4 Construction Activities

4.1 Introduction

This chapter describes the construction activities and sequencing for the proposed flood relief scheme and outlines the general mitigation measures which have been incorporated into the design and which will be implemented during the construction phase to ensure the potential impacts of the construction activities on the environment are avoided, prevented or reduced.

It is anticipated that, with the proper implementation, phasing and management of construction activities described in this chapter, the construction phase of the development will have no significant or long-term impact.

4.2 Summary of Construction Works

The main aspects of the proposed flood relief scheme comprise construction works entailing the following:

- Construction of new flood defence walls and/or replacement of existing walls with new flood defence walls;
- Replacement of and/or extension of existing culverts;
- Removal of and/or replacement of bridges;
- Removal of existing trash screens and construction of new coarse screens;
- Local channel widening, deepening, realignment and regrading of river channel;
- Construction of new earthen flood defence embankments;
- Provision of civil works such as road/footpath re-grading at a number of locations;
- Removal of vegetation and trees to facilitate construction works;
- Protecting drainage outlets along the line of flood defence works with non-return flap valves;
- Landscaping and tree planting;
- Reinstatement of boundary walls and fences and landscaping and replanting of trees on completion in agreement with landowners; and
- Once construction is completed, ongoing maintenance of the river channel, trash screens etc.

An outline of the methodology to construct the major elements of the works is described below.

4.3 Outline Construction methodology

4.3.1 Enabling works and site clearance

The proposed scheme will be a linear development along the various watercourses. The proposed construction works will be limited to the areas outlined in red on the drawings with the exception of some temporary access routes and site accesses which will be required at some locations so that construction workers and construction vehicles can access certain areas and Landscaping and reinstatement works for landowners may take place outside these areas with their agreement. For example, access will be temporarily required along the existing cycle path in Ballybrack in order to construct the coarse screen at Ballybrack Woods. These access routes are shown on **Drawing No's C-000-040** to **C-000-042** in **Appendix 3.3** of this EIS.

Similar enabling works will be required at each of the areas and are detailed below. Works specific to individual working areas are detailed separately where necessary.

- Construction of the temporary site access.
- Once access is achieved the Contractor will install secure hoarding approximately 2.4m high around each of the working areas that will remain in-situ during the construction of the works in each area.
- Vegetation, tree and topsoil removal to take place as necessary.

A construction compound will be installed to accommodate site offices and welfare facilities. Refer to **Section 4.5.6** for further details.

4.3.2 Culverts

The construction of the culverts in Togher, Church Road and Donnybrook Commercial Centre will generally be undertaken by excavating and removing the existing culverts before craning in precast culvert units. The precast units come in standard lengths and will be joined on site. Temporary over pumping or piping of the watercourses or temporary diversion channels / culverts (where space allows) will be required to facilitate the construction of the culvert sections. Thus the works will be carried out in the dry.

In general, the new culverts will be constructed on the footprint of the existing river channel/existing culvert or in some cases offline. Short lengths of the culvert in Togher will be cast on site at the location of bends and tie-ins of large diameter existing surface water sewers. The foundations will be excavated down to formation level and blinding concrete poured. The precast concrete culverts will be placed in position and where in situ culverts are required, formwork will be prepared and reinforcement bars fixed, followed by the pouring of the concrete. Utilities and drainage pipes will be diverted into permanent positions as required. The excavations will then be backfilled and road surfaces reinstated. Boundary walls/fences reinstatement and landscaping and replanting reinstatement will take place in agreement with landowners.

Specific traffic management measures will be required along the sections of culvert which are located beneath the public road such as along Togher Road in Togher and along Church Road in Douglas in order to minimise impacts on traffic. Every effort will be made to carry out the works as quickly as possible in order to minimise impacts on the residents in the area. It is envisaged that traffic measures such as a stop-go system, temporary one-way traffic systems or similar will be implemented to allow the trenches for the culverts and utility diversions to be constructed and at the same time to manage traffic. Full road closures will be required however on Church Road, Togher Road at the northern tie-in and Togher Road at the existing open channel section south of Togher cross. They will be for a short duration only and will take place during the summer months or at other suitable times, i.e. long weekends or mid-term school holidays to minimise the impact on traffic in the area.

4.3.3 Reinforced Concrete Flood Walls and Bridge Parapets

The reinforced concrete flood walls and bridge parapets will be constructed using industry standard techniques including excavation of foundations, fixing of steel reinforcement, pouring concrete and reinstatement of the works area.

In general, the construction of the reinforced concrete walls will be undertaken from the bank of the river for the majority of the scheme. In some locations however, in particular upper Ravensdale, due to a constricted working area or access issues, temporary over pumping or piping of the watercourses or temporary diversion channels / culverts (where space allows) will be required to facilitate the construction of the walls from within the river channel. Thus these works will be carried out in the dry. The form of wall construction will have to be a concrete U-shaped channel for a significant portion of the channel in Ravensdale, for approximately 120 meters due to the close proximity of the properties, poor ground conditions and need to maintain access to properties. The construction of a U-shaped wall will take up a much reduced construction footprint. The bed of the channel will be constructed a minimum of 500mm below the existing channel bed and a low flow channel will be constructed using the excavated channel bed material and suitably sized gravels and boulders.

At St Patricks Mills, close to the existing bridge, access to the bank will be constrained due to the presence of a building directly adjacent to the bank (Refer to **Figure 3.6**). In this location, it is envisaged that works will be carried out from a temporary working platform on a scaffold attached to the bank over the river.

It is acknowledged that specific traffic management measures will be required in the Ravensdale area due to the extent of construction works and due to the restricted access in this location. Every effort will be made to carry out the works as quickly as possible in order to minimise impacts on the residents of Ravensdale.

