 4, Appendix 5.2**. The drawings to accompany the tree survey are contained in **EIAR Volume 3**.

Trees will be removed in advance of the works in accordance with the approved Construction and Environmental Management Plan. Any trees that have to be removed during nesting periods will be done under the supervision of the Ecological Clerk of Works.

The proposed development of the Flood Alleviation Scheme will require the removal of a number of trees to facilitate both the Scheme itself and the construction process. The majority of trees lost are of moderate value. New semi mature tree planting is proposed as an integral part of the Scheme, which will assist in mitigating the proposed tree removals.

The report concludes with recommendations for protection measures to ensure the conservation of those trees to be retained during the construction process, including mitigation measures such as excavations by hand or using an airspade to protect roots in working areas in Ravensdale Park and Mount Argus Close.

3.3.7 Earthen Embankments

The proposed works to construct the embankments will require removal of trees in Tymon North and Tymon Park for access by machinery and personnel.

Topsoil will be stripped from the footprint of the embankment before the construction starts. This will help to key the embankment to its foundation and to reduce settlement. The material will be stored for reuse in landscape restoration in accordance with the landscape mitigation plan in **EIAR Volume 3**.

Approximately 3,000m³ of preferably clayey material will be required to be brought on to site to construct the embankment at Tymon Lake. Wherever possible uncontaminated, locally sourced material will be used. The required strength will be achieved by constructing the embankment in layers and compacting each layer using the appropriate mechanical plant.

If the construction material is highly permeable prevention measures must be in place to avoid seepage through the foundation. Sheet piles can be driven deep enough into the core of the embankment to provide an effective cut off.

After construction of the embankments the works areas will be reinstated. Any remaining material after the construction is complete will be removed from the site and disposed of in accordance with relevant waste management legislation.

Activities such as final landscaping and grass seeding will take place after the construction is complete in accordance with an agreed landscaping plan.

3.3.8 Flow Control Structure

Construction of the flow control structure at the embankment at Tymon Lake will follow after the piles are installed. Sheet piles will be used to hold the stream flow. An excavator will be used to dig a trench and install a pre-cast 900mm concrete pipe which will be backfilled to provide a temporary bypass of the River while the flow control structure is being constructed. The sheet pile will then be removed to allow the flow to pass through the temporary culvert. A sheet pile cofferdam will be constructed around the footprint of the flow control structure. This will be below the level of the embankment to permit the Poddle River to flow during possible extreme events. Whilst the flow control structure is being formed, a pump will remove water with silt controls including a silt bag and a settlement tank. The structure will be formed of concrete and poured in sections. Pumping operations will be discontinued when concrete is being placed adjacent to groundwater. After the structure is completed, the sheet piles and the temporary bypass pipe will be removed by an excavator. The embankments will be constructed around the flow control structure in the method described above.

3.3.9 Integrated Constructed Wetland

The main earthworks activities involved in the development of the Integrated Constructed Wetland (ICW) in Tymon Park are levelling, excavation, and placement of soils for integration with existing topography. An estimated 5,000m³ of material is to be excavated and reused elsewhere on site or locally. The excess material from the excavation works will be used as bulk fill, embankments or landscaping where possible. It is estimated that 50% of the material will be required for the embankments and landscaping and the remainder will be taken off site for disposal at an agreed licensed area. All material removed from site will be disposed of in accordance with relevant waste management legislation. The main construction works are briefly summarised below, and more detail can be found in **EIAR Volume 4, Appendix 5.3** with accompanying maps displayed in **EIAR Volume 3**.

A temporary river water management system will need to be established during the earthworks. To reduce the impact of construction works on the river flow the ICW will first be constructed outside of the river channel and erecting temporary bunds along the existing river route to contain and maintain river flows.

The stone baffles and stone weir and are to be installed at the inlet point and outlet points respectively from material acquired from site where suitable and available, otherwise locally sourced natural stone can be used.

On completion of construction and planting, the river will be diverted into the ICW and temporary bunds removed. The ICW can then be finished off with remaining levelling and planting where required. Careful timing with regards to weather conditions and silt mitigation methods will need consideration prior to construction stage scheduling. All in-stream works should ideally be carried out in low flow periods (i.e. between July to September), unless otherwise agreed.

There should be no requirement to import or export material to or from the site for construction of the ICW, however this will need to be confirmed during site investigation. Indicative levels are provided in the ICW layout **Drawing No. 08146** in **EIAR Volume 3**.

The base of the ICW cell will be completely level to promote dispersal across the entire treatment area. The slope gradient will vary depending on landscaping requirements but will be at 4:1 minimum. There may be slight variations to the layout and level of the ICW during construction, as required, so as to work within the confines of the site conditions and to utilise the characteristics of the site.

Appropriate access will be provided around the ICW site to allow for future monitoring and maintenance works. Access to the site will be via existing park paths.

3.3.10 Channel Re-Alignment

At Whitehall Park the channel will be re-aligned to take it away from the adjacent properties. This will be achieved with the temporary diversion of flows through the use of sheet piles in the same method as the flow control structure in Tymon Lake.

3.3.11 Flood Defence Walls

Flood defence walls are proposed for areas to prevent the River overflowing its banks in the middle reaches. This will involve reinforcing existing walls, constructing new walls in places where there currently are none, and replacing existing walls. The flood defence walls will be constructed by the methods briefly described below. Selection of this method will depend on the condition of the existing foundation and wall, ground conditions, the height of the wall, and proximity of structures to the wall.

The construction of walls, whether reinforced or new walls, will require vegetation clearance on both banks.

Prior to construction the route of the proposed flood protection walls will be surveyed and set out. Any works areas that overlap with public roads and pedestrian areas will be isolated.

The construction of the walls will require some movement of materials to and from the site. Most of the materials leaving the site will consist of spoil from the excavation works and some demolition rubble. The excess material from excavation works that is not used as bulk fill, embankments or in landscaping will be removed from the site and disposed of in accordance with relevant waste management legislation.

Once the walls are constructed the area will be backfilled and reinstated. The walls will be finished in stone cladding or pointed with concrete capping beam on top. Reinstatement of lands and finishes will be to a specification agreed with the construction management team, SDCC and OPW.

Reinforcing walls

In cases where an existing wall is not structurally sound to withstand a flood it may be necessary to construct a scour protection beam. The advantage of this method is that it will avoid working in the rear gardens of properties, and the walls can be accessed from the opposite bank using an excavator. Culverts approximately 600mm will be installed in the channel to allow works to be undertaken by personnel. Channel flows will be temporarily diverted using 600mm pipes and a pump sump will be installed to direct the flow through a baffled settlement tank and discharged through a silt bag. A trench will be excavated alongside the existing wall foundation. The wall will be shuttered, then a reinforcing cage will be placed in the trench. The cage will then be filled with concrete and following this the pump would be switched off. Depending on the mix and ambient conditions the shutter would be struck in 24 to 48hrs and the process repeated. Once at the end of a 20m run, the haul road stone, pumping system, *etc.* would be moved along and the same process repeated until the scour beam is complete.

In certain situations, it may be necessary to retain the existing boundary wall and construct a new wall adjacent to or up against it. A possible solution will be to underpin the existing foundation and construct a new wall up against the underpin and extend this up to the required design level. The underpinning process is similar to that described for the scour protection beam with the exception that each underpin will only be in the order of 1m at a time when measuring along channel chainage so as to minimise the amount of unsupported foundation. Therefore, this process is considerably slower than that of the scour beam works.

New or replacement walls

Walls will have a precast base and will be constructed *in-situ*. The walls will have to be underpinned as above, and a stone platform will be constructed, and the flow diverted through silt controls as above. It may be beneficial to precast (at a precasting yard) the bases of these units in lengths of 2m keeping the weight down avoid the use of very large excavators/cranes. Precasting would also minimise the need for pumping during the construction of the bases. It would be necessary to dig out and bed the bases at the required level and place them in units of 10m at a time. The bases will then be shuttered and poured. These works will be undertaken from the opposite (right) side of the bank using an excavator for digging and lifting operations.

3.3.12 Footbridge Replacements

The replacement of the footbridge in Ravensdale Park will involve the demolition of the existing bridge, excavation of foundations for the proposed bridge, craning in a precast concrete bridge and reinstatement of the area impacted by the works. The existing footbridge at Tymon Lake will be replaced with a new structure along the embankment using a similar method.

It is expected that any utility diversions required for the replacement of the bridge at Ravensdale will be completed prior to the demolition of the existing bridge.

3.3.13 Sealing Manholes

The process of sealing manholes is done by either reinforcing the manhole chamber with concrete and anchoring the chamber to the concrete with an “L” bar, then replacing the cover and frame with a sealed unit or by replacing the covers with a sealed frame/cover solution. Because the manholes to be sealed are located within the public roads, works areas will have to be fenced off and a traffic management system put in place whilst works are ongoing.

