

Project

Ballyhale Flood Relief Scheme, Ballyhale, Co. Kilkenny

Report Title

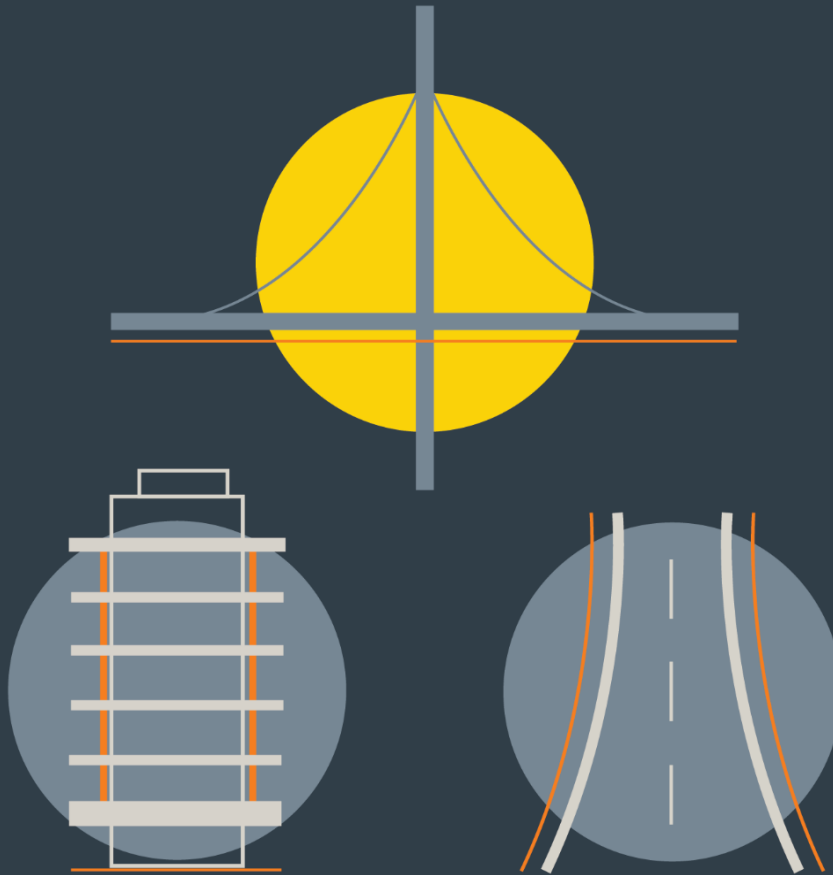
Construction & Environmental Management Plan

Clients

OPW

Kilkenny County Council

INFRASTRUCTURE



DBFL CONSULTING ENGINEERS

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1.0 INTRODUCTION

This document is an planning stage Construction & Environmental Management Plan for the proposed works to develop the flood defences at Ballyhale, Co. Kilkenny. It includes an outline description of the proposed works and how these works will be managed for their duration.

The project is currently at planning stage and as such input from the contractor has not been incorporated into the plan. The scheme shall also be subject to detailed design post planning which will develop the scheme and construction methodology further. On appointment of a contractor this document will be issued to them to be further developed into their final construction management plan for the project. The final construction management plan will be submitted by the contractor to be approved by the planning authority prior to commencement of development.

The outline plan seeks to demonstrate how works can be delivered in a logical sensible and safe sequence with the incorporation of specific measures to mitigate the potential impact on people and the surrounding environment, particularly the residential areas adjacent the site.

This document is a live document that will be reviewed throughout the construction period to ensure compliance with any planning conditions and updated environmental legislation.

Nothing stated in this document shall supersede or be taken to replace the terms of the Contract or the detailed design description issued with the Contract tender or the conditions of planning. Similarly, the issues covered within this document may be amended or added to by the Main contractors or in accordance with their specific works proposals, sequencing and procedures.

When read by the contractor, this document should be read carefully in conjunction with all drawings, specifications and survey information provided.

The contractor shall also incorporate all mitigation measures outlined in the EIAR and any other planning conditions relevant.

Any consequences that result through failure to implement measures in this construction plan, or inadequate development of this plan by the contractor are the responsibility of the contractor and not DBFL.

1.1 Project Background

The Office of Public Works (OPW) commissioned the South Eastern CFRAM study to determine locations in Ireland which may be at risk of flooding. This study concluded in 2017 and determined that properties in Ballyhale are at risk of flooding for the current day 1% Annual Exceedance Probability (AEP) event. This led to Ballyhale being approved for funding for a Flood Relief Scheme which involves a detailed study of flooding and constraints in Ballyhale.

Kilkenny County Council have appointed DBFL Consulting Engineers to develop a sustainable flood relief scheme for Ballyhale. DBFL is an Irish owned multi-disciplinary engineering consultancy with head office located in Dublin and regional offices in Waterford & Cork cities. The scheme is funded by the Office of Public Works (OPW).

The scheme has been developed by DBFL for Statutory Planning approval and this CEMP is intended to support the planning application to An Bord Pleanála

2.0 SITE DESCRIPTION & EXISTING CONDITIONS

Ballyhale is within the catchment of the Little Arrigle River which is a tributary of the River Nore. The main channel of the Little Arrigle runs to the west of the village and a tributary of the Little Arrigle runs through the village. This tributary is also known locally as the Little Arrigle however will be termed the Ballyhale River for the purposes of this assessment (this is also referred to in EPA mapping as Knockwilliam Stream).

The Ballyhale River rises approximately 2.9km south of the town of Ballyhale. It begins in a forested region and flows north through largely agricultural land. The Ballyhale River enters the village near the church and splits into two channels either side of the church. The western branch flows in a generally open channel through agricultural land. The eastern channel flows through the rear of a number of domestic properties through a heavily modified channel with frequent structures of varying construction type. The branches merge upstream of Arrigle Business Park and flow through a long (circa 50m) culvert under buildings in the business park. Several additional culverts/bridges are present on the watercourse along its remaining route through the village.

A number of weirs are also present on the channel within the village. The Ballyhale River leaves Ballyhale and merges with the Little Arrigle approximately 850 m north of Ballyhale.