It is expected that any utility diversions required for the construction of the walls will be completed prior to excavating the foundations. In Ravensdale, adjacent to the ICA Hall, there is a 1200mm diameter watermain running from west to east. This watermain will not be diverted, but will be adequately protected, with the reinforced concrete wall designed to span over the pipe ensuring that the load is adequately dispersed and not transferred directly to it.

4.3.4 Bridge Replacement

The replacement of Lower Ravensdale Bridge will involve the demolition of the existing bridge, excavation of foundations for the proposed bridge, craning in a pre-cast concrete bridge and reinstatement of the area impacted by the works.

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

The Lower Ravensdale Bridge is the only access route to the existing properties to the west of Ballybrack Stream. The new bridge will be located to the north of the existing bridge therefore the new bridge can be constructed whilst maintaining access via the existing bridge. Once the new bridge has been constructed then the existing bridge can be removed.

As noted above, every effort will be made to carry out the works as quickly as possible in order to minimise impacts on the residents of Ravensdale.

4.3.5 Embankments

The embankments in Douglas Community Park will be constructed by stripping the topsoil within the embankments footprint and placing low permeability clay soils to the required flood defence level. Topsoil will be placed on top of the embankment and seeded. The existing walkway adjacent to the right bank of the stream will be reconstructed at the top of the embankment. All material excavated during construction that is not suitable for use elsewhere in the project will be disposed of off-site. It may be necessary to import the clay soils required to construct the embankment if suitable soil is not available from elsewhere in the project. The construction of the embankments can be undertaken from the river bank with no in channel works required.

It is expected that any utility diversions necessary to facilitate the construction of the embankment will be completed prior to the construction of the embankment. There is an existing c. 2 m x 2 m ESB substation located adjacent to the Ballybrack Stream in the northern part of the Community Park that will need to be moved slightly to within 10 m of its current position in the park to construct the embankment. A smaller ESB substation of c. 1.5 m X 1.5 m located adjacent to the left bank channel of the Ballybrack Stream will also be moved slightly to within 5 m of its current position. Diversions will be carried out in consultation with ESB Networks.

4.3.6 Channel Widening and Deepening

The proposed channel widening and deepening in Ravensdale and Douglas Community Park will generally be undertaken from the bank of the watercourse using an excavator. As above, temporary over pumping or piping of the watercourses or temporary diversion channels / culverts (where space allows) will be required to facilitate the construction works. Thus the works will be carried out in the dry.

As above, any utility diversions required to widen and deepen the watercourse will be completed prior to the widening and deepening works commencing.

4.3.7 Trash Screen

In Togher, the trash screen in Lehenaghmore Industrial Estate will be constructed adjacent to the existing watercourse. This method of construction will minimise the in-channel works required to construct the screen and therefore will have a minimal impact on the Tramore River. Construction of the trash screen will involve excavating to formation level, fixing steel reinforcement, pouring concrete, installing the steel trash screen and construction of the proposed channel diversion.

A coarse trash screen is proposed upstream of the Ballybrack Woods cycle track bridge. In the Donnybrook Commercial Centre, it is also proposed to remove the existing two coarse screens and install a new coarse screen.

4.3.8 Site Investigation

Two site investigations to inform the detailed design of the proposed scheme have been carried out in May 2015 and summer 2016. The results of these works are discussed further in **Chapter 11 Soils, Geology and Hydrogeology**.

4.3.9 Future Maintenance Regime

A channel maintenance programme will be required throughout the reach of the watercourses impacted by the proposed works. The channel maintenance programme will pay particular attention to locations where silt, gravel and debris are likely to accumulate, such as at structures, screens, sharp bends, culvert inlets, blockages from trees etc.

Other measures will include regular inspections of flood walls and embankments, regular scheduled maintenance of the river channel and pruning or removal of trees (if there is potential for flood blockages), planning and control measures. The inspection regime will ensure that there is no deterioration in the structural integrity of the defences which may occur as a result of a collision for example. It is expected that the flood defences will otherwise be relatively maintenance free. In general, maintenance will typically consist of the following activities:

- The channels will be monitored by means of a walkover survey from the banks on a regular basis (likely quarterly, and also following a flood event). The walkover surveys would aim to identify issues with implications for flood risk (e.g. fallen trees, excessive vegetation build-up, overgrown trees, illegal dumping, accumulation of granular deposits, etc.). In-channel debris will typically be removed by a long reach excavator working from the banks. Excessive overhanging vegetation will typically be pruned back or removed by hand using a cherry-picker, depending on access.

- The structures including coarse trash screens, will be monitored by means of a walkover survey from the banks on a bi-annual basis. The walkover surveys would aim to identify issues with implications for flood risk (e.g. damage to structures, settlement of embankments, etc.).

- Culverts will be inspected by means of man-entry on an annual basis, or following a significant flood event. Any debris present in the culvert will be cleared by hand. A full CCTV survey and clearing of silt/sediment from the culvert is expected to take place approximately every five years. Removal of debris will be carried out as required.

The relevant stakeholders will be consulted with as necessary during the planning of these maintenance works including landowners, Inland Fisheries Ireland (IFI), the National Monuments Service (NMS), Cork County Council (CCC) and National Parks and Wildlife Service (NPWS) to ensure that the works are carried out with minimal environmental impact.

4.4 Duration, Phasing and Employment

Subject to statutory consent, construction of the proposed scheme will commence mid-2018. An overall construction duration of approximately 18 months is envisaged with an estimated completion date of late 2019/early 2020. Specific activities (such as Lower Ravensdale bridge and Church Road bridge replacement) will be completed over a much shorter duration. As noted previously, every effort will be made to carry out the works as quickly as possible in order to minimise impacts on neighbouring residents. The expected construction duration for each area are summarised in **Table 4.1** below.