3.4 Works Areas Reinstatement and Landscape Mitigation

All work areas will be reinstated following the completion of the scheme. The commitments to the restoration and reinstatement are as follows:

- During all stages of construction, all reasonable measures will be adopted to confine workings to within as defined a construction corridor as possible, so as to minimise impacts on the surrounding environment;
- The excavation programme will be designed to take cognisance of the ground conditions existing within parts of the sites and will also take account of the environmental sensitivities existing within the various sites;
- After completion of the works, the lands within the works footprint will be landscaped in a way that is in line with the surrounding landscape character;
- All exposed soil surfaces will be seeded;
- Specific landscape mitigation plans have been made for Tymon North and Tymon Park, and for Ravensdale Park (see **EIAR Volume 3**)
- The final landscape plans were developed by the project’s Landscape Architects and Designers, with input from the project Ecologist and Arboriculturist, and in consultation with SDCC and DCC Parks and Landscape departments.

3.4.1 Tymon Park Lakes

The objectives of the landscape mitigation plan for Tymon Park Lakes were for pedestrian access, providing sitting out areas, creating and restoring habitats, and replacement tree planting. Habitat loss and disruption to resident flora and the human community are an inevitable feature of the Flood Alleviation Scheme since the main flood storage and ICW are being created in Tymon Park. The landscape mitigation plan seeks to re-establish pedestrian access by re-aligning paths to meet the embankments and re-profiling areas to reduce impact on trees in the park. The main flood storage embankment will have a pedestrian path running along the top of it, with the ground re-profiled to meet existing contours and existing paths. Areas for replacement tree planting have been identified within the Park. The final proposals for Tymon Park are to be agreed with South Dublin County Council at detailed design stage.

3.4.2 Ravensdale Park

The main objectives of the landscape mitigation plan for Ravensdale Park is to make a feature from the proposed flood wall that will run through Ravensdale Park, to minimise tree loss, to ensure access and visibility through the Park, and to provide replacement tree planting. The landscape mitigation plan makes a feature of the central flood wall by integrating seating areas and enhances the entrance to the Park. Various options were

suggested for the area of the Park which will be enclosed within the flood walls such as a skatepark, playground or kickabout area. The final proposals for Ravensdale Park are subject to be agreed with Dublin City Council but are outside the Flood Alleviation Scheme.

3.4.3 St. Martin's Drive

The main objective of the landscaping and tree planting plan for St. Martin's Drive were to replace trees that will be lost from the construction of a 1.1m high flood wall along the River here. A tree planting and landscaping plan has been prepared for this works area.

3.5 Land Take

The total land take for the project during the construction phase is approximately 12ha. This takes into account all areas for the proposed works and temporary compounds, construction access and temporary stockpiling areas.

3.6 Geotechnical Investigations

Ground investigations will be carried out as part of the detailed design stage of the project by a specialist contractor. The results of the site investigations may influence the construction methods employed during the construction stage.

3.7 Duration and Sequencing of Construction Works

It is envisaged that, subject to approval by the Board, construction will commence in Autumn 2020 and will take 24 months to complete. There will be six main works areas, namely Tymon North and Tymon Park; Whitehall Park and Wainsfort Manor Crescent; Fortfield Road; Ravensdale Park and Poddle Park; St. Martin's Drive and Mount Argus, and St. Teresa's Gardens / Donore Avenue / National Stadium.

After establishing the main works compound in Tymon Park, access tracks and setting out works areas, works will begin in Tymon North and generally move downstream, however the sequencing and duration of works will be dependent on weather and ground conditions. There is a priority to carry out work on the embankment at Tymon Lake and in-stream or adjacent to stream works during low flow periods of May to September.

3.8 Construction Management

The Contractor will be obliged to prepare a Project Controls Procedures Manual (PCPM) prior to commencement of the works. The purpose of the PCPM is to define the contract specific strategy for the management and control of the Project and to describe the procedures and policies for its successful completion.

The contractor is also obliged to prepare their own Construction Environmental Management Plan (CEMP) which will set out proposed measures to mitigate against environmental impacts during construction and operational stages. The contractor will take account of all recommendations contained in the outline CEMP and will expand as appropriate.

Throughout the progress of the works, the Contractor shall also take account of relevant legislation and best practice UK CIRIA guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- SP156 Control of water pollution from construction sites – guide to good practice.

The Contractor's construction method statements shall also indicate how management, monitoring, interception, removal and/or treatment of silt run-off shall prevent contamination of ground or surface waters by mobilisation of soil particles. Fail-safe site drainage shall be provided to prevent discharge of chemical spillage from the construction site. All road and hardstanding areas with potential for contamination shall be drained to a suitable receptor where they can be stored for removal and disposal off-site. The Contractor will be obliged to comply with the mitigation measures which are compiled and set out in the **EIAR Chapter 17 Schedule of Mitigation Measures**.

In respect of noise control during the construction works, the Contractor will be obliged to comply with the mitigation measures set out in the **EIAR Chapter 12 Noise and Vibration** of the EIAR. In respect of dust and air pollution, the Contractor shall be obliged to comply with the mitigation measures set out in **EIAR Chapter 13 Air Quality and Climate Change** of the EIAR.

Mitigation measures identified within each subject area and agreed with the planning authority will be written into the Contract Documents.

In respect of the above, it is noted that the construction will be monitored by a resident engineer and Ecological Clerk of Works (ECoW) to ensure compliance with the Contract Documents and the environmental mitigation measures set out herein.

3.9 Construction Materials

In so far as possible, construction materials will be from local sources. All imported material that will be used on site will be procured from approved sources and biosecurity measures will be adhered to.

All construction products will be required to be subject to the European Union (Construction Products) Regulations 2013 and carry the CE marking. The Construction Products Regulation aims to ensure that reliable performance-related data is made available, by means of Declarations of Performance, in relation to construction products being placed on the European market.

It is envisaged that deliveries of materials will occur on a 'just in time' basis to reduce stocks on site. Temporary hard standing areas with drainage to a hydrocarbon interceptor will be constructed before refuelling/servicing activities will be allowed onsite. These areas will be bunded. Temporary bunded and suitably equipped areas will also be in place before any potentially polluting materials (oils, lubricants, solvents, fuel, etc.) will be stored on-site. Temporary stockpiling and storage of construction materials will only be allowed in designated areas.

3.10 Waste and Odour Management

The wastes expected to arise as a result of construction would be mostly earth from excavations. The project will aim to reuse as much excavated material as possible in the Flood Alleviation project. For all works, any waste generated during the construction phase will be adequately segregated and stored prior to transfer to an authorised facility for recovery/recycling/disposal.

During the construction phase both solid and liquid waste will be produced at the site. All domestic effluent generated on site will discharge to temporary sewage containment facilities prior to transport and treatment off-site by an authorised contractor. Waste oils and solvents will be stored in a temporary bunded area prior to transport off-site by a licensed contractor.

3.11 Pest Control

A Pest Control Management Plan will be prepared by the Contractor. While pests were not identified during the walkover surveys it is expected that pests and vermin are present on the site owing to the riverine habitat, and that pest control management will be required on the site.

Six weeks prior to the commencement of construction the site will be surveyed by professional pest control staff in order to identify the presence and extent of any infestations. Where infestations are identified, appropriate treatments will be implemented to eliminate infestation before construction. A continuous monitoring programme will be implemented throughout the construction period.

The control measures would be implemented in accordance with the guidelines on Rodent Control for the Construction Industry issued by the HSE, 2009.

3.12 Best Practice Construction Measures

The construction stage of the project will be managed in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2006, amendments and associated Codes of Practice and international best practice for projects of this type.

A Project Safety Plan will be developed to ensure that the safety of human beings is not impacted on in a negative way by the construction works. The site will be adequately secured to prevent unauthorised access and all visitors to the site will be required to report to the site manager. When implemented, these mitigation measures will not have any additional negative impact on the health and safety of human beings. The Project Supervisor for the Construction Stage (PSCS) will have responsibility for ensuring that relevant health and safety legislation is adhered to and that recommended mitigation measures are implemented.

4 ENVIRONMENTAL RISK ASSESSMENT

4.1 Overview

This CEMP addresses both the actual and potential effects on the environment that may be generated by the construction of the proposed development.

This section of the Contractors CEMP will provide a summary of the construction activities and related environmental aspects and impacts of the project.

The Environmental Aspects and Impacts Register is a tool for identifying, prioritising and managing activities that have the potential to impact the environment. The scheme specific Environmental Aspects and Impacts Register will set out the activities, locations, environmental aspects, and risk ratings, and will provide a reference to the mitigation measures and controls that are in place to manage the significant impacts.

The Environmental Aspects and Impacts Risk Register will be regularly updated and reassessed to allow all significant aspects to be identified.

4.2 Risk Assessment Methodology

The following step can be used to determine aspects and impacts, according to their significance:

1. Identifying project activities under all applicable conditions.
2. Determining their environmental aspects.
3. Determining the impacts of these aspects.
4. Assessing the significance of these impacts.
5. Ranking the impacts according to their significance.

Once the environmental aspects of the project have been identified, their impact risk is scored according to the Environmental Risk Assessment methodology as shown in **Table 4-1** which will then be presented by the appointed Contractor within the Scheme specific Environmental Aspects and Impacts Risk Register.