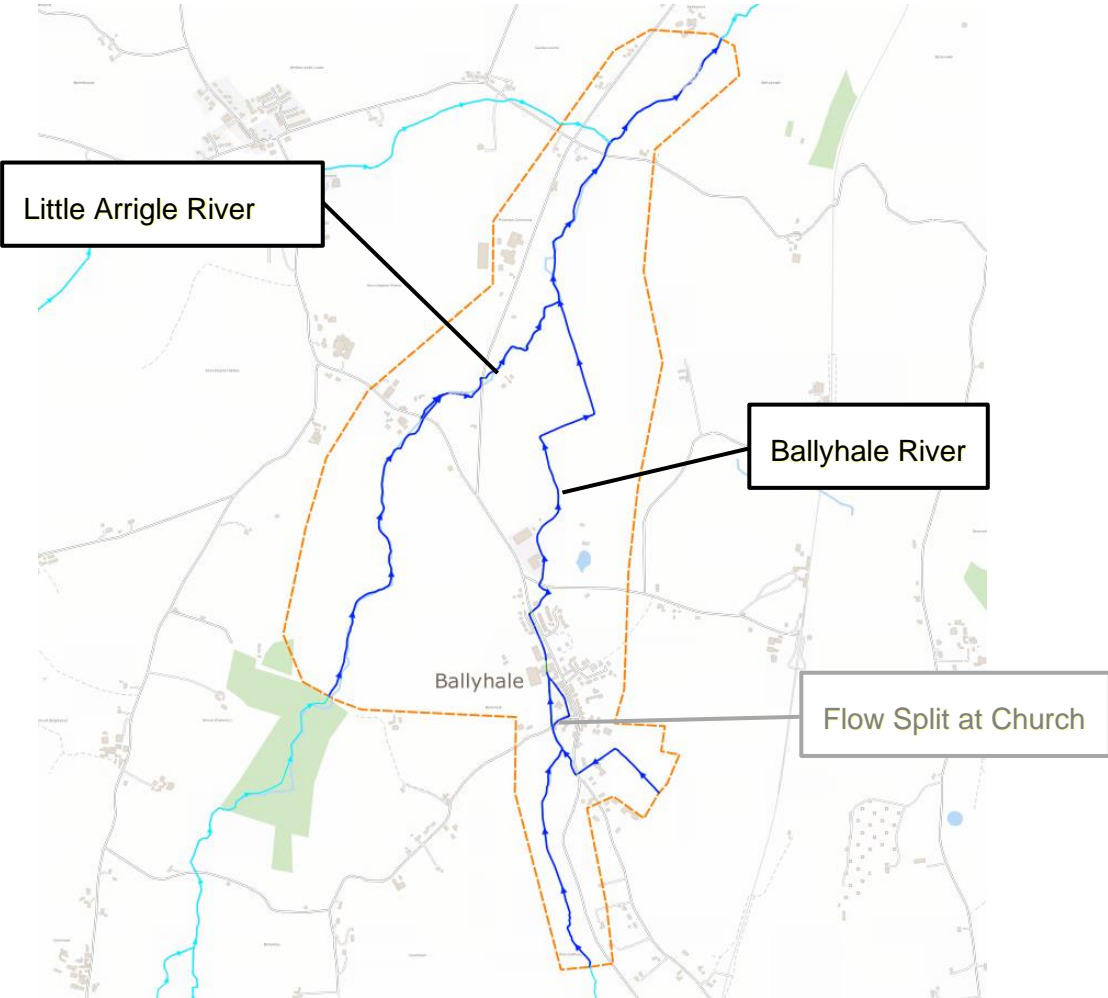


Figure 2-1 – Local Watercourses

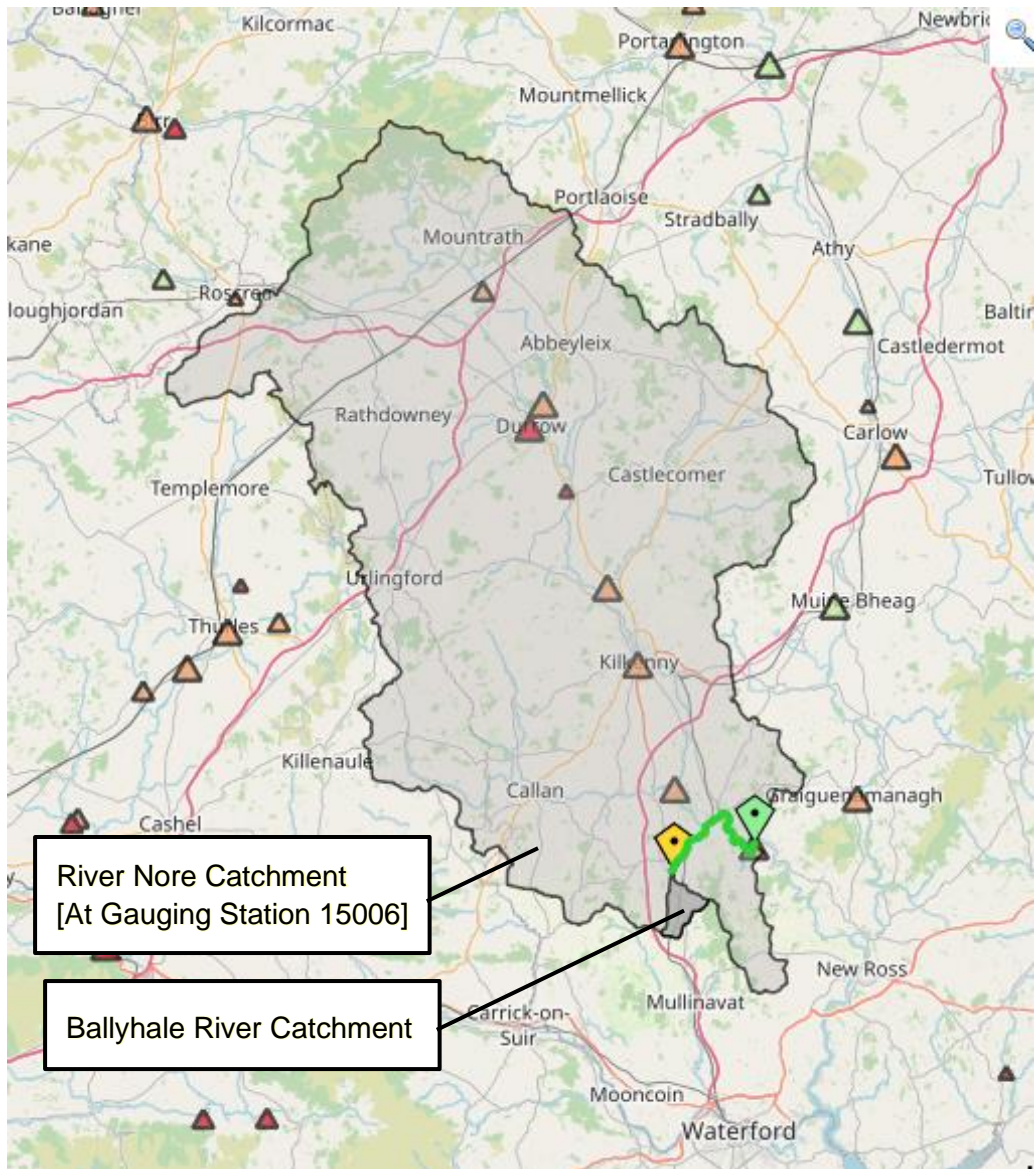


Figure 2-2 – Ballyhale River Catchment
[Source OPW FSU Web Portal]

2.1 Environmental Constraints

The key Environmental Constraints for the proposed development have been established via the supporting EIAR and Constraints Report and reference should be made to these reports for detailed information. A high-level summary is presented below.

Table 2-1: Summary of Constraints

Discipline	Constraints Summary
Water Environment	<ul style="list-style-type: none"> • Watercourses present in the study area consist of The Little Arrigle River, & The Ballyhale River (which includes a split channel section at Ballyhale Church). All are tributaries of the River Nore • The River Barrow and River Nore SAC begins close to the downstream extent of works and is considered sensitive to potential hydrological impacts on water quality/quantity from the scheme. <u>Therefore, scheme will need to ensure impacts on surface water quality/quantity are avoided.</u> • The bedrock Aquifer is a Regionally Important sandstone aquifer. • No Drinking Water Protection Areas were identified in the vicinity of the site however protection zones are present on the aquifer near Thomastown where there are abstractions for drinking water supplies
Land & Soils	<ul style="list-style-type: none"> • The Ballyhale Flood Relief Scheme is underlain in its majority by Kiltorcan Formation. The Kiltorcan Formation generally consists of yellow and red sandstone and green mudstone. • A number of bedrock outcrops in the vicinity of the site were noted on geological mapping and some bedrock was visible within stream channels during site walkovers. Bedrock is anticipated to be shallowest at the southern extent of the study area. • GSI Quaternary sediment mapping indicates the majority of the scheme to be underlain by till derived from limestones and alluvium along some stream channels. • No evidence of contaminated ground, mines, quarries or waste facilities have been identified within the concept route corridors. • No Geological Heritage Sites are within the proposed scheme extents
Biodiversity	<ul style="list-style-type: none"> • The proposed works are proximate to and potentially within designated sites including Natura 2000 sites of international importance. The primary designated site proximate to/within or downstream of the proposed works is the River Barrow and River Nore SAC and there is a direct hydrological connection to this SAC. In addition, the River Nore SPA is 5km downstream of all instream works. • At the of start the scheme there is a large group of trees. The potential impact on this area should be minimised and an arborist included within the team to provide input into the retention of these trees. • Based on the provisional site assessments many of the potential biodiversity issues noted on site can be mitigated and would not impact on the proposed development of the site. • <u>A Natura Impact Statement will be required as all options have a direct pathway to Natura 2000 sites.</u> • For much of its length through Ballyhale the stream is highly modified and channelled. There are a few pools, or areas of sanctuary for brown trout or juvenile salmon within the village or within the upstream section. Numerous sections of the stream are bridged and culverted