Table 4.1: Summary of Proposed Flood Defence Measures

Area	Location	Estimated construction period (cumulative months)
1	**Ballybrack Stream through Douglas**	**18 months overall**[1]
1a	Upper Ravensdale	6 months
2	St Patrick's Mills, Douglas	2 months
3a	Donnybrook Commercial Centre - lower	3 months
3b	Grange Stream above commercial centre	2 months
4	Togher	12-15 months

In-stream works (including preparatory work) shall normally be undertaken between May and September (inclusive) and in consultation with IFI (except in exceptional circumstances and in agreement with IFI). The appropriate window for in-stream works can vary depending on the nature of the fishery resource concerned and the existence of other factors such as catchment or sub catchment specific Bye Laws and Regulations. As a result, some in-stream activities may require two summer seasons for final completion. Therefore an 18 month construction window is envisaged.

In Douglas and Donnybrook as the majority of the works are in stream and immediately adjacent, the bulk of the works will be carried out during May to September inclusive.

[1] To allow for two construction windows in accordance with IFI and NPWS requirements.

St Patricks Mills will likely be constructed before or after these areas are not subject to the May to September window.

In Togher the works will likely take 12-15 months given the nature and scale of the culvert replacement works and the need for extensive associated service diversions. The lower section of the culvert, from the outfall at the northern end of the scheme to the entrance to the national schools, will be carried out during the school holidays. A full road closure will likely be required where the culvert crosses the road at the entrance to Greenwood Estate, again this will be carried out during the summer months.

To avoid impacting on bird nesting sites, the vegetation removal within the defined working area will not be carried out during the peak bird nesting season of March to August (inclusive) prior to the commencement of works.

Christmas non-working time is from the beginning of the second week of December to the end of the first week of January to avoid impacts on residents/businesses in the vicinity. However off-road works may continue during this period.

The timing of construction activities, core working hours and the rate of progress of construction works are a balance between efficiency of construction and minimising the impact on the operations of neighbouring facilities, residents and road users.

The co-ordination of people and materials on site will be one of the key activities throughout the construction phase. In order to ensure that construction workers do not create undue disruption, there will be a requirement that the Contractor provide adequate site supervision to co-ordinate, monitor and implement site regulations.

It is envisaged that the average number of construction personnel on site will be circa 26 personnel with an approximate 50/50 split between Douglas and Togher. This will vary depending on the construction activities required and seasonal constraints and will likely peak during the summer months when up to 40 construction personnel are envisaged.

The permissible noise levels are detailed in **Chapter 9 Noise and Vibration** where “daytime” noise limits are defined as 7am to 7pm, and lower permissible noise levels are stipulated outside these hours.

The removal of waste material off site by road and regular deliveries to site will be generally confined to daytime hours but outside of peak traffic hours, from 10am to 4pm.

Normal construction working hours will be observed. These are 08.00 – 19.00 Monday to Friday; 09.00 – 16.00 on Saturday. It may be necessary in exceptional circumstances to undertake certain types of activities outside of normal construction core working hours. Heavy or noisy construction activities will be avoided outside normal hours and the amount of work outside normal hours will be strictly controlled. Approval from Cork County Council will be obtained for works outside normal hours. The planning of such works will have regard to nearby sensitive receptors.

4.5 Construction Site Layout

4.5.1 Construction Access

It is anticipated, where possible, that access to the works area will be gained from the dry (land) side of the channel to minimise impact on the watercourse. In some locations however, due to a constricted working area or access issues, temporary over pumping or piping of the watercourses or temporary diversion channels / culverts (where space allows) will be required to facilitate the construction of the works from within the river channel. Thus these works will be carried out in the dry. In the case of St Patricks Mills, it is envisaged that a small section of works will be carried out from a temporary working platform on a scaffold attached to the bank over the river.

The proposed construction works will generally be limited to the areas outlined in red on the drawings. Accommodation works for landowners may take place outside these areas with their agreement. Traffic management setups will be required outside these areas on the approaches to the works areas. In general, the public will be excluded from entering these areas during the construction period for reasons of health and safety, however, it is acknowledged that some works will be located within residential areas such as in Ravensdale and the Pond Bank off Church Street, where vehicular and pedestrian access will be maintained to the residential properties and therefore construction access to these properties will need be discussed and agreed with residents prior to construction works commencing. Temporary access routes will be required outside of the construction works areas at some locations so that construction workers and construction vehicles can access certain areas. For example, access will be temporarily required along the existing cycle path in Ballybrack in order to construct the coarse screen at Ballybrack Woods. These access routes are shown on **Drawing No's C-000-040, C-000-041** and **C-000-042** in **Appendix 3.3** of this EIS.

On the L2454 Togher Road works will affect the lower section from Southern Fruits to Togher Cross. Access will be maintained to Southern Fruits, Brook Avenue, Palmbury Orchard and the properties on the eastern side adjacent to Togher cross. There will be an impact however due to the stop/go traffic management system.

A number of premises and residential properties adjoining the west side of Togher Road (L2452) from Togher Cross northbound, which the construction works and traffic management will have an impact in terms of access and egress. These include a convenience Supermarket, a residential care home facility, Robinscourt Housing estate, Togher Church and Le Chéile care facility, and Togher National Schools. However vehicular access will be maintained throughout the duration of the works. It noted the Church has two separate car parks with the Le Chéile facility accessed only via the northern car park. Both car parks will be kept operational for the duration of the works. The works do not pass directly in front of the entrance to Togher Music School, Togher Community Centre or the entrance road to Westside estate, however, the traffic management will extend past these areas when the northern half of the works are being constructed.