Table 4-1: Environmental Risk Assessment Methodology

	Occurrence	Severity	Control
1	Will not occur	No impact	Very controlled
2	Rare possibility	Impact minimal	Systematic control
3	May occur	Has average impact	Average control
4	Likely	Major impact	Intermittent control
5	Almost certain	Disastrous impact	No Control
Overall Risk Rating	Low 1 – 20; Medium 21 – 45; High 46 – 125		

4.3 Environmental Aspects and Impact Risk Register

An Aspects and Impacts register will be drafted by the appointed Contractor upon appointment and will be re-evaluated and updated on a regular basis by the Contractor as environmental aspects and impacts change during project execution.

5 ENVIRONMENTAL PROTECTION OBJECTIVES & TARGETS

Environmental Protection Indicators (EPOs) are a set of protection objectives for each environmental receptor. Each EPO has an associated indicator(s) and associated target(s). The EPO for each environmental receptor aims to ensure no impacts on a receptor. The indicators and targets are used as a measure of success of the objectives.

The EPOs, indicators and targets for the project are shown in **Table 5-1** and **Table 5-2** below and will be finalised following the appointment of the Contractor and will be updated as required as the project progresses.

Table 5-1 provides a list of principal objectives and targets required for delivery of the Construction Stage of this project.

Table 5-1: CEMP Principal Objectives and Targets

Principal Objectives	Targets
Ensure construction of the project is carried out in accordance with the Conditions of Planning/Consent.	The appointed Contractor will adopt this CEMP prior to the commencement of construction and ensures this Plan is agreed and approved by the Client.
	Comply with the CEMP at all times and implement the controls, procedures, method statements and plans that form the CEMP.
	Comply with all relevant legislation with no regulatory infringements and no formal regulatory warnings.
	Review and update CEMP and supporting documentation on a regular basis throughout the construction stage of the project.
	Prepare an Environmental Emergency Preparedness and Response Plan, which will detail procedures for preparing and dealing with incidents or finds during construction.
	Prepare a Waste Management Plan to be implemented for the duration of the works. The generation of waste should be minimised and waste should be reused or recycled on site where possible.
	Prepare a Dust Management Plan to be implemented for the duration of the construction works with the aim of preventing dust pollution.
	Compile procedures for addressing non-compliances and corrective actions.
	Carry out regular environmental monitoring to allow for the continual evaluation of the environmental effects of the construction phase and to

Principal Objectives	Targets
	provide monitoring information which will feed into the CEMP during the works.
Construct the development with minimal impact on the Environment.	Carry out all construction works in accordance with the CEMP and associated Method Statements, Plans and Procedures.
	Ensure all construction environmental protection and control measures are effectively and strictly adhered to.
	Review the Environmental Aspects and Impacts Risk Register and associated procedures which clearly show how environmental risks will be addressed. This register will be updated regularly.
	Prepare an effective Environmental Monitoring Programme, which will be updated regularly.
	Undertake audits and inspections in a timely manner.
	Ensure all environmental consents, permits and licences are in place prior to commencement of construction works.
	Ensure construction activities are carried out in line with planning permission conditions.
Provide appropriate environmental training to all project personnel throughout the construction works.	Induction training, including environmental requirements, to be provided to all permanent and temporary site staff and sub-contractors prior to the commencement of the construction works and throughout the works, as appropriate.
	Detailed training for staff or sub-contractors with specific environmental responsibilities.
Construct project with minimal disturbance to local businesses and community.	Prepare a Construction Traffic Management Plan (<i>as required</i>) and ensure this Plan is agreed and approved by SDCC and DCC.
	Minimise potential for dust and noise impacts by ensuring all protection and control measures are implemented and adhered to.
	Determine effective procedures for handling external communications, liaisons and complaints.

Table 5-2 presents the EPOs, indicators and targets for the project.

Table 5-2: Draft Environmental Protection Objectives, Indicators and Targets

Environmental Receptor	Environmental Protection Objective	Impact Indicator	Target
Ecology	Protect and enhance the existing flora, fauna and habitats.	Reduction in biodiversity.	Promote the biodiversity of terrestrial habitats within the works areas.
	Manage and control the spread of alien invasive species and avoid introducing new species.	Spread of invasive species.	No high impact invasive species to be spread onto site during construction.
	Ensure the protection of the Qualifying Interests of the downstream North and South Dublin Bay SACs and the South Dublin Bay and River Tolka Estuary SPA.	Impact on a Qualifying Interest.	No impact on Qualifying Interests of the downstream North Dublin Bay and South Dublin Bay SACs and the South Dublin Bay and River Tolka SPA.
Soils and Geology	Protect local soil quality, integrity and function.	Soil and/or geological contamination from construction works.	No impact on soil and geology.
Hydrology and Hydrogeology	Prevent the contamination of surface waters.	Decrease in water quality.	No contamination of surface waters.
	Prevent pollution and contamination of groundwater.	Pollution incident.	No pollution incidents.
Noise and Vibration	No impact from works in terms of noise and vibration.	No. of complaints.	No exceedances of target levels for noise and vibration monitoring on the boundary of the development sites.
Archaeological Heritage	Development in accordance with the CDPs and the National Monuments Acts	Non-compliances with the policies and objective of the CDPs and National Monuments Acts	Development in accordance with the National Monuments Acts and the policies and objective of the CDPs and no impact on protected structures along the course of the Poddle.

6 IMPLEMENTATION AND OPERATION

This section addresses the implementation and operation of the CEMP.

The following areas that will be covered include:

- Roles and Responsibility;
- Training;
- Environmental Mapping.

6.1 Roles and Responsibilities

There will be dedicated staff to manage environmental issues (or integrated HSE matters) during construction. The Construction Manager, HSQE Team and Environmental Clerk of Works (ECoW) are the project focal points relating to construction-related environmental issues. However, it is important to note that **all** personnel working on this project will be required to conduct all their activities in a manner consistent with regulatory and best environmental practice and will be required to co-operate fully with the Construction Manager, HSQE Team and Environmental Clerk of Works (ECoW) in the implementation and development of the CEMP at the project site.

A general outline of the roles and responsibilities in relation to the environmental management of the construction of the Flood Alleviation Scheme is provided below:

6.1.1 Construction/Site Manager

The Construction/Site Manager (*individual to be confirmed by the appointed Contractor*) will have a working knowledge of all the environmental permit conditions, design requirements, environmental aspects and impacts and necessary mitigating measures for the project.

They will have overall responsibility for the organisation and execution of all related environmental activities, as appropriate, in accordance with regulatory and project environmental requirements.

The environmental duties and responsibilities of the Construction/Site Manager will include (*non-exhaustive list*):

- Approve and implement the CEMP and supporting environmental documentation and ensure that all environmental standards are achieved during the construction phase of the project;
- Take advice from the HSQE Team and ECoW on legislation, codes of practice, guidance notes and good environmental working practice relevant to their work;
- Ensure that all works are completed safely and with minimal environmental risk;
- Ensure compliance through audits and management of site visits;
- Ensure timely notification of environmental incidents;
- Ensure that all construction activities are planned and performed such that minimal risk to the environment is introduced;
- Address/approve site specific environmental issues in conjunction with the Site Management Team.

6.1.2 HSQE Manager/Environmental Manager

The HSQE Manager/Environmental Manager (*individual to be confirmed by the appointed Contractor*), will be responsible for the development, implementation and revision of this CEMP and to ensure that all environmental management procedures are followed on site.

The HSQE Manager/Environmental Manager will be responsible for establishing and maintaining a document management system for the management of all records and documentation in relation to environmental management, for co-ordinating and carrying out on-site monitoring and inspections and monthly audits for the works.

The CEMP will be updated regularly by the HSQE Manager/Environmental Manager in accordance with any new work practices, legislation or changes to works which has the potential to result in an environmental impact.

The environmental responsibilities and duties of the HSQE Manager/Environmental Manager will include the following (*non-exhaustive list*):

- The implementation and maintenance of the EMS;
- Development and implementation of the site-specific Environmental Plans e.g. WMP;
- Continual assessment of all environmental risks, aspects and impacts;
- Ensuring compliance with legal, regulatory and other environmental requirements;
- Communicate with relevant Environmental Stakeholders;
- Co-ordinate the checking of environmental working procedures e.g. audit reports/inspections, corrective and preventative actions;
- Update of the EMP and sub-plans (e.g. WMP) as site activities progress.

6.1.3 HSQE Officer

The dedicated HSQE officer (*individual to be confirmed by the appointed Contractor*), will work closely with the HSQE Manager/Environmental Manager and will be responsible for ensuring that the Contract is delivered by environmentally aware personnel using safe working practices, reinforcing environmental mitigation measures through daily site inspections and audits, and appropriate training.

A record of daily checks that the works are being undertaken out in accordance with the CEMP will be kept for inspection by the Planning Authority.