	<p>through the town. These include several level changes within the watercourse would obstruct migrating and non-migrating fish within the watercourse. In the upstream section of the stream the stream is silted with some locally impacted areas with “sewage fungus” on the instream rocks. Organic-rich sediment line the banksides in the upstream areas. Of particular importance is the improvement of the habitat observed just downstream of Ballyhale where water quality and habitat appeared to improve significantly.</p>
<p>Biodiversity (Bats)</p>	<ul style="list-style-type: none"> • The following bat species were recorded during this bat survey: common pipistrelle, soprano pipistrelle, Leisler’s bat, Daubenton’s bat, brown long-eared bat and Natterer’s bat. This represents six of the nine resident bat species known to Ireland. • The flood relief scheme was assessed in relation to potential impact on local bat populations. Due to the fact that the majority of bat activity was recorded west and north of the village of Ballyhale, any route options that involve loss of treelines and hedgerows will impact on local bat populations due to the removal of commuting routes and foraging habitat.
<p>Cultural Heritage</p>	<ul style="list-style-type: none"> • A number of sites of archaeological importance are present in the vicinity of Ballyhale church including the church, castle the graveyard and a font. All are listed within the Kilkenny County Development plan and most are listed in the Record of Monuments and Places (RMP) • Additional sites of archaeological importance from the RMP are identified west of the watercourse upstream of the village and include a souterrain and a burnt mound. • Site of Architectural heritage are listed within the National Inventory of Architectural Heritage (NIAH) and within the Record of Protected Structures (RPS) • NIAH sites in the vicinity of the works include the Church tower, a number of buildings on main street, a water pump on main street. • Two existing bridges on the Ballyhale River are also on the NIAH
<p>Landscape & Visual</p>	<ul style="list-style-type: none"> • A number of county development plan aims relate to protection of existing woodlands, trees and hedgerows. • The landscape character of this area is defined by a smooth terrain, allowing views over long distances, and vegetation is predominantly low. Land use comprises pasturelands and tree plantations, the area is described as a rural area with scattered, low-density settlement patterns. • The area in the vicinity of the Church and to the south has a strong historic character with several key landscape and townscape features, which include mature trees, the historic church tower, stone walls, bridges and steps, and the stream. • <u>Elements which are considered to contribute to the character of the area and should be retained include the mature trees, the stream channel, the stone walls and bridges and Pairc na Seamróg.</u> • The Kilkenny Landscape Character Assessment notes that this landscape unit is perceived as having no special landscape or scenic value. • Trees in Ballyhale are not included on the Tree Register of Ireland or under Tree Preservation Orders
<p>Air & Noise</p>	<ul style="list-style-type: none"> • The Air Quality Index for Health indicates that the air quality in Ballyhale is ‘Good’. • Ballyhale is not included within the Kilkenny Noise action plan as it is located along the regional road R448 and the noise maps produced