Access and egress to the properties on the east side of Togher Road, including Greenwood Estate will be impacted given that the traffic management system that will be set-up on Togher Road. Access to the sports pitch and public walkway at the northern end opposite Togher Community Centre will be maintained via a temporary construction access.

A temporary access will be constructed for Donnybrook Commercial Centre as shown on **Drawing C-000-042** for the duration of the works to facilitate vehicular access to the approximately 25 commercial units affected by the culvert replacement works.

It is noted that many of the linear defences will require the temporary removal of boundary walls and fences, vegetation and trees to facilitate construction access (generally parallel with watercourses). These boundary walls / fences and landscaping will be reinstated on completion in agreement with the local authority and landowners.

4.5.2 Utilities

Temporary planned utility diversions will be required in most of the working areas during the construction phase. The works are in built up areas which are serviced with utilities such as gas, water, electricity, telecoms, foul and surface water drainage etc. The most likely impacts will be due to the planned utility diversions. It is possible that a short term disruption to some services may occur when the diversion is being undertaken. However, it is not considered that these disruptions will result in significant negative impacts on customers. All utility diversions, will be carried out in consultation with the relevant utility company. The Contractor will be required to submit diversion proposals to the relevant utility company for their approval prior to works being carried out. Refer to **Chapter 15 Material Assets** for further details on utilities.

4.5.3 Hoarding

Where possible, a site boundary in the form of hoarding or fencing or similar where appropriate (approx. 2.4m), will be established around working areas before any significant construction activity commences.

Construction site hoarding is used to provide a secure site boundary to what can be a dangerous environment for people who have not received the proper training and are unfamiliar with construction operations.

Hoarding works will be of the same nature as that carried out for similar operations at most construction sites.

Site hoarding also performs an important function in relation to minimising some of the potential environmental impacts associated with construction, namely:

- Noise;
- Visual impact; and
- Dust minimisation.

Excavation for mounting posts for hoarding will be carried out by a mini-digger, and the posts will be set in concrete. The size and nature of the posts and hoarding will be dependent on the requirements for any acoustic mitigation as well as Contractor preference.

4.5.4 Site Lighting

Temporary construction lighting will generally be provided by tower mounted 1000W metal halide floodlights, which will be angled downwards to minimise spillage of light from the site. These will be powered by mains supplies in general. Lighting will be provided on the exterior of hoarding for walkways for public safety where required. Specific lighting requirements which are close to residential properties will be discussed with the residents in advance.

4.5.5 In-stream works

Works within the watercourse channels are anticipated at a number of locations such as along the Ballybrack Stream in Ravensdale, Church Road and in the Community Park. In-stream works will also be carried out to facilitate construction of new culverts such as along the Grange stream and along the Tramore River.

As mentioned previously, it is anticipated, where possible, that access to the works area will be gained from the dry (land) side of the channel to minimise impact on the watercourse however, in some locations, due to a constricted working area or access issues, temporary over pumping or piping of the watercourses or temporary diversion channels / culverts (where space allows) will be required to facilitate the construction of the works from within the river channel. Thus these works will be carried out in the dry.

Detailed silt control methods will be required for all in-stream works. All such works will require effective control of silt and it is expected that a variety of methods may be required i.e. silt curtains, dewatering, silt sumps etc. Detailed method statements will be drawn up which deal specifically with the works proposed in consultation with the supervising ecologist and with NPWS and IFI prior to the commencement of works

All concrete works will be carried out in dry conditions and no in-stream pouring of concrete will be carried out. The temporary works will require temporarily damming the watercourse upstream of the culvert/works and over pumping flows to the same watercourse, installation of the culvert and removal of temporary damming of the watercourse. Refer to **Chapters 6 (Biodiversity)** and **12 Hydrology** below for further details on water quality management.

In-stream works associated with the proposed scheme will be carried out under the supervision of a suitably qualified and experienced ecologist. All in-stream works will be designed and carried out with in accordance with the IFI 2016 *Guidelines on protection of fisheries during construction works in and adjacent to waters within the approved period* and in consultation with IFI.

In-stream works (including preparatory work) shall normally be undertaken between May and September (inclusive) and in consultation with IFI (except in exceptional circumstances and in agreement with IFI). This restriction does not apply to tidal waters on the Tramore River.

The appropriate window for in-stream works can vary depending on the nature of the fishery resource concerned and the existence of other factors such as catchment or sub catchment specific Bye Laws and Regulations. As a result, some in-stream activities may require two summer seasons for final completion

Input from a qualified fisheries/aquatic ecologist with experience in the design of in-stream structures is required for the design of culverts and the post works flow patterns and channel structure. The specialist in conjunction with the supervising ecologist will be required to visit the watercourses prior to the commencement of site works to assess the existing channel structure, fish holding features, substrate composition, flow patterns etc.

Where feasible such structures will be incorporated into the channels following completion of work. All culverts, walls and trash screens will be designed to minimise impacts on fish and macroinvertebrate populations. Where possible, gravel substrates and as natural a flow pattern as possible under low water/ low tide conditions will be provided in channels affected by site works.

4.5.6 Construction Compounds

There is an existing Cork City Council compound in the Togher area adjacent to the N40 national primary road (South Ring Road) that has been identified as a potential construction compound for the scheme, refer to **Figure 4.1**. Additional areas may be considered where necessary as minor construction compounds in the immediate vicinity of the works. The final selection of the compound(s) will be made by the Contractor appointed to construct the works in consultation with Cork County Council and the project ecologist.