The environmental responsibilities and duties of the HSQE Officer will include the following (*non-exhaustive list*):

- Oversee that the CEMP and all sub-plans (e.g. WMP) are implemented and maintained on site;
- Maintain a record of daily checks that the works are being undertaken out in accordance with the CEMP;
- Provision of assistance to the Site Management Team in relation to addressing environmental matters;
- Oversee that the Environmental Management System (EMS) is being implemented and maintained;
- Provision of environmental training to all personnel;
- Provision of toolbox talks and site inductions for the site personnel;

- Reinforce environmental mitigation measures through daily site inspections and audits;
- Conduct day-to-day environmental monitoring;
- Generate environmental reports as required to show environmental data trends and incidents and ensure environmental records are maintained throughout the construction period;
- Daily record keeping, signing off construction documents, and production of reports as required;
- Accurate completion of Environmental Non-conformance Reports (NCRs);
- Co-ordinate the implementation of the Environmental Management Plan as associated sub-plans with sub-contractor's;
- Liaising with the Site Managers in relation to all environmental matters;
- Collate information on behalf of the HQSE Manager including waste management documentation to facilitate waste traceability and disposal/re-use/recycling in accordance with current environmental legal and regulatory requirement.

6.1.4 Ecological Clerk of Works (ECoW)

The contractor will employ an Ecological Clerk of Works (ECoW) to oversee the implementation of the mitigation measures outlined below. The ECoW will be required to provide reports and written correspondence to the Employers' Representative as requested, in order to demonstrate compliance with the measures outlined in this report.

The responsibilities and duties of the ECoW will include the following (*non-exhaustive list*):

- Review of the CEMP and supporting environmental documentation and review/approval of Contractors' method statements;
- Undertake inspections and reviews to ensure that works are carried out in compliance with the CEMP;
- Monitor the implementation of the CEMP, particularly all proposed/required Environmental Monitoring;
- Generate environmental reports as required to show environmental data trends and incidents and ensure environmental records are maintained throughout the construction period;
- Ensure proper mitigation measures are initiated and adhered to during the construction phase;
- Support the investigation of incidents of significant, potential or actual environmental damage and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties;
- Identify environmental training requirements and arrange relevant training for all levels of site-based staff/workers;
- Liaison with the statutory and non-statutory stakeholders, as required;
- Regular record keeping and production of reports, as required for auditing purposes;
- Pre-construction and construction phase checks for protected species;
- Attendance at and input to site meetings, as required;
- Provision of advice on the protection of ecological features and protected species mitigation measures.

6.1.5 Site Foreman

The foreman will report on environmental activities to the site environmental representatives and will be responsible for the following:

- Implement and maintain environmental controls on site;
- Attend to any spills or environmental incident that may occur on site;
- Report any activity that has resulted, or has the potential to result, in an environmental incident immediately to the site Contract Manager and HSQE Manager;
- Complete daily environmental log;
- Maintain waste register and ensure correct waste management procedures are being implemented.

6.1.6 All Construction Personnel

All construction personnel will be required to comply with the requirements of this CEMP and will be required to:

- Comply with all legal and contractual requirements;
- Comply with all site environmental requirements;
- Comply with management/foreman directions;
- Participate in environmental induction and training, as directed;
- Comply with the Contractors' environmental policy and procedures;
- Promptly report to management on any non-conformances, environmental incidents and system breaches;
- Act in an environmentally-responsible manner at all times.

6.2 Environmental Maps

It is envisaged that a series of maps will be prepared to show locations of the works boundaries, construction activities, sensitive receptor controls and environmental protection and control measures.

The maps will be updated as necessary during the Construction of the Project and refined further by the Contractor to reflect any changes to construction activities, protection and control measures and results of monitoring.

These maps will be used by the Contractor as a tool for inductions, tool-box sessions and training and for general display in site offices.

6.3 Environmental Incidents & Non-Conformances

Whilst every effort is made to reduce their occurrence, environmental incidents and non-conformances could potentially occur on a project. Any environmental incident or non-conformance which occurs during the construction phase must be immediately reported to the Client and the relevant authorities.

The Contractor, in line with ISO 14001, will establish, implement and maintain a procedure for dealing with actual and potential non-conformities and for taking corrective action and preventive action. This procedure will define requirements for:

1. identifying and correcting non-conformities and taking actions to mitigate their environmental impacts,
2. investigating nonconformities, determining their cause(s) and taking actions to avoid their recurrence,
3. evaluating the need for actions to prevent non-conformities and implementing appropriate actions designed to avoid their occurrence,
4. recording the results of corrective actions and preventive actions taken, and
5. reviewing the effectiveness of corrective actions and preventive actions taken.

Actions taken will be appropriate to the magnitude of the problems and the environmental impacts encountered. The Contractor will ensure that any necessary changes are made to their environmental management system documentation and their project specific CEMP.

7 ENVIRONMENTAL MANAGEMENT MEASURES

The following environmental management measures have been incorporated into the development design from the Reports and Assessments prepared for the proposed development. These measures now form an integral part of the proposed development.

7.1 Population and Human Health

Impacts associated with construction – such as noise, dust, the passage of heavy works vehicles *etc.*, will be short-term effects that will end once the project is completed. The appropriate management of construction activities and traffic will mitigate against significant impacts, as set out in various sections of the EIAR.

Techniques to minimise the generation of dust before during and after the works and to protect receptors from dust and noise during construction and construction traffic have been dealt with in the following sections.

7.2 Biodiversity

The contractor will employ an Ecological Clerk of Works (ECoW) to oversee the implementation of the mitigation measures outlined below. The ECoW will be required to provide reports and written correspondence to the Employers' Representative as requested, in order to demonstrate compliance with the measures outlined in this report.

The contractor will be required to employ an Environmental Manager and ECoW to assist with preparing a detailed CEMP and its implementation, and to advise on all works in close proximity to the river.

The pollution prevention measures are as follows:

- All work within 50m of the river corridor will be planned in accordance with the contractor's ECoW and recorded in a method statement. The ECoW will give a toolbox talk in advance of works, and all working areas will be marked out clearly in advance of work;
- Silt-management measures will be implemented for all groundworks in order to prevent the release of suspended solids into the watercourse;

- The main site compound at Tymon Park will include a bunded area for the storage of pollutants, with additional areas for the stockpiling of materials, and drainage control for the washing area;
- Hazardous materials (e.g. fuel, cement, etc.) will be stored at least 50m from the river;
- Vehicles will be refuelled over drip trays;
- Spill kits will be kept in the site compound and all mobile vehicles; and
- Any concrete required for construction work will be ordered ready-mixed. Vehicles will be cleaned off site.

All in-stream works will comply with current best practice, notable the Inland Fisheries Ireland *Guidelines on protection of fisheries during construction works in and adjacent to waters* (IFI, 2016) and Transport Infrastructure Ireland's *Guidelines for the crossing of watercourses during the construction of national road schemes* (TII 2008). Impacts on habitat will be mitigated by re-instating disturbed areas with an equivalent habitat type, e.g. species-rich dry meadow or a treeline. The majority of new tree and shrub planting will be of native species, complemented by some common ornamental species, e.g. beech, chestnut, walnut, cherries and limes.

Species-rich dry meadow will be re-instated on the surface of new embankments in Tymon Park, and in the footprint of the temporary construction compound. At the outset of construction works, all topsoil will be stripped in these areas to a depth of 200 mm, stockpiled during construction works (stored separately from other materials), and then spread in a thin layer across surface of the final areas. The stripped topsoil will provide a seed source for the re-establishment of meadows in these areas. No grass-seed should be spread in these areas, and they should not be fertilised. They will be managed in the same manner as the wildflower meadow to the north of Tymon Lake. Scattered trees may be planted in some areas, but no trees or shrubs will be planted on the embankment adjacent to Tymon Lake, because wildfowl typically prefer areas with a broad field of view.

New specimen trees will be planted in Tymon Park, Ravensdale and St Martins Drive Park, accounting for twice the number of trees that will be removed.

To ensure the protection of the recorded rare plant species, the following mitigation measures will be adhered to:

- At the outset of construction works, the contractor's ECoW will survey the affected areas in order to map all individual plants of flowering rush and broad-leaved helleborine. The survey should be carried out during the growing season for these species (May to September, inclusive)
- The ECoW will review the proposed working areas with the contractor, in order to determine whether the rare plants will be disturbed
- Where possible, plants will be left in-situ and protected during construction works. Robust measures will be taken to protect the plants, including the use of temporary fences or other similar measures
- Where such impacts are unavoidable, the plants will be translocated to a similar habitat nearby (e.g. shallow flowing water for flowering rush, or broadleaf woodland for broad-leaved helleborine). The ECoW should liaise with a landscape contractor regarding suitable techniques for translocation, in order

to maximise chances of survival. The ECoW will also consider options for the collection and dispersal of seed if any plants are in flower

To control the spread of Nuttall's waterweed, a third schedule invasive species, the following mitigation measures will be adhered to:

- Prior to the commencement of construction, the contractor's ECoW will survey the affected section of channel to map the distribution of Nuttall's waterweed.
- If any waterweed is observed in the footprint of works, the ECoW will prepare an Invasive Species Management Plan, which will set out the contractor's strategy to ensure compliance with the law during construction works. The plan should include measures to avoid the accidental spread of waterweed plants during construction works, and to manually remove (and dispose of) any plants within or adjacent to the proposed working area. A derogation licence will be required from the Department of Culture, Heritage and the Gaeltacht.