	<p>do not cover this area as there is less than 3 million vehicles per year on the R448.</p> <ul style="list-style-type: none"> • Receptors sensitive to noise and air impacts are primarily located along the main street. • No operational impacts on noise and air are anticipated however construction stage activities may cause short term impacts
<p>Arborist Survey</p>	<ul style="list-style-type: none"> • The vast majority of the tree cover within the survey area was located within established traditional agricultural field boundary hedges or linear tree groups (of a similar species mix) running alongside the banks of the watercourse or alongside drainage ditches. • Tree group and hedge condition was variable, with most of the understorey species being in reasonable health, however, many of the Ash trees are showing signs of significant crown dieback associated with infection by the fungal disease commonly known as Ash Dieback disease (ADB). The disease is widespread across the survey area and was seen to be affecting both younger and older trees. • There are several small clusters of young trees and bushes along the exposed sections of stream through the centre of the village, these are mostly of relatively small size and value/quality and were graded category C (low value). • Significant construction activity should be avoided within the root protection areas (RPAs) of trees intended for long-term retention.
<p>Site Investigations</p>	<ul style="list-style-type: none"> • A high degree of consistency was noted in the general stratification. Topsoil (with a little fill in places) generally overlies firm to stiff very gravelly CLAY. • In some locations a thin SAND/Gravel layer is noted between the upper topsoil and the gravelly CLAY. • Trial pits were terminated at relatively shallow depths (between 1.00 and 2.00 metres) in eight of the ten locations. • All samples testes are confirmed to be classified as INERT in accordance with the Landfill Waste Acceptance Criteria (WAC). Material excavated during construction may be disposed of within the site or off site to a suitably licensed landfill facility. • No traces of Asbestos were determined during routine testing.

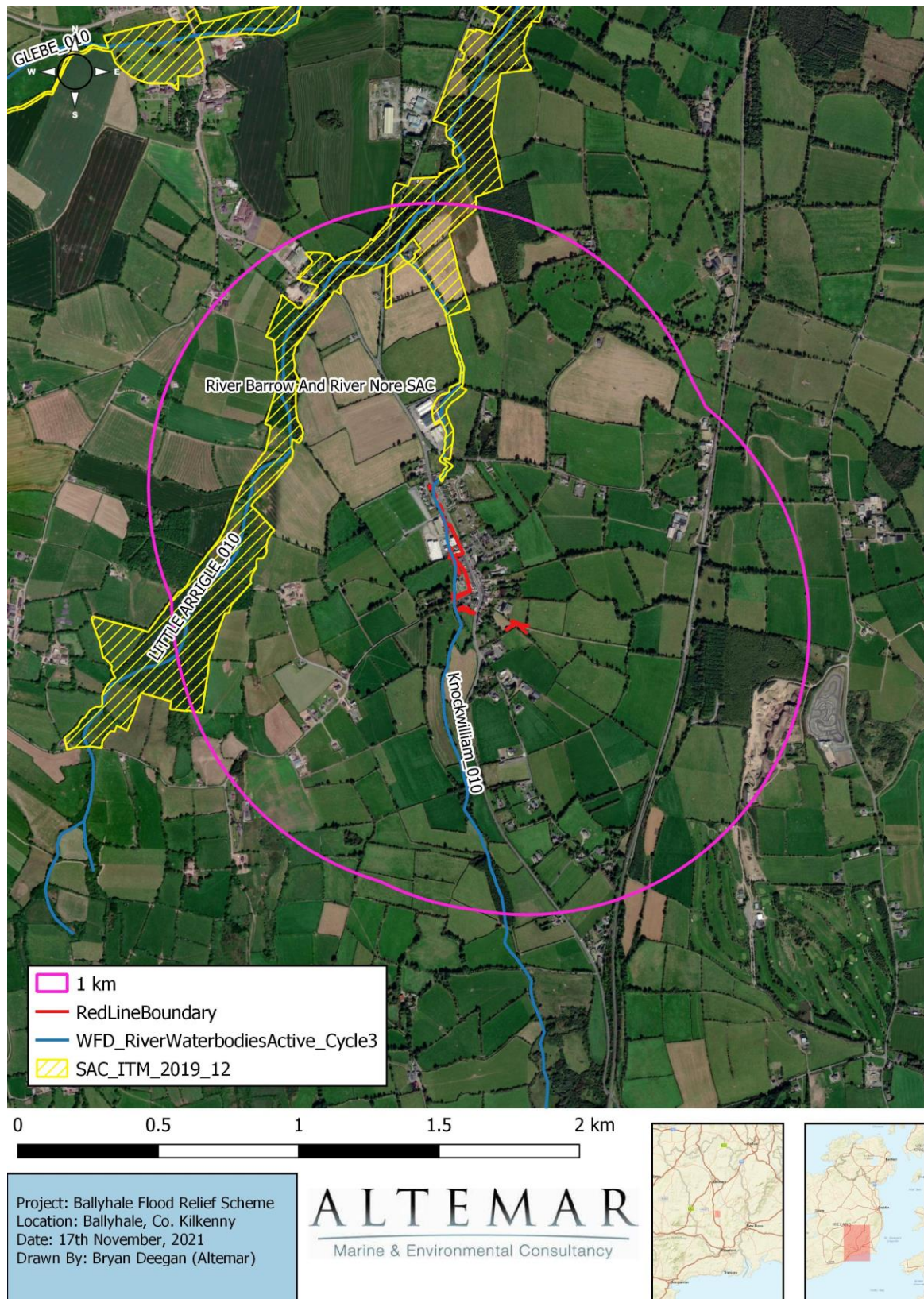


Figure 2-3: Natura 2000 Sites associated with the works area

3.0 OVERVIEW OF PROPOSED SCHEME

The Flood Relief Scheme consists of a range of interventions along the watercourse reach. The general intent of the Flood Relief Scheme is to enhance the flow capacity and level of defence through the town so that the design flows can be conveyed through the town without causing property flooding.