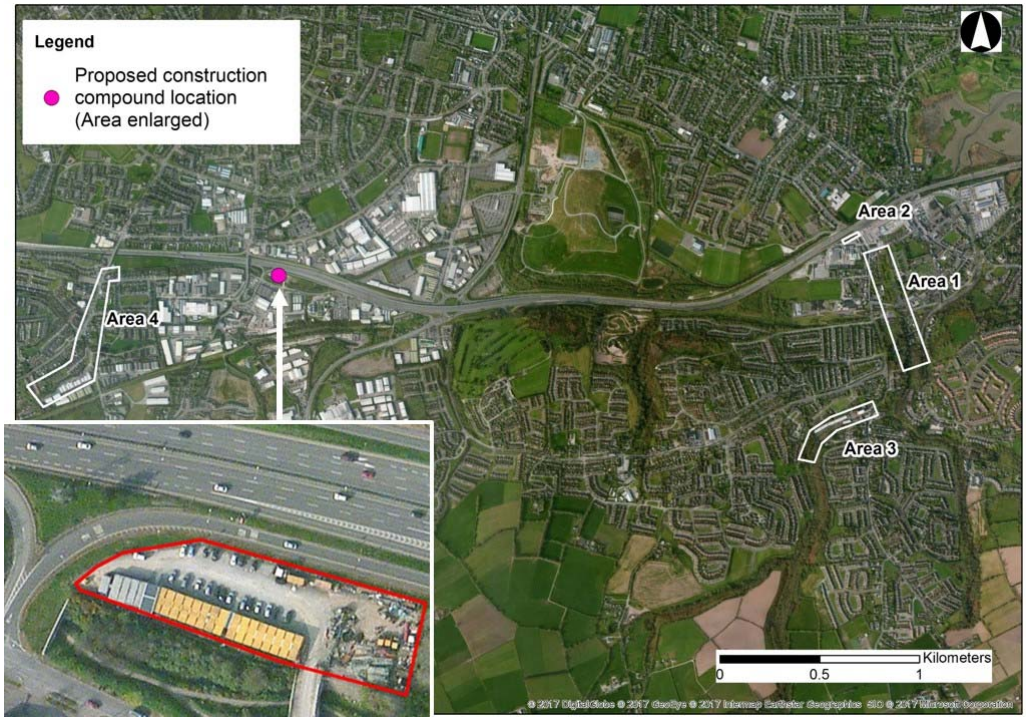

Figure 4.1: Location of proposed construction compound (including enlarged image of site) and proposed works areas (Area 1-4) | Source: Bing Maps.

4.5.7 Construction Compound Site Drainage

The construction site drainage within the construction compounds will be designed in such a manner so as to minimise the risk of contamination of the surrounding soil, surface water and groundwater. Rainwater run-off from the contractor's compounds will be controlled via a temporary surface water control system comprising measures such as swales (ditches) and settlement ponds (or similar system) which will minimise the risk of pollution to soil, surface water or groundwater. The temporary surface water control system will be subject to a daily visual inspection as well as routine maintenance.

The inspection frequency will be increased during periods of exceptional high rainfall. Written procedures will be maintained and a log recorded of the inspections.

The contractor facilities will contain toilets, canteen, construction containers and a site office. A grease trap will also be installed at the canteen. The disposal of sanitary effluent during construction will be via tankers.

Refer to **Section 4.6.2** for further details on water quality management and site drainage.

4.5.8 Construction Traffic

A detailed construction traffic management plan will be prepared and agreed with Cork County Council by the Main Contractor in advance of any works taking place on site. Refer to **Chapter 14** for further details on same.

As discussed previously, works will be carried out on the public road in Togher and Douglas. Alternative access routes will be agreed with Cork County Council and An Garda Siochána. Every effort will be made to carry out the works as quickly as possible in order to minimise impacts on the residents in the area. It is envisaged that traffic measures such as a stop-go system, temporary one-way traffic systems or similar will be implemented to allow the construction works and utility diversions to be constructed and at the same time to manage traffic. It is expected that the majority of the intense works on the public road will be programmed to be carried out in the summer months to avoid school traffic etc. such as outside the primary school on the Togher Road. It is not anticipated at this stage that full road closures will be required, however, if they are required, they will be for a very short duration only and will take place at night or other suitable times to minimise the impact on traffic in the area.

Traffic movement at the site will be planned to ensure traffic movements to and from site are managed efficiently and in accordance with Health and Safety requirements. In addition, any impacts on the local environment including local residents, road users and pedestrians will be minimised.

The following provisions will be adhered to as a minimum;

- All trucks entering and exiting the site will be covered with tarpaulin;
- Adequate parking will be provided to avoid queuing at the site entrances and prevent disruption to neighbouring businesses;
- Deliveries of materials will be planned and programmed to ensure that the materials are delivered only as they are required on site. Works requiring multiple vehicle deliveries to site, such as concrete pours, will be planned so as to ensure there will no queuing on the public roadways. Deliveries will be limited to outside of peak hours;
- Trucks will not be allowed to park on the public road either outside the site or on any of the approach roads leading to the site;
- All trucks entering the site will be restricted to suitable speed limit and will be directed to the relevant area by the site manager;
- Trucks required to wait on site will switch off engines to avoid unnecessary fuel usage and noise;
- All trucks exiting the site will be required to pass through a wheel wash. All water from the wheel wash will be collected, treated to remove silt or other contaminants, and discharged via an approved discharge licence to a local water course or drainage network. A lance will be provided to clean down the bodies and sides of the truck prior to leaving site; and
- Roads outside the site will be visually inspected on a daily basis and power swept and washed as and when required.