Tree and shrub removal will be ideally carried out between September and February (inclusive). If this is not possible, an ecologist will survey relevant vegetation in advance in order to determine whether any protected fauna are present. If any are encountered, the vegetation clearance will be delayed until the protected fauna have moved away from the area, e.g. when chicks have fledged and a nest has been abandoned.

Tree protection zones will be marked out for all retained trees and hedgerows in the vicinity of working areas.

In recognition of the risk to nesting birds in Tymon Lake (which will be used for flood storage), two floating nest platforms will be installed on the Lake. It is intended that the nesting platforms will be approximately 1m x 1m in size and surfaced with sods of grass or reeds. They will be constructed on stable, floating platforms, but anchored to the ground to prevent them from drifting. Advice will be sought from specialists in the design of the rafts in order to maximise the likelihood of their success.

The optional provision of artificial nesting sites for sand martins and kingfisher as a measure for ecological enhancement is recommended. The following sites would be suitable:

- The western edge of Tymon Lake, on the steep section of bank between the two streams
- The southern bank of the river downstream of Tymon Lake, immediately opposite the ICW
- The north bank of the realigned section of watercourse at Whitehall Park.

Artificial nesting banks can be created from concrete and clay / polyethylene pipes or purchased as pre-fabricated wooden boxes. Nesting sites should be located on or beside the river bank, with a minimum height of 1.5m above water level, and a length of at least 5m.

All working areas will be surveyed in the year following construction in order to assess the re-establishment of vegetation. If any areas are found not to be revegetating or are found to be susceptible to localised bank erosion, additional landscaping work will be carried out. If any replanted trees or shrubs fail to establish, they will be replaced with a suitable alternative.

If Nuttall's waterweed or any other invasive species is found to have spread during construction works, the contractor will be required to eradicate any new growth.

Populations of rare flora will be monitored for the first three years after construction. If any populations are observed to be declining or in poor health, an ecologist will liaise with a landscape contractor regarding suitable methods to assist the plants.

The status of nesting birds in Tymon Lake will be assessed for three years following construction, including during any periods of high rainfall in the nesting season. If nests are being affected by inundation on an annual basis, then additional measures will be implemented, such as the provision of additional nesting rafts or modifications to the rafts.

7.3 Hydrology and Hydromorphology

In general, all works on the riverbank will be subject to a specific method statement agreed in advance with the statutory authorities. The method statement will incorporate the following points:

- To avoid excessive silt runoff, site clearance is not to be undertaken during wet conditions, when rainfall of more than 0.5 mm/hour is forecast within the next 24 hours;
- To avoid contamination of the river water during an extreme flood event, no works likely to generate soiled water are to be carried out when rainfall of more than 3 mm/hour is forecast within the next five days in the River Poddle catchment;
- At the riverbank works locations, eroded sediments are to be retained with silt fences;
- Soil cleared from the site and all materials associated with the building process are to be stored outside the flood zone in designated storage areas;
- Works adjacent to the riverbank will have catch-nets and silt traps to prevent debris from falling into the river;
- Raw or uncured waste concrete is not to be disposed of within 30m of the river;
- Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents and oils *etc.*, is to be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment;
- Fuelling and lubrication of equipment is not to be carried out close to the riverbank or lake shore;
- Any spillage of fuels, lubricants or hydraulic oils is to be immediately contained and the contaminated soil removed from the site and properly disposed of;
- Waste oils and hydraulic fluids is to be collected in leak-proof containers and removed from the site for disposal or re-cycling;
- Hydrocarbon/grit interceptors of suitable size are to be placed on the runoff discharge from the car park at the abstraction point and must be maintained by a person or persons designated to carry out this maintenance;

Best practice mitigation measures will be employed for this Scheme as contained in the following guidance documents and best practice UK CIRIA guidance which includes but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects;
- SP156 Control of water pollution from construction sites – guide to good practice
- NRA's 'Guidelines for the Crossing of Watercourses during Construction of National Road Schemes (NRA, 2005);
- the Eastern Regional Fisheries Board guidance document 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Murphy, 2004); and
- the Southern Regional Fisheries Board guidance document 'Maintenance and protection of the inland fisheries resource during road construction and improvement works' (Kilfeather, 2007).

For in-river works the following mitigation measures are recommended:

- Measures to minimise the suspension and mobilisation of sediment downstream of the working area should consider silt barriers and cofferdamming to create dry working areas;
- Works should allow the river to recover for at least 14 hours on a daily basis meaning that the period of in river work should be about 10 hours maximum;
- A dry working area should be created for pouring of concrete;
- In areas of the river where there are alien species, all plant and machinery should be thoroughly washed before moving to another section of the river;
- All vehicles should be regularly checked for oil leaks, and ruptured hose pipes.

Best practice measures will be adhered to during in stream works and any diversions of the river during construction should follow the NRA's "*Guidelines for the Crossing of Watercourses during Construction of National Road Schemes*" (NRA, 2005).

Best practice methods should be employed at all stages during the construction. It is recommended that the contractor's compound is situated as far as is practicable from the river.

Fuel, lubricants, hydraulic oil, repair equipment used on the construction site should be carefully handled to avoid spillage.

All tanks, barrels or containers containing hazardous materials (oils, lubricants, sealants etc.) must be stored in a sufficiently sized bunded area.

Spill kits will be made available in site compound and in site machinery. In the event that a spillage does occur, adsorbent material should be placed on the material to adsorb it. The contaminated adsorbent should be correctly disposed of as a hazardous waste and brought to a licenced waste handling site by a licenced waste contractor. The site manager

must retain a copy of any waste transport and disposal documentation. In the event of a larger spillage of oil/hydraulic oil then South Dublin County Council and/or Dublin City Council Environment Sections should be contacted immediately. The Emergency Procedures for the site should have a procedure for dealing with large spillages.

All empty diesel/oil/hydraulic oil containers should be drained to a single labelled container. The empty oil containers should be stored in a dedicated labelled totally sealed skip. Waste skips should be collected by a licenced waste carrier and brought to a licenced facility for disposal. All disposal records must be retained at the site offices.

The waste from the chemical toilets should be collected by a licenced waste carrier and brought to a licenced treatment facility.

A supply of oil booms and soak pads must be maintained within the contractor's area.

A robust programme of maintenance will ensure that culvert screens and channels are kept clear of debris to ensure the flood alleviation scheme functions correctly during a storm event. This includes carrying out repair works on existing walls and instituting a robust maintenance programme to ensure that debris that has accumulated in the channel is removed and vegetation cleared in order to prevent blockages in the future. These measures will be undertaken by each Council (South Dublin County Council and Dublin City Council) as part of a regular maintenance programme. The existing culverts and screens at Wainsfort Manor, Lakelands and Gandon Close have CCTV cameras and level alarms and are currently checked and cleared by the responsible local authority in advance of forecast rainfalls.

In addition to the above maintenance an asset register of the flood defences for the River Poddle will be prepared for SDCC/DCC to be incorporated into the Development Plans for both authorities to ensure that defences that are erected will not be removed as part of any future development either by a local resident or as part of a planning submission.

The embankment structures will be kept clear of tree planting to maintain structural integrity and the flow control structure and embankment at Tymon Lake will undergo periodic checks by an All Panel Reservoir Engineer to ensure that the structural condition of the embankment is in order and there is no change or obstruction to the operation of the emergency overflow spillway that would inhibit the secure overflow of embankment for events greater than 1% AEP.

7.4 Soils, Geology and Hydrogeology

Any soil imported to site will be subject to assessment to identify any invasive alien species present by a suitably qualified Ecologist. Any soils stored on site will be seeded and periodically topped. Such stores will be subject to on-going monitoring.

If invasive plant species are present at any of the sites, machinery and equipment including footwear and tools will be cleaned appropriately (as per species requirements) between infested sites.

An estimated 5,000m³ of material is to be excavated and reused elsewhere on site or locally. The excess material from the excavation works will be used as bulk fill, embankments or landscaping where possible. It is estimated that 50% of the material will be required for the embankments and landscaping and the remainder will be taken off site

for disposal at an agreed licensed area. All material removed from site will be disposed of in accordance with relevant waste management legislation. Where material cannot be reused on site, it will be exported to co-ordinate deliveries of imported fill with a load of unsuitable material requiring removal from site in order to minimise traffic movements.

The top layer of soil (approximately 200m depth) contains valuable ecological material that will be saved separately from subsoils and will be used to reinstate the parks and green areas and allow for natural restoration and establishment of plants. Stockpiles of this material are to be stored in banks no more than 1m high.

All materials excavated from the works areas will be stockpiled as close to the area where they are to be re used in landscape restoration in order to minimise on-site haulage and double handling. Areas for material storage have been assigned in consideration of sensitive habitats and ecological features and use of the parks and green spaces in the Scheme. Stockpiles of other material will be formed no more than 2m in height and will be sealed using the back of an excavator bucket or tracked upon by a tracked excavator to ensure the stockpile does not become saturated and therefore difficult to handle when being reinstated into the works. All stockpiles will be clearly defined, fenced and signed to ensure no cross contamination of other materials to be stockpiled.