It seeks to remove the existing flow split at the church and direct all flow to the open channel western branch. This removes flow from the heavily modified and under capacity eastern channel which is adjacent to a number of at-risk properties. It allows a continuous flood defence to be provided between all river flows and the at-risk properties and the principal elements associated with the proposed scheme include the following:

- Embankments located upstream of the village to prevent overland flooding.
- Flood wall to western perimeter of “Arrigle View” Property.
- A section of new river channel re-connecting all outlets from the Chapel Lane bridge into the western river channel and removing the flow split. This will require excavation of the existing church pedestrian access and replacement via a new pedestrian connection which also serves to form a new bank to the redirected stream.
- Landscaping of eastern river channel to allow for a low flow channel to reflect reduced flow conditions.
- Flood Defences (wall and embankments) between the western channel and the properties at risk on Main St. Lands acquired for these flood defences will be landscaped to provide a riverside walkway/park.
- Removal of one of two existing minor private bridges providing access across the river to a private land parcel.
- Removal of a boundary wall spanning the watercourse
- The existing weir at the Ballyhale Business Park will be removed allowing the channel gradient to be increased along this section which increases capacity. The existing bridge will be removed and replaced with a 6m wide by 1.2m high precast portal culvert.

- Low flood wall alongside the road opposite Brookfield to prevent out of bank flows emerging onto the road surface.
- Provision of rock ramp to existing weir at Ballyhale Shamrocks access to improve fish pass conditions.
- Channel reprofiling at the existing Main St bridge to improve bridge inlet conditions.
- Provision of additional conveyance capacity to the Main Street Bridge. The additional conveyance will be provided by an additional bridge opening (box culvert) set at high level to provide capacity for extreme flood events.
- Provision of rock ramp to downstream face of the Main Street Bridge to improve fish pass conditions.
- Provision of a temporary construction compound.
- Fencing, accommodation works and all site development and landscaping works. proposed works consist of a range of interventions along the watercourse reach. The general intent of the works are to enhance the flow capacity and level of defence through the town so that the design flows can be conveyed through the town without causing property flooding.