4.5.9 Cranage

Some of the construction works will require the use of standard mobile cranes on site in order to install the pre-cast bridge and culverts.

The cranes will generally be required for the moving of building materials on site such as concrete pipes, formwork for concrete, reinforcement, precast concrete, plant and general building materials. Heavy machinery movements will be restricted to outside of peak hours.

4.6 Construction Environmental Management Plan

4.6.1 General

Every effort will be made to ensure that any significant environmental effects will be avoided, prevented or reduced during the construction phase of this scheme.

A construction environmental management plan (CEMP) will be prepared by the Contractor prior to construction commencing. The CEMP will comprise all of the construction mitigation measures, which are set out in this EIS, and any additional measures which are required by the conditions attached to the statutory consent issued by An Bord Pleanála. The main aspects of the CEMP are outlined below. Implementation of the CEMP will ensure disruption and nuisance are kept to a minimum.

The CEMP will have regard to the guidance contained in the handbook published by Construction Industry Research and Information Association (CIRIA) in the UK, Environmental Good Practice on Site Guide, 4th Edition (CIRIA 2015). The CEMP will be developed in accordance with industry best practice and will be effective for the duration of the construction works.

Cork County Council will have a construction management team on the project site for the duration of the construction phase. The team will supervise the construction of the scheme including monitoring the contractors' performance to ensure that the proposed construction works are carried out in accordance with industry best practice and that construction impacts and nuisance are minimised. The construction management team will liaise with residents and the general community during the construction phase to ensure that any disturbance is kept to a minimum and to ensure that all anticipated nuisances are minimised and that the construction activity will have the lowest possible impacts on the residents and other properties.

It is also proposed that a Community Liaison Officer will be appointed who will coordinate communications and liaise with the local community during the construction phase.

4.6.2 Soil, Surface Water and Groundwater Management

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off, adjacent watercourses and groundwater. The Construction Industry Research and Information Association (CIRIA) in the UK has issued a guidance note on the control and management of water pollution from construction sites, *Control of Water Pollution from Construction Sites, guidance for consultants and contractors* (Masters-Williams et al 2001). Additional guidance is provided in the CIRIA technical guidance on *Control of Water Pollution from Linear Construction Projects* (Murnane et al. 2006).

The guides are written for project promoters, design engineers and site and construction managers.

They address the main causes of pollution of soil, groundwater and surface waters from construction sites and describes the protection measures required to prevent pollution of groundwater and surface waters and the emergency response procedures to be put in place so that any pollution, which occurs, can be remedied.

The guides address developments on green field and potentially contaminated brownfield sites. The construction management of the site will take account of the recommendations of the CIRIA guidance to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Site activities considered in the guidance include the following:

- Excavation;
- Earthmoving;
- Concreting operations;
- Spreading of topsoil;
- Road surfacing;
- Site drainage, and the control and discharge of surface water runoff from the site;
- Oil and fuel delivery and storage; and
- Plant maintenance.

Measures, as recommended in the guidance above, will be implemented to minimise the risk of spills and contamination of soils and waters. Refer to the Hydrology and Biodiversity chapters for further details on same.

4.6.3 Emissions to Air

As construction activities are likely to generate some dust emissions, particularly during the site clearance and excavation phase, a dust minimisation plan will be prepared and implemented by the contractor during the construction phase of the project. Refer to **Chapter 10 Air Quality** for further details on same.

4.6.4 Site Tidiness

The following are some of the measures that will be taken to ensure that the site and surroundings are maintained to a high standard of cleanliness:

- Daily site inspections will be undertaken to monitor site tidiness;
- A regular programme of site tidying will be established to ensure a safe and orderly site;
- Scaffolding will have debris netting attached to prevent materials and equipment being scattered by the wind;

- Food waste will be strictly controlled on all parts of the site;
- Mud spillages on roads and footpaths outside the site will be cleaned regularly and will not be allowed to accumulate;
- Wheel-wash facilities will be provided for vehicles exiting the site; and
- In the event of any fugitive solid waste escaping the site, it will be collected immediately and removed to storage on site, and subsequently disposed of in the normal manner.

4.6.5 Noise and Vibration Emissions

Construction noise will be kept to a minimum in accordance with BS 5228 (2009). The contract documents will specify that the contractor, undertaking the construction of the works, will be obliged to take specific noise abatement measures and will comply with the best practice outlined in British Standard BS 5228-1 and 2:2009+A1:2014 (British Standards, 2014): *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise* and the NRA (now TII) guidelines *Good Practice Guideline for the Treatment of Noise during the planning of National Road Schemes* (NRA 2014). Refer to **Chapter 9, Noise and Vibration** for further details on same.

4.6.6 Invasive Species

Invasive plant species, particularly Japanese knotweed is known to be within some of the proposed works areas. Special consideration will need to be taken by the contractor when working within these areas so as to avoid spreading the material to unaffected areas and downstream. Refer to **Appendix 4.1** and **Chapter 6 Biodiversity** for details on same.

4.6.7 Construction Waste Methodology

The expected volume of material to be excavated to construct the works is as follows in **Table 4.3**.

Table 4.3: Estimate volumes of material excavated from each proposed works area (1-4).

Works Areas	Estimate volume of excavated material
Area 1: Douglas Community Park	2,050m^3
Area 1: Ravensdale	5,100m^3
Area 2: St Patrick's Mills	60m^3
Area 3: Donnybrook Commercial Centre	2,250m^3
Area 4: Togher	9,000m^3
Total excavated volume:	18,460m^3

Where possible this material will be used on site, however, it is anticipated that the majority of this material will be disposed of in a suitably licenced facility off site. Refer to **Chapter 11 Soils, Geology and Hydrogeology** for the management of soil and excavated material during construction.