The contractor shall be obliged to ensure no deleterious discharges are released from the sites to the River Poddle during excavation de-watering, testing or washing activities. Throughout the period of works the contractor shall also take account of relevant legislation and best practice guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects;
- SP156 Control of water pollution from construction sites – guide to good practice.

The contractor's construction method statements shall also indicate how management, monitoring, interception, removal and/or treatment of silt run-off will prevent contamination of ground or surface waters by mobilisation of soil particles.

The contractor's methodology statement should be reviewed and approved by a suitably qualified geotechnical engineer prior to site operations.

Excavations will be backfilled as soon as possible to prevent any infiltration of potentially polluting compounds to the subsurface and the aquifer.

Prior to the storage of any potentially polluting material on site, the site manager will be responsible for ensuring that a material safety data sheet for each product is available for inspection. A copy of all relevant material safety data sheets will be available at storage locations as well as the site office.

The majority of new material brought to site will be used immediately or will be stored within the site boundary. Other materials such as asphalt or concrete will be brought directly to the construction site when required and immediately placed.

All potentially polluting materials will be stored in bunded areas, the capacity of which will be 110% of the total volume of liquid to be stored. Any machinery refuelling that takes

place on site will be carried out by competent personnel at a single designated location within the site boundaries, close to the site entrance.

Spill kits will be stored at the machinery refuelling area. The spill kits will comprise suitable absorbent material, refuse bags, *etc.* to allow for the appropriate clean-up and storage of contaminated material in the event of a spillage or leak occurring.

The washing of any plant equipment will be carried out in designated areas to prevent potentially polluting material from contaminating aquifers and soils/subsoils.

There will be no discharge of effluent to groundwater during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment.

Any potentially contaminated groundwater that may be pumped from excavations will be tested and discharged appropriately.

All machinery will be inspected at the start of each work shift for signs of leaking hydrocarbons. Parking areas will be inspected on a daily basis for evidence of hydrocarbons leaking from machinery.

All materials required for the maintenance of the sites will be stored according to good practice and in areas either off-site or in bunded areas with impermeable floors. A programme of inspection and maintenance of the site drainage will ensure that any damage, blockages, *etc.* are identified and remedied.

7.5 Landscape Character and Visual Amenity

Landscape effects of the proposed development range from Not Significant to Moderate/Significant, adverse, as with visual effects in relation to tree removal and changes to the character of the areas.

Mitigation and avoidance measure were incorporated into the project design, including Landscape Mitigation plans which are proposed for Ravensdale Park, parts of Tymon Park, and a tree planting plan is also included for St. Martin's Drive.

7.6 Archaeological, Architectural and Cultural Heritage

Table 7-1 presents a range of proposed mitigation measures which will be implemented for archaeology, architecture and cultural heritage in and near the works areas prior to and during works associated with construction of the proposed scheme.

Table 7-1: Archaeology and Architectural and Cultural Heritage mitigation measures

Unique ID	Description	Proposed mitigation
DU022-007	Zone of notification for castle – tower house	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
DU018-043003	Weir	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
DU018-043004, DU022-003, and DU018-043002	Zone of notification for the City watercourse	<p>Where it is proposed to divert the watercourse, a wade survey should be carried out along the existing stretch of the Poddle prior to commencement of construction activities. This should be carried out under licence from the National Monuments Service of the DoCHG.</p> <p>Archaeological monitoring of any excavation works along the course of the city watercourse should be carried out during construction. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.</p>
DU022-078	Zone of notification for a windmill	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
DU018-047001	Zone of notification	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by

Unique ID	Description	Proposed mitigation
	for the site of Donore Castle	record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
DU018-020	Zone of archaeological potential for Dublin City	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
CH 01 and CH 06	Ravensdale Mills and its mill pond	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
CH 03	Cutlers Mill	Archaeological testing in the first instance. This should be carried out by an archaeologist under licence from the DoCHG. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
CH 04	Cutlers mill race	Archaeological testing in the first instance. This should be carried out by an archaeologist under licence from the DoCHG. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
n/a	Greenfield areas	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further

Unique ID	Description	Proposed mitigation
		mitigation will require approval from the National Monuments Service of the DoCHG.

7.7 Noise and Vibration

The contractor will be required to implement the control measures recommended in BS 5228 and apply the appropriate measures where applicable. Other measures will include:

- Working hours during site construction operations will be restricted to daytime hours from 07:30 hours to 16:30 hours (Monday to Friday) and, as may be required, from 08.00 hours to 13.00 hours (Saturdays). Evening and night-time work is not expected to take place although it is possible that limited 24 hours working may be required to take place on occasion. This will only take place with the prior agreement of SDCC and DCC.
- An on-site speed limit will be enforced for all traffic. Drivers of vehicles will be advised of the speed limits through the erection of signs *i.e.* a typically recommended on site speed limit is 10 km/hr.
- Where practicable, the use of quiet working methods and the most suitable plant will be selected for each activity having due regard to the need for noise control.
- Best practicable means will be employed to minimise noise emissions and will comply with the general recommendations of BS 5228, 1997. To this end operators will use “noise reduced” plant and/or will modify their construction methods so that noisy plant is unnecessary.
- By positioning potentially noisy plant as far as possible from noise sensitive receivers the transmission of sound can be minimised. Earth mounds and/or stockpiles of material or perimeter hoarding on site can be used as a physical barrier between the source and the receiver.
- Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately in order to minimise noise breakout from the site while still maintaining their effectiveness.
- All plant will be maintained in good working order. Where practicable, machines will be operated at low speeds and will be shut down when not in use.
- Compressors will be of the “noise reduced” variety and fitted with properly lined and sealed acoustic covers.
- In all cases engine and/or machinery covers will be closed whenever the machines or engines are in use.
- All pneumatic percussive tools will be fitted with mufflers or silencers as recommended by the equipment manufactures. Where practicable, all mechanical static plant will be enclosed by acoustic sheds or screens.
- Employees working on the site will be informed about the requirement to minimise noise and will undergo training on the following aspects:

- The proper use and maintenance of tools and equipment.
- The positioning of machinery on-site to reduce the emission of noise to the noise sensitive receptors.
- Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment.
- The use and maintenance of sound reduction equipment fitted to power pressure tools and machines.
- Cognisance will also be taken of the *Environmental good practice site guide 2005* compiled by CIRIA and the UK Environment Agency. This guide provides useful and practical information regarding the control of noise at construction sites.
- Where excessive noise levels are recorded, further mitigation measures will be employed which may include temporary wooden hoarding / acoustic screening to be installed to a height of no less than 2m around areas of construction where loud noise levels occur.
- The contractor will ensure that the TII Guidelines which identify limits for protection against cosmetic damage as a function of vibration frequency are not exceeded through the use of the selected low vibration piling method.
- Responsible Person –The Contractor will appoint a responsible and trained person who will be present on site and who will be willing to answer and act upon complaints and queries from the local public.
- Night-time Working - If there are items of plant (e.g. dewatering pumps and similar) in use during night-time hours they will be chosen, sited and enclosed such that levels at the nearest properties do not exceed the measured background noise levels.
- Where deemed necessary due to excessive impact or complaints received, noise monitoring will be undertaken during construction works to determine noise levels at noise sensitive receivers. On the basis of the findings of such noise monitoring, appropriate noise mitigation measures will be implemented to reduce noise impacts.
- The contractor will conduct continuous monitoring of vibration levels during any piling that may have the potential to result in a vibration impact at nearby properties.

7.8 Air Quality and Climate

The site manager has the overall responsibility for ensuring that operations comply with the requirements of any planning authorisation.

The site will have at its disposal a suitable water bowser and associated water supply to allow for dampening down of areas of the site works when windblown dust arises. The occurrence of potential wind-blown dust is very much weather dependent but suitable facilities will be available to minimise windblown dust from the site surfaces.

Construction activities will take place Monday to Friday, between 07:30 and 16:30, and as may be required on Saturdays from 08.00 hours to 13.00 hours. Evening and night-time

work is not expected to take place, although it is possible that limited 24 hours working may be required to take place on occasion. This will only take place with the prior agreement of SDCC and DCC.

Regular attention shall be paid to cleaning dust material from all roadways, hard surfaced areas and working areas of the construction site. Dust from clean-up will be re-incorporated into stockpiles within the construction compound and adjacent to working areas. This will be done at appropriate intervals during the day and at the end of each working period.

Roadways and other areas within the construction compound where vehicles are regularly moving shall be kept clean, by sweeping or by wetting.

When loading vehicles within the construction compound and overall construction site, the following procedures will be adhered to:

- No overloading of vehicles or containers resulting in either peaks of cargo or overspill onto the working areas or roadways.
- Keep fall heights of the material into the transport vehicles to a minimum.

Strictly applied, suitable on-site speed limits shall be set, displayed and observed for the movement of all vehicles (10 mph)

Mandatory use of the wheel wash provided.