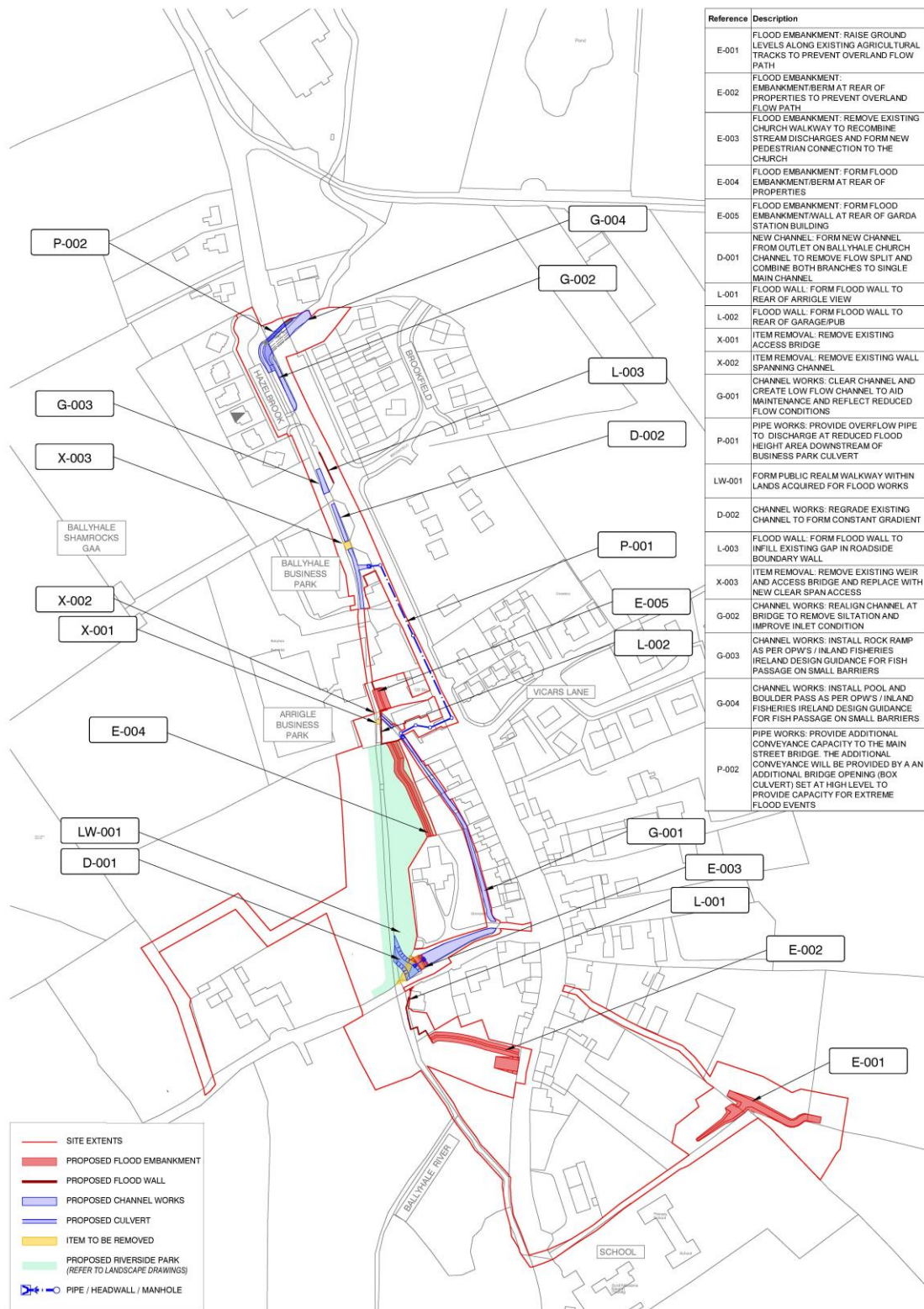


Figure 3-1: Schematic Works Layout

Table 3-1: Schedule of Works

Reference	Description	Detail Drawing Reference
E-001	Flood Embankment: Raise ground levels along existing Agricultural Tracks to prevent overland flow path	200055-DBFL-RD-SP-C-1001
E-002	Flood Embankment: Embankment / berm at rear of properties to prevent overland flow path and form new entrance	200055-DBFL-RD-SP-C-1002
E-003	Flood Embankment: Remove existing church walkway to recombine stream discharges and form new pedestrian connection to the Church	200055-DBFL-RD-SP-C-1004
E-004	Flood Embankment: Form Flood embankment/ wall at rear of properties	200055-DBFL-RD-SP-C-1005
E-005	Flood Embankment: Form flood embankment/ wall at rear of Garda Station building	200055-DBFL-RD-SP-C-1007
D-001	New Channel: Form new channel from outlet on Ballyhale Church Channel to remove flow split and combine both branches to single main channel	200055-DBFL-RD-SP-C-1004
L-001	Flood Wall: Form flood wall to rear of Arrigle View	200055-DBFL-RD-SP-C-1003
L-002	Flood Wall: Form flood wall to rear of Garage/Pub	200055-DBFL-RD-SP-C-1006
X-001	Item Removal: Remove Existing Access Bridge	200055-DBFL-RD-SP-C-1006
X-002	Item Removal: Remove Existing Wall spanning channel	200055-DBFL-RD-SP-C-1006
G-001	Channel Works: Clear channel, line with riprap and create low flow channel to aid maintenance	200055-DBFL-RD-SP-C-1004
P-001	Pipe Works: Provide Overflow pipe to discharge at reduced flood height area downstream of business park culvert	200055-DBFL-RD-SP-C-1012
LW-001	Form public realm walkway within lands acquired for flood works	Landscape Drawings
D-002	Channel Works: Regrade Existing Channel to form constant gradient	200055-DBFL-RD-SP-C-1008
L-003	Flood Wall: Form Flood Wall to infill existing gap in roadside boundary wall	200055-DBFL-RD-SP-C-1009

Reference	Description	Detail Drawing Reference
X-003	Remove Weir and existing access crossing and replace with new clear span access	200055-DBFL-RD-SP-C-1008
G-002	Channel Works: Realign channel at roadway bridge to remove siltation and improve inlet condition	200055-DBFL-RD-SP-C-1010
G-003	Channel Works: Install Rock Ramp as per OPW's / Inland Fisheries Ireland Design Guidance For Fish Passage on Small Barriers	200055-DBFL-RD-SP-C-1009
G-004	Channel Works: Install Pool and Boulder Pass as per OPW's / Inland Fisheries Ireland Design Guidance For Fish Passage on Small Barriers	200055-DBFL-RD-SP-C-1011
P-002	Pipe Works: Provide additional conveyance capacity to the Main Street bridge. The additional conveyance will be provided by an additional bridge opening (box culvert) set at a high level to provide capacity for extreme flood events	200055-DBFL-RD-SP-C-1011
Site Compound	Provide area for Site compound to facilitate the construction of the proposed scheme	200055-DBFL-Z0-SP-C-0003

4.0 DOCUMENTS TO BE PREPARED BY THE CONTRACTOR

The following section outlines key documents to be prepared by the contractor post planning and key items to be addressed within the documents.

The documents shall incorporate all requirements set out in this CEMP and the EIAR.

4.1 Construction Stage Construction & Environmental Management Plan (CEMP)

On appointment of a contractor this CEMP document will be issued to them to be further developed into their final construction management plan for the project. The final construction management plan would be submitted by the contractor to be approved by the Local Authority prior to commencement of development.

In addition to including the measures included within this CEMP, it should detail at a minimum;

- Working hours and days and construction schedule;
- Site Compound locations & layouts;
- Site Security Plan;
- Erosion and Sediment Control measures for surface water runoff and in stream works;
- Pollution prevention measures in order to protect Inland Fisheries and watercourses;
- Details of chemical/fuel storage areas (including location and bunding to contain runoff of spillages and leakages);
- Details of construction plant storage, chemical and fuel storage, temporary toilet;
- Earthworks plans including intended stockpile locations;
- Dust management measures to prevent nuisance;
- Noise and vibration management to prevent nuisance;
- Measures for Landscape management;
- Temporary hoarding & lighting plans;
- Method Statements for diversion of services;
- Method Statements for Storage, Treatment and transport of soils;
- Health and Safety procedures

4.2 Environmental Operating Plan (EOP)

The contractor will be responsible for the production, implementation and maintenance of an Environmental Operating Plan (EOP). TII have published 'Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan' which should be used as a basis for the creation of the EOP. The EOP shall:

- Comprehensively incorporate all Environmental Commitments set out in the Contract documents, Planning Documents (including EIAR), any conditions and/or modifications imposed by An Bord Pleanála or the local authority;
- Provide a method of documenting compliance with these Environmental Commitments and conditions/modifications;
- Itemise relevant environmental legislative requirements and best practice guidance. The EOP should also provide a method of documenting compliance with these requirements, and
- Outline methods by which construction work will be managed to prevent, reduce or compensate for potential adverse impacts on the environment;
- Incorporate procedures for communicating with the public, landowners, statutory consultees, local authority and relevant site-personnel;
- Incorporate procedures for Environmental Awareness Training for the main contractor's staff;
- Incorporate monitoring procedures and responses to monitoring results, where contractually required, and
- Provide for a system of audit with regard to the effectiveness of the EOP during the construction life cycle of the project.
- Include an Emergency Response Plan (ERP) detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes, fires or flood events.