Waste generated during the construction phase will be carefully managed according to the accepted waste hierarchy which gives precedence to prevention, minimisation, reuse and recycling over disposal with energy recovery and finally disposal to landfill.

This hierarchy will be implemented by identifying opportunities to firstly prevent waste from being produced, and secondly minimise the amount of waste produced. Where prevention and minimisation will not be feasible, ways to reuse or recycle waste will be sought, preferably on-site to avoid the impacts arising from transportation. If this is not feasible, opportunities to reuse or recycle the waste off-site will be investigated.

If this is not feasible, then waste will be sent to an energy recovery facility, and only where there is no alternative, will waste be disposed of to landfill. To achieve this, existing waste management programmes and networks will be used such as the National Waste Prevention Programme (2015) issued by the Environmental Protection Agency and the Southern Region Waste Management Plan 2015-2021 issued by the Southern Waste Region.

All waste removed from the site will be collected only by contractors with valid waste collection certificate or permit under the Waste Management (Facility Permit and Registration) Regulations 2007 as amended or a waste licence under the Waste Management Act 1996 as amended.

Hazardous waste generation will be minimised, and such waste will be recovered where feasible, and only disposed of if recovery is not feasible.

The management of hazardous waste will be in line with the National Hazardous Waste Management Plan (2014-2020) and managed in accordance the Waste Management Act 1996 as amended and other relevant legislation.

4.6.7.1 Waste Arising

In general, construction waste materials may include general construction debris, scrap timber and steel, machinery oils and chemical cleaning solutions.

It is anticipated that the vast majority of the excavated material, will need to be disposed of offsite. In the unlikely event of any evidence of soil contamination being found during work on site, the appropriate remediation measures will be employed. Significant sections of the banks of Ballybrack Stream are infested with Japanese knotweed and all of the material excavated in this areas will need to be disposed to a licenced waste facility under permit from the NPWS. The treatment of knotweed infested soil and associated biosecurity measures to prevent the spread of knotweed are described in **Appendix 4.1**.

Any work of this nature would be carried out in consultation with the Environment Department of Cork County Council, IFI, EPA and NPWS as necessary.

The material would be transported to a permitted site via the national and regional road network.

Timber from trees, felled as part of the site preparation, will be sold to the timber industry where economically viable.

4.6.7.2 Waste Management Plan

The contractor will be required to develop, implement and maintain a Waste Management Plan (WMP) during the construction works. A senior manager will be responsible for the waste management plan. The manager will be competent in waste management, and will receive training, where necessary, such as the CIF Site Waste Management and Environmental Awareness course.

The key principles underlying the plan will be to minimise waste generation and to segregate waste at source. The measures to achieve these aims include:

- Ordering of appropriate quantities of materials, with a just-in-time philosophy;
- Immediate and careful storage of materials delivered to the site;
- Storing materials which are vulnerable to damage by rain under cover and raised above the ground;
- Careful handling of materials, using appropriate equipment, to avoid undue damage; and
- Designation of separate storage areas for different types of waste, in order to maximise the reuse and recycling potential of the waste.

The WMP will outline how residual waste will be handled as follows:

- The identification of disposal sites;
- The identification of quantities to be excavated and disposed of and classification of this material;
- The identification of measures to prevent nuisance, etc.;
- The identification of the amounts intended to be stored temporarily on site and the location of such storage;
- The contractor's approach to waste management; and
- The names, roles, responsibilities, and authority of the key personnel involved in the waste management.

The WMP will include documented procedures for dealing with waste management including liaison with third parties, statutory undertakers and other companies.

The WMP will meet the requirements of the guidelines prepared by the National Construction and Demolition Waste Council (NCDWC), *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects*, NCDWC 2006.

The following will also be considered as part of the WMP:

- The identification of the amounts of materials intended to be stored temporarily on site and the location of such storage;
- Procedures for controlling sub contracts i.e. for checking waste procedures of subcontractors and ensuring sub-contractors fulfil design teams and contractors obligations in respect of waste management;
- Designation of separate storage areas for different types of waste materials in order to maximise their re-use and recycling potential;
- Procedure for record keeping for waste retained on site;
- Procedure for record keeping for hazardous waste, for example, C1 forms and trans-frontier shipment documents; and
- Details of authorised waste hauliers with appropriate and up-to-date Waste Collection Permits. Details of permitted or licensed recovery and/or disposal facilities where waste materials will be sent, including copies of permits and licenses.

4.6.7.3 Waste Minimisation

The main contractor will be required to minimise waste and to segregate waste at source. The possible measures used to achieve these aims will include:

- Ordering of appropriate quantities of materials, with a just-in-time philosophy.
- Immediate and careful storage of materials delivered to the site.
- Storing under cover and raised above ground materials, which are vulnerable to damage by rain.
- Careful handling of materials, using appropriate equipment, to avoid undue damage.
- Designating separate storage areas for different types of waste in order to maximise the re-use and recycling potential of the waste.

Anticipated wastes arising can be summarised as follows:

- Sanitary waste from toilet and washing facilities. These will be routed to the existing sanitary waste infrastructure and treated on site prior to discharge; and
- Construction Waste – e.g. packaging, pallets, and metal waste will be disposed off-site at suitably permitted or licensed waste facilities.

4.7 Materials Source and Transportation

In so far as is feasible, all construction materials will be sourced from local suppliers if these are available within the Cork area. The selection and specification of construction materials will be informed by local availability of these materials. Within the necessary constraints of performance, durability and cost, construction materials will be sourced from local suppliers and manufacturers, where possible.