Stockpiling shall be co-ordinated in such a way as to minimise the potential for double handling of material and carefully planned to ensure minimum exposure to winds, thereby reducing dust emission to air.

Stockpile areas will be clearly and physically delineated to deter vehicles from running over extracted material at the stock edge.

Stockpiles shall be managed to ensure that the profile of material will be no higher than 2m which will minimise wind whipping.

During embankment construction and any stockpiling, embankments and stockpiles shall be profiled and compacted by flattening out peaks and ridges and when partially worked, shall be re-contoured to prevent ridges or overhanging falls.

Whenever possible, embankments and stockpiles shall not be broken into when the wind is likely to lift newly exposed dry dust. When this is unavoidable, effective dust control methods shall be implemented.

Prior to carrying out any stockpile handling operations, the dust suppression equipment will be checked to ensure that it is working properly.

A high standard of housekeeping will be maintained on site.

Contingency plans shall be made to provide dust control in the event of equipment malfunction, whether by loan, hire or other arrangements.

Systems for monitoring processes, responding to and reporting pollution incidents shall be devised. This information shall be kept in a logbook, together with information regarding equipment failure, periods of significant dust emissions off-site and the inspection of roadways, together with any remedial action taken.

Any complaints received from neighbouring properties will be logged and appropriate actions taken to reduce the potential for further complaint.

The following Dust Management Plan will be implemented by the contractors at all times and special importance will be placed on these actions on high wind days.

Table 7-2: Dust Management Plan

Parameter	Action	Responsibility
Induction	Induction for all employees will include information on: <ul style="list-style-type: none"> • Potential sources of dust • Dust Management Plan, Monitoring program and awareness • Speed limits onsite and staying on designated roads • Who to report dust issues too 	Site Manager
Windy Conditions	<ul style="list-style-type: none"> • Monitor wind and weather forecasts and cease operations where dust cannot be controlled. 	Site Manager
Traffic	<ul style="list-style-type: none"> • Adhere to site speed limits and designated roads • Use of wheel wash when leaving site 	Drivers
Open Areas	<ul style="list-style-type: none"> • Minimise open areas exposed to wind erosion as much as practical by completing an assessment of all construction areas. 	Site Manager
Dust Suppression	<ul style="list-style-type: none"> • Operate water bowzers during dry, windy conditions and during the summer months, generally from April to September, across the site and construction compound to apply water to operational areas (<i>i.e.</i> roads, stockpile and loading areas) • All roads being used for heavy vehicle traffic within the construction area will be treated with dust suppression, where appropriate. • Apply dust suppression to all stockpiles prone to wind erosion. 	Site Manager
Soil stripping	<ul style="list-style-type: none"> • Conduct soil stripping only during suitable wind and weather conditions, so as to minimise the generation of dust. 	Site Manager
Loading & haulage	<ul style="list-style-type: none"> • Haul truck operators to monitor loading conditions and call on water bowser to dampen areas in dusty conditions. • Haul truck operators to monitor road conditions and call on water trucks to dampen roads when dusty • Haul truck operators to reduce speed to minimise dust. • On days where dust cannot be controlled shut down operations until dust can be satisfactorily managed. 	Site Operators
Record Keeping	<ul style="list-style-type: none"> • All actions undertaken for mitigation of dust during dusty conditions will be recorded by the site supervisor. • Document all readings, wind directions, area omitting dust and actions undertaken. • Determine compliance when auditing and reporting. 	Site Manager
Dust Monitoring	<ul style="list-style-type: none"> • Monitoring is required to enable an assessment of the effectiveness of the dust management controls and improvements to be made, where required. 	Site Manager

Parameter	Action	Responsibility
	<ul style="list-style-type: none"> Bergerhoff dust deposition monitoring along the construction compound perimeter and site boundaries where any prolonged construction activities will occur and where there are any reported construction dust complaints. A report on the results of this monitoring shall be available to the local authority on a quarterly basis. 	
Complaint Records	<ul style="list-style-type: none"> Complaints will be logged and maintained on site. 	Site Manager
Performance Indicators	<p>The effectiveness of the Dust Management Plan will be reviewed against the following indicators:</p> <ul style="list-style-type: none"> Compliance with guideline values for dust deposition monitoring. The level of substantiated complaints received and registered. The level of complaints satisfaction achieved. The absence of fugitive dust originating from the site. Audit results of compliance with actions 	Site Manager

7.9 Traffic Management

A Traffic Management Plan (TMP) will be agreed between the Contractor, local authorities and client's Representative to:

- Minimise construction, maintenance and ancillary vehicle movements to site during peak times such as rush hour.
- Ensure daily construction programs will be planned to minimise the number of disruptions to surrounding roads by staggering HGV movements to avoid site queues.
- Provide wheel and vehicle body washing facilities, use water bowsers, dust suppression or similar apparatus and street sweepers in order to keep construction routes free from vehicle deposits and debris.
- Provide appropriate information and signage along the construction routes and on approach roads to the site.
- Ensure vehicle loads are securely sheeted and restrained, where appropriate, prior to dispatch.
- Ensure all appropriate signage is installed prior to the works commencing on site. All signage shall be provided in accordance with the Department of Transport's Traffic Signs Manual, November 2010 – Chapter 8 – Temporary Traffic Measures and Signs for Roadworks.

Mitigation measures may also be proposed following consultation with the local roads authority and public transport operators. It is recommended that the roads authority and the public transport operators are consulted in order to address any concerns they may have regarding accidents and road safety along the proposed route.

7.9.1 Training and Awareness

All construction personnel, subcontractors and consultants will receive training during the site induction and toolbox talks. This will include a traffic management component to reinforce the importance of traffic management issues and the measures that will be implemented to protect the environment and community.

Site inductions and toolbox talks will highlight the specific environmental requirements for activities being undertaken at each worksite, which will include relevant traffic management matters. All drivers associated with the project are to abide by the relevant driver behaviour requirements and laws including speed restrictions, observation, fatigue management, vehicle maintenance and the onsite drugs and alcohol policy.

7.10 Material Assets

7.10.1 Local Settlement and Land Uses

The working areas in the proposed Poddle River Flood Alleviation project is in an urban / suburban setting in the south-west of Dublin City in the administrative areas of SDCC and DCC.

The Poddle River passes through areas of industrial, commercial, residential and open space/recreational uses. Much of the area in the vicinity of the proposed works is urban and well developed.

7.10.2 Utilities

This section provides a baseline description of the utilities services within the study area that interface with the proposed Scheme. Utility data for the study area has been collated from the following sources:

- South Dublin County Council;
- Dublin City Council;
- Irish Water;
- ESB;
- Telecoms: Virgin Media, Eir, BT, Three;
- Gas Networks Ireland;
- Site topographic surveys;
- Geotechnical site investigations including slit trenches, trial pits and boreholes.

7.10.3 Wastewater

This section reviews the existing wastewater infrastructure which includes pipe sewer networks, foul pumping station and wastewater treatment plants within the study area. The wastewater assets in particular adjacent to the proposed Scheme are:

- 300mm and 675mm pipe crossing River Poddle near the area downstream of Tymon Lake;
- 525mm pipe installed along Limekiln Road;
- 225mm pipe installed along Whitehall Close;
- 225mm pipe installed along Glendale Park;

- 300mm pipe installed along Fortified Road.

7.10.4 Water Supply

This section reviews the existing water infrastructure which includes pipe networks, pumping stations and treatment plants within the study area and the assets specifically adjacent to the proposed works are:

- 101.6 UpVC watermain installed along Limekiln Road
- 6" UPVc watermain in the green area near Templeville Road
- 6" UPVc watermain in the green area adjacent to the Wainsfort overflow weir
- 101.6 Cast- Iron watermain installed along Fortified Road
- 101.6 Asbestos watermain installed along Ravensdale Drive
- 9" Asbestos watermain installed along Ravensdale Park Road
- 200mm Ductile Iron watermain installed along Poddle Park Road
- 100mm Ductile Iron watermain installed at the end of Mount Argus Close

7.10.5 Surface Water Network

This section reviews the existing surface water infrastructure which includes pipe networks, stormwater pumping stations and stormwater attenuation area within the study area and the assets specifically adjacent to the proposed works are:

- 600mm pipe installed adjacent to ESB substation in Tymon North;
- A 525mm and a 450mm outfall at the area downstream of Tymon Lake;
- 300mm pipe and a 600mm at the north east area of Tymon Park;
- 225mm outfall at the green area near Templeville Road;
- 600m pipe crossing River Poddle near the Wainsfort overflow weir;
- 225m outfall from Glendale Park;
- 225mm pipe installed along Wainsfort Manor Crescent;
- 450mm outfall from Glenanne Road;
- 920mm pipe installed along Fortfield Road;
- 225mm pipe installed along Ravensdale Park;
- 225mm pipe crossing River Poddle at the area downstream of Poddle park footbridge;
- 300mm pipe installed along St. Martin's Drive;
- 225mm outfall at the end of Mount Argus Close.
- 600mm outfall at the end of Mount Argus Square.