4.3 Traffic Management Plan (TMP)

The successful contractor will develop a Construction Stage Temporary Management Plan in consultation with KCC's transportation department.

The Traffic Management will be in full accordance with Chapter 8 of the Traffic Signs Manual and the requirements set out in this PCEMP and the EIAR.

The Contractors TMP shall include:

- Development of traffic management proposals in accordance with the principles of prevention and by following the hierarchy of risk prevention and protection;
- Optimisation of road space and the provision of an adequate safety zone and work space at work locations;
- Consideration for the needs of vulnerable road users;
- Minimisation of potential conflict between road users;
- Details of routing of network traffic;
- Temporary road closures;
- Temporary signal strategy;
- Routing of construction traffic;
- Temporary signal strategy;
- Programme of vehicular arrivals;
- On-site parking locations for visitors and workers;
- Road cleaning management plan; and
- Provision of appropriate speed limits and restrictions.
- Provision of clear directions relation to decisions/actions required from road users;

Other traffic management requirements to comply with the principles described above and the contract requirements.

5.0 GENERAL CONSTRUCTION METHODOLOGY

The project is currently at planning stage and subject to approval and detailed design. It is estimated that the works would be tendered in 2023 with commencement in 2024 and an estimated site programme of approximately 20 months depending on construction phasing.

The primary works elements are anticipated to include.

- Site Setup
- Advance Archaeology Surveys
- Site Clearance and Demolition
- Earthworks
- Channel Works
- New Structures
- Installation of Drainage
- Landscaping & Demobilisation

5.1 Programme Constraints

The proposed in stream works will be constructed during the instream open season (between June – September only). Weather conditions will be monitored throughout the construction period by the contractor and works will not be carried out during extreme rainfall or high flow events and shall take notice of other statutory and best practice working period restrictions imposed.

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, a derogation licence will be sought only where no alternatives exist.

The works include a number of elements which will affect access or operations within residential and commercial properties. The contractor shall liaise with all property owners to ensure the works schedule is co-ordinated with landowner requirements to minimise disturbance and provide temporary access measures as appropriate. Particular landowner requirements or restrictions shall be included within tender documents for the project.

As set out in Chapter 12, Advance Archaeological Investigations are to be carried out in advance of appointment of a main contractor. All works associated with the

archaeological investigations shall comply with the requirements and mitigation measures set out in the EIAR and supporting statutory documents.

5.2 Preliminary Construction Programme

A preliminary construction programme has been prepared by DBFL but when a contractor is appointed post planning permission, they will produce a Programme for construction which will be submitted to the Local Authority for approval before any works commence. The contractors programme shall comply with works restrictions set out in the EIAR and this CEMP.

The indicative programme chart below shows an 20-month construction period and assumes a start date in Q2 2024. This allows for works to span across two instream windows however if all instream works can be completed in a single window the construction period could be reduced.

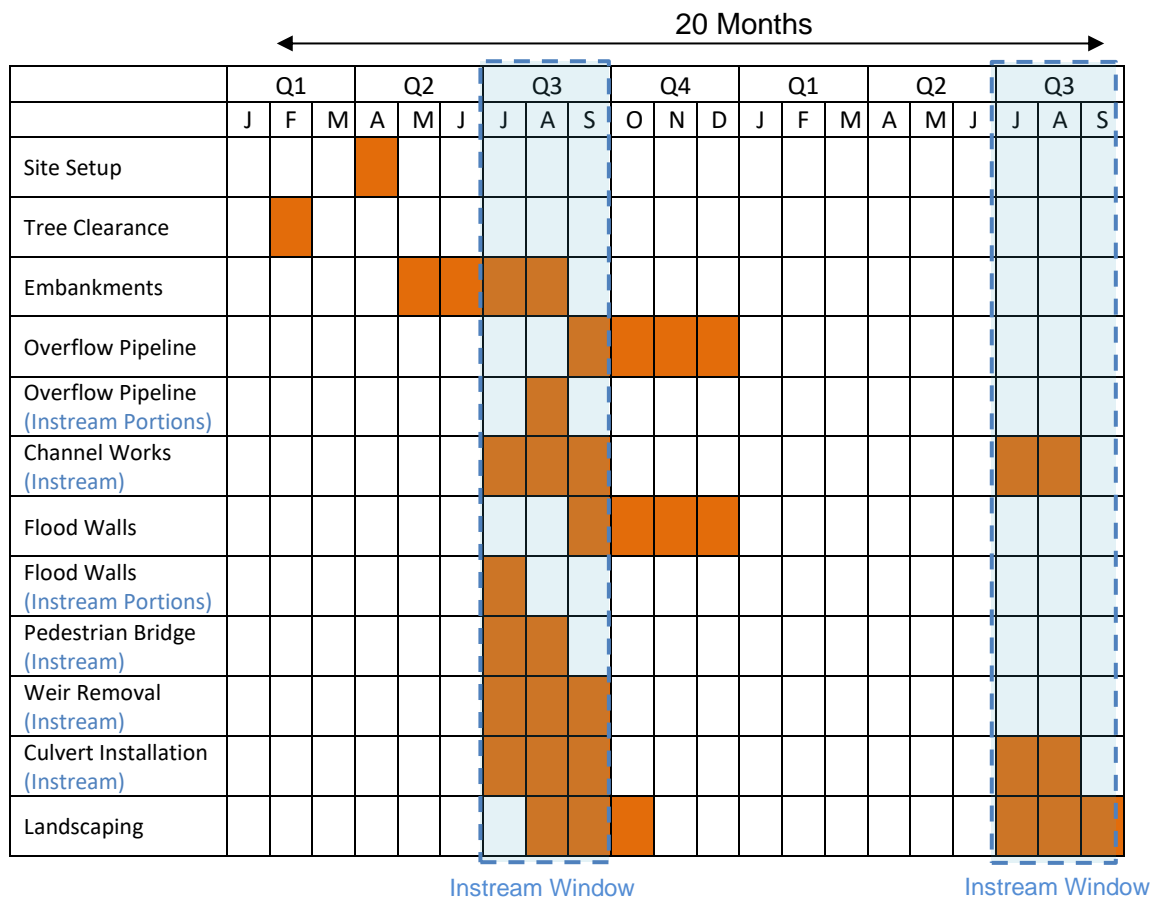


Table 5-1: Indicative Construction Programme

5.3 Site Setup

The contractor shall establish a site compound and additional temporary compounds as necessary. The exact location of the construction compound will be detailed in the Contractors Construction Management Plan which will be submitted to the local authority for approval, but it should be within an area proximate to the works from which safe access to the surrounding road network can be provided and be located outside environmental restriction zones set out in the EIAR/CEMP. An indicative location for site compound is shown in Figure 5-1 below.