The coordination and logistics of construction traffic will be captured within the construction traffic management plan which will be agreed with Cork County Council and An Garda Siochána.

Removal of surplus materials off site will be managed in accordance with the construction traffic management measures outlined in **Chapter 14 Roads and Traffic** to ensure that there will be no queuing of trucks on the public roadways in the area.

All surplus excavation material will be removed off site by an authorised waste contractor to an appropriately licensed/permitted waste facility (refer to **Chapter 11 Soils, Geology and Hydrogeology** for further information).

The Main Contractor will be required to establish and implement a detailed Construction and Demolition Waste Management Plan, as part of the detailed CEMP.

4.8 Construction Safety

As required by the Safety, Health and Welfare at Work (Construction) Regulations 2013, a Health and Safety Plan will be prepared which will address health and safety issues from the design stages through to the completion of the construction and maintenance phases. This plan will be reviewed as the scheme progresses. The contents of the Health and Safety Plan will comply with the requirements of the Regulations.

The Regulations require the developer, i.e. “the Client” of a project to appoint a “Project Supervisor Design Process” (PSDP) and “Project Supervisor Construction Stage” (PSCS). Cork County Council has appointed Arup as Project Supervisor Design Process in accordance with the current legislation.

The PSDP will assemble the Safety File and issue it to the client at the completion of the project. The Safety File will be incorporated into the overall technical record system at the end of the project.

Safety on site will be of paramount importance. During the selection of the contractors and subcontractors, their safety records will be investigated. Only contractors with high safety standards will be selected.

Prior to working on site, each individual will receive a full safety induction and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.

Safety briefings will be held regularly and prior to any onerous or special task. ‘Toolbox talks’ will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

Regular site safety audits will be carried out throughout the construction and the complied with at all times.

At any time that a potentially unsafe practice is observed, the site safety manager will have the right as well as the responsibility to halt the work in question, until a safe system of working is again put in place.

Appropriate site personnel will be trained as first aiders and fire marshals. In addition, appropriate staff will be trained in environmental issues and spill response procedures. Tanks and drums of potentially polluting materials will be stored in secure containers or compounds which will be locked when not in use. Secure valves will be provided on oil and fuel storage facilities. Equipment and vehicles will be locked, have keys removed and be stored in secure compounds.

The Main Contractor will be required to maintain an emergency response plan which will cover all risks i.e. fire, flood, collapse etc.

In preparing this plan the Contractor will be required to liaise with the emergency response services.

4.9 Community Liaison During Construction

Effective community liaison is essential in order to help ensure the smooth running of construction activities and in relation to residents and public welfare. Important key issues in ensuring good relations are:

- Availability of information for the public during the construction phase, (particularly nearby sensitive receptors);
- Having the correct points of contact and being responsive; and
- The need for good housekeeping in all aspects of the operations.

Due to the nature of construction works it is essential to operate ‘Good Neighbour’ policy in so far as possible. Key aspects of this policy include:

- Early implementation of the policy, i.e. from the commencement of construction;
- Reduction of nuisance factors;
- Access to amenity areas, walkways and cycle paths and for neighbouring premises;
- Clear and concise information; and
- Undertaking timely liaison with stakeholders.

With regard to liaison, the Main Contractor will be required to prepare a Community Liaison Plan, which will include details of how the local community, road users and affected residents will be notified in advance of the scheduling of major works, any temporary traffic diversions and the progress of the construction works.

This plan will typically include details of the following:

- Contractor’s community relations policy;

- Personnel nominated to manage public relations;
- A methodology for processing observations, queries and complaints from the general public, relevant authorities, the media, emergency services and the like; and
- The strategy for project wide liaison with all relevant parties.

A full time Community Liaison Officer will be appointed by the Main Contractor and will be responsible for managing such tasks as the following:

- Briefing neighbours on progress and issues as necessary;
- Liaison with Cork County Council and emergency services as appropriate;
- Liaison with An Garda Síochána, particularly in relation to traffic movements and permits where necessary;
- Contact details for the Liaison Manager will be posted on all construction site notice boards and on any other information or correspondence, which may be distributed from time to time;

Cork County Council's construction supervision team will also take an active role in community liaison and will work in close collaboration with the Community Liaison Officer.

4.10 Construction Site Decommissioning

On completion of construction, all construction facilities and equipment such as plant, materials, signage, contractors' offices and laydown areas, etc. will be removed from site. Temporary entrances will be removed and boundary walls, fences and all roads reinstated as necessary. Construction site fencing will be removed and landscaping/replanting will be completed.

4.11 References

British Standard BS 5228 – 1: 2009 +A1 2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise and the

Construction Industry Research and Information Association (CIRIA), Environmental Good Practice on Site Guide (2015) 4th Edition (CIRIA 2015), UK.

Environment Agency (2013) Managing Japanese knotweed on development sites - The Knotweed Code of Practice (2006) UK Environmental Agency (officially withdrawn July 2016)

Environmental Protection Agency (2015) National Waste Prevention Programme

Invasive Species Ireland (2008) Best Practice Management Guidelines Japanese knotweed Fallopia japonica

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Kelly, J., Maguire, C.M., Cosgrove, P.J. (2008) The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads, Transport Infrastructure Ireland

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Murnane, E., Heap, A., Swain, A. (2006) Control of water pollution from linear construction projects – Technical guidance (C648D), CIRIA

National Construction and Demolition Waste Council (NCDWC) (2006) Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects

National Roads Authority (now TII) (2014) Good Practice Guideline for the Treatment of Noise during the planning of National Road Schemes, Transport Infrastructure Ireland

Southern Waste Region (2015) Southern Region Waste Management Plan 2015-2021