7.10.6 Electricity Supply

This section reviews the existing ESB infrastructure, including underground and overhead infrastructure, substations, within the study area. The following is a brief description of the ESB infrastructure in the study area:

- 38kV HV underground cable installed along River Poddle route adjacent to Tymon Castle
- 38kV HV underground cable adjacent to the ESB substation in Tymon North

- Two MVLV underground three phase cables crossing River Poddle adjacent to the ESB substation
- One MVLV underground three phase cable crossing the River Poddle at the north east area of Tymon Park
- One MVLV underground three phase cable in the green area near Templeville Road
- One MVLV underground three phase cable in the green area adjacent to the Wainsfort overflow weir
- Two 38kV HV underground cable installed along the left bank of River Poddle adjacent to Fortfield Road
- One 110kV HV underground cable installed along Ravensdale Park Road
- One 38kV HV underground cable crossing River Poddle at the area downstream of Poddle park footbridge
- One MVLV underground three phase cable installed at the end of Mount Argus Close

7.10.7 Gas Networks

This section reviews the existing Gas Network Ireland infrastructure, including distribution and transmission infrastructure, within the study area. The following is a brief description of the Gas networks infrastructure in the study area:

- A 63 PE-80 700mbar medium pressure distribution gasline installed in the area upstream of the ESB substation in Tymon North
- A 90 PE -80 25mbar low pressure distribution gasline installed along Fortfield Road
- A 180 PE -80 25mbar low pressure distribution gasline installed along Ravensdale Park Road.
- A 90 PE -80 25mbar low pressure distribution gasline installed along Ravensdale Drive.
- A 180PE 4bar medium pressure distribution gasline crossing River Poddle adjacent to Saint Martin's Drive at the upstream area of the existing footbridge.
- A 90 PE -80 25mbar low pressure distribution gasline installed along Saint Martin's Drive.
- A 63 PE-80 700mbar medium pressure distribution gasline installed at the end of Mount Argus Close

7.10.8 Telecommunications

This section reviews the existing telecommunications infrastructure, including Virgin Media, BT, Eir Tree Network infrastructure, within the study area. The following is a brief description of the telecoms networks infrastructure in the study area:

- Lines present along Limekiln Road adjacent to Tymon Park site boundary;
- Lines crossing the river channel adjacent to the proposed ICW in Tymon Park;
- Lines installed close to proposed site entrance at Whitehall Park;

- Lines installed adjacent to site boundary along Wainsfort Manor Green, Wainsfort Manor Drive and Wainsfort Manor Crescent;
- Lines installed adjacent to proposed works at St Anne's Terrace;
- Lines on Kimmage road Lower adjacent to Ravensdale Park and along Ravensdale Drive;
- Lines along Poddle Park Road adjacent to works at St. Martin's Drive;
- Lines installed in Mount Argos Square and Mount Argos Close adjacent to the proposed works at Mount Argos Close.

8 MONITORING, REVIEW & TRAINING

8.1 Monitoring

Scheduled environmental monitoring of environmental performance and compliance with planning consents and legislation and regulations will be required throughout the construction phase of the Project. This will enable the overall effectiveness of the environmental controls to be determined and allows areas of non-compliance to be identified so corrective actions can be taken. Environmental monitoring will take place prior to construction to assess the baseline, during construction to assess the impact of the construction on the environment and after construction to assess the impact of the completed Project. Environmental monitoring will be required at various stages of construction for each environmental aspect as developed in specific environmental sub-plans and the Project. The overall monitoring schedule, including environmental aspects, frequency and monitoring requirements will be developed by the appointed Contractor and approved by the Client. The monitoring schedule will be a working document and will be amended and updated to reflect resource consent and designation conditions and management review changes.

The overall monitoring schedule, including environmental aspects, frequency and monitoring requirements will be finalised by the appointed Contractor and approved by the OPW prior to works commencing on site.

The monitoring schedule will be a working document and will be amended and updated to reflect resource consent, designation conditions and management review changes.

8.2 Review

The Contractor appointed representative will review the daily inspection forms on a weekly basis to confirm that the checks and subsequent required works are being carried out and additional inspections are included as construction progresses.

Regular meetings will be held on site by key personnel to discuss the results of the daily, weekly and monthly site monitoring.

Should inspections indicate that any environmental protection and controls measures are not functioning as intended, the Contractor will instigate a review of the CEMP or relevant sub-plan, as required. As mentioned previously, specific environmental objectives indicators and targets will be further developed prior to the project construction works commencing.

8.3 Reporting Requirements

8.3.1 Environment Report

The monthly Environmental Report which will form part of the overall Contract Progress Report will cover all aspects of environmental reporting but specifically includes summaries of all regular data and KPI's. The format will cover, but will not necessarily be limited to, the following:

Details of Inspections/ Audits

- Audits and inspections programmed for the month;
- Audits and inspections carried out;
- Audit and inspection findings/reports;
- Actions arising/ corrective actions put in place;
- Number of audits planned for Month ahead.

Environmental Performance

- Level 1: Man hours
 - Man-hours completed during the month and cumulative annual and contract man-hours including those of sub-contractors.
- Level 2: Environmental Incidents and Information
 - Any environmental incidents;
 - Any environmental violations/non-compliances with environmental permits, licenses, regulations or similar statutory or contractual requirements;
 - Any environmental near miss incidents;
 - Any environmental and/or nuisance type complaints;
 - Details of any EPA and/or local authority Site visits / inspections / enforcements / correspondences etc.
- Level 3: Waste Records
 - Quantities and types of materials used;
 - Waste Management Records, including waste material identified by European Waste Catalogue (EWC) Code;
 - Detailed (tonnage) data on the various waste streams generated.
- Level 4: Fuel Consumption
 - Data collected by the Appointed Contractor to measure/estimate the Carbon Footprint;
 - Details of any environmental initiatives.

The format of the Environmental Report will be agreed with the employer and submitted on a Monthly Basis as an appendix to the Monthly Progress Report.

All Environmental KPI's will also be captured in the Contractor's Monthly Progress Report and will be provided to the Employer's Representative each month as part of the KPI Report.

8.4 Environmental Audits

The appointed Contractor will detail the environmental audits for the Contract. Environmental audits will take place to ensure conformance with the Contractors'

Environmental Management System, to ensure the EMS is properly implemented and maintained and to determine the extent to which the requirements defined in the project resource consents, management plans and environmental procedures have been met.

These audits will focus on site and task specific activities such as erosion and sediment controls, refuelling procedures and any high-risk construction activities. The objective of these audits will be to ensure all mitigation and control measures and methodologies are being implemented and adhered to. Results of the audits (internal and any external audits) will be reported back to the project team through a variety of mechanisms including site toolbox talks, construction meetings and inspection reports.

8.5 Corrective Actions Plans

For any non-compliances, Corrective Action Requests (CARs) will be issued to ensure that prompt action is agreed and committed to, with a view to the effective resolution of any deviations from the CEMP requirements or any environmental issues.

CARs may be raised as a result of:

- An internal or external communication;
- An internal audit - A regulatory audit or inspection;
- A suggestion for improvement;
- An incident or potential incident.

All corrective action requests will be numbered and logged.

8.6 Control of Sub-Contractors

The Contractor will ensure that all appropriate environmental documentation is communicated, and relevant training is provided to sub-contractors before commencement of associated works. The Contractor will prepare a written procedure outlining how all appropriate environmental requirements associated with sub-contractor activities are compliantly managed. This will include a methodology for ensuring sub-contractor's competence and compliance and the availability and provision of necessary resources.

8.7 Management Review

The CEMP will be reviewed by senior management on an on-going basis at progress and management meetings to ensure continual improvement in accordance with the BS EN ISO 14001. Review of the CEMP will be carried out at each project phase and where changes are made that affect the scope of the works to ensure its continuing relevance and accuracy.

This will ensure that the environmental performance of construction activities associated with the Poddle Flood Alleviation Scheme are subject to continual improvement and will ensure that environmental objectives and targets outlined in this Plan are achieved.

8.8 Training

Training should include at minimum:

- Induction training including environmental requirements for all operatives and subcontractors;
- More detailed training for staff or subcontractors with specific responsibilities *e.g.* Waste Rep;
- Toolbox talks, depending on the type of works being undertaken and the environmental impacts that may result from these activities *e.g.* training on water pollution prevention before works near watercourses. Training to be given will include:
 - Protected species/habitats
 - Environmental incidents
 - Invasive plants
 - Water pollution prevention
 - Waste management
 - Spill control & spill kits
 - Dust and Air Quality
 - Storage and use of petrol diesel and oils

Contact specific information should be displayed on notice boards and briefed to all staff.

9 CONCLUSION

The project specific CEMP will be a live document which will be reviewed throughout the construction process through regular auditing, monitoring and site inspections. This will ensure that the environmental performance of construction activities associated with the River Poddle Flood Alleviation Scheme are subject to continual improvement and will ensure that environmental objectives and targets outlined in the Plan are achieved. Revisions to the CEMP may include any changes and improvements made during the works from an environmental perspective.