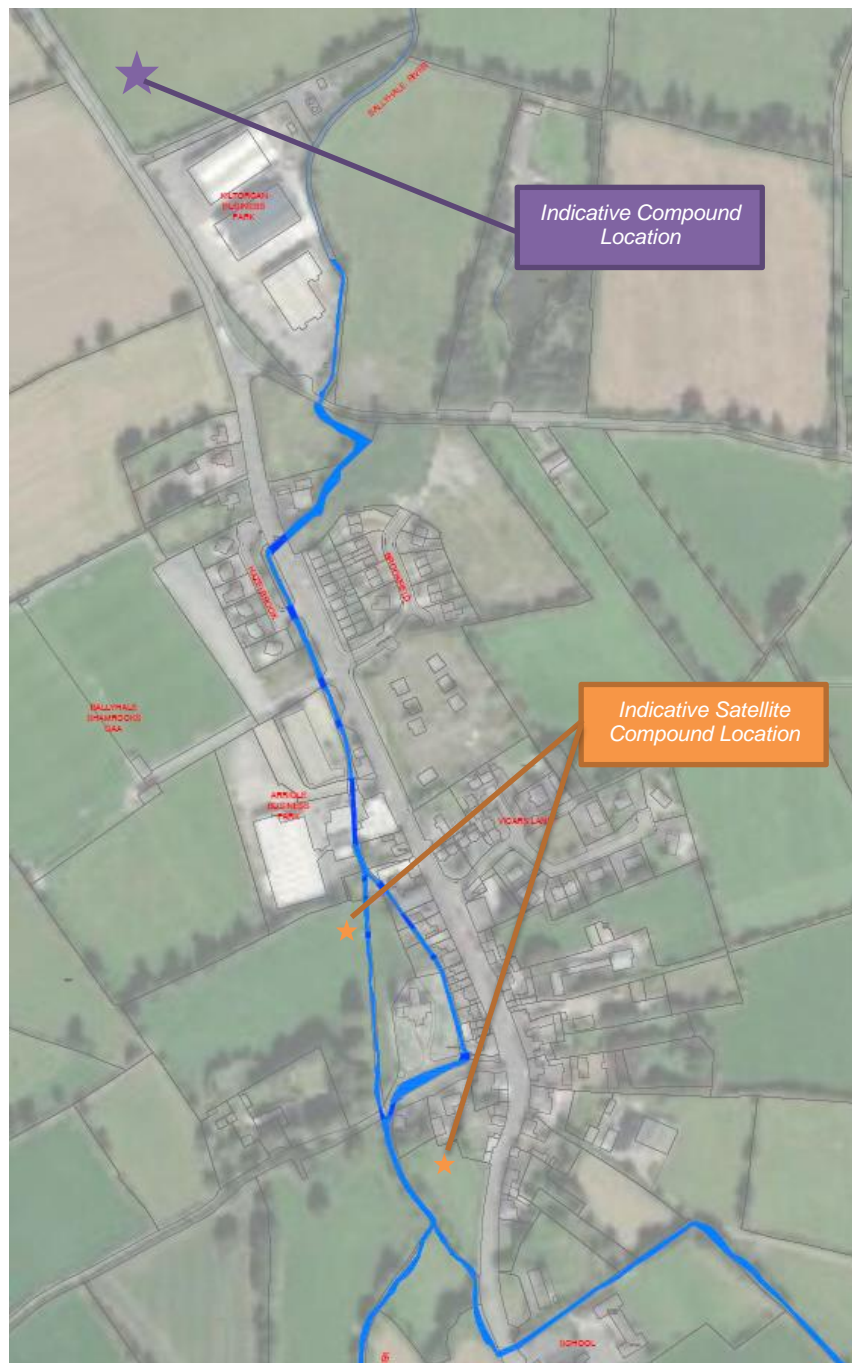


Figure 5-1: Indicative Compound Location

Much of the site is adjacent or within the Ballyhale River which is a sensitive receptor draining to an SAC as outlined in the project EIAR. The contractor shall put in place measures to ensure that the river bed and banks are not damaged, pollution is avoided and that the flow is correctly managed throughout the construction period. All mitigation measures outlined in the EIAR and within this PCMP shall be included in the contractor's Construction Management Plan. In general, all works in the vicinity of the channel will be subject to a specific method statement agreed in advance with the statutory authorities.

Given the nature of the proposed works at Ballyhale there are a number of discrete works areas and it is likely that individual access will be required to each area, complete with temporary fencing around these works areas as required.

The contractor shall establish and maintain suitable temporary fencing around their works areas. Where semi-permanent hoarding is required, hoardings will be painted timber hoarding circa 2.4m including supports and appropriate anchoring (Designed by Temporary Works Engineer), with external lighting and Safety signage as appropriate. Site hoarding will include Health and Safety warnings at appropriate intervals.

Site security will be provided by way of a monitored infrastructure systems such as site lighting and CCTV cameras, when deemed necessary.

The construction compound will not be located within 50m of the Ballyhale River.

5.4 Access Routes

The proposed contract works will use existing access routes where possible and were selected to minimise impact and potential disturbance. The access routes will be clearly demarcated across the site prior to any construction activities.

The public road network will be used to access the general areas of the proposed works where practical. Existing farm access routes will be used to gain access to other areas which are not directly accessible from the public road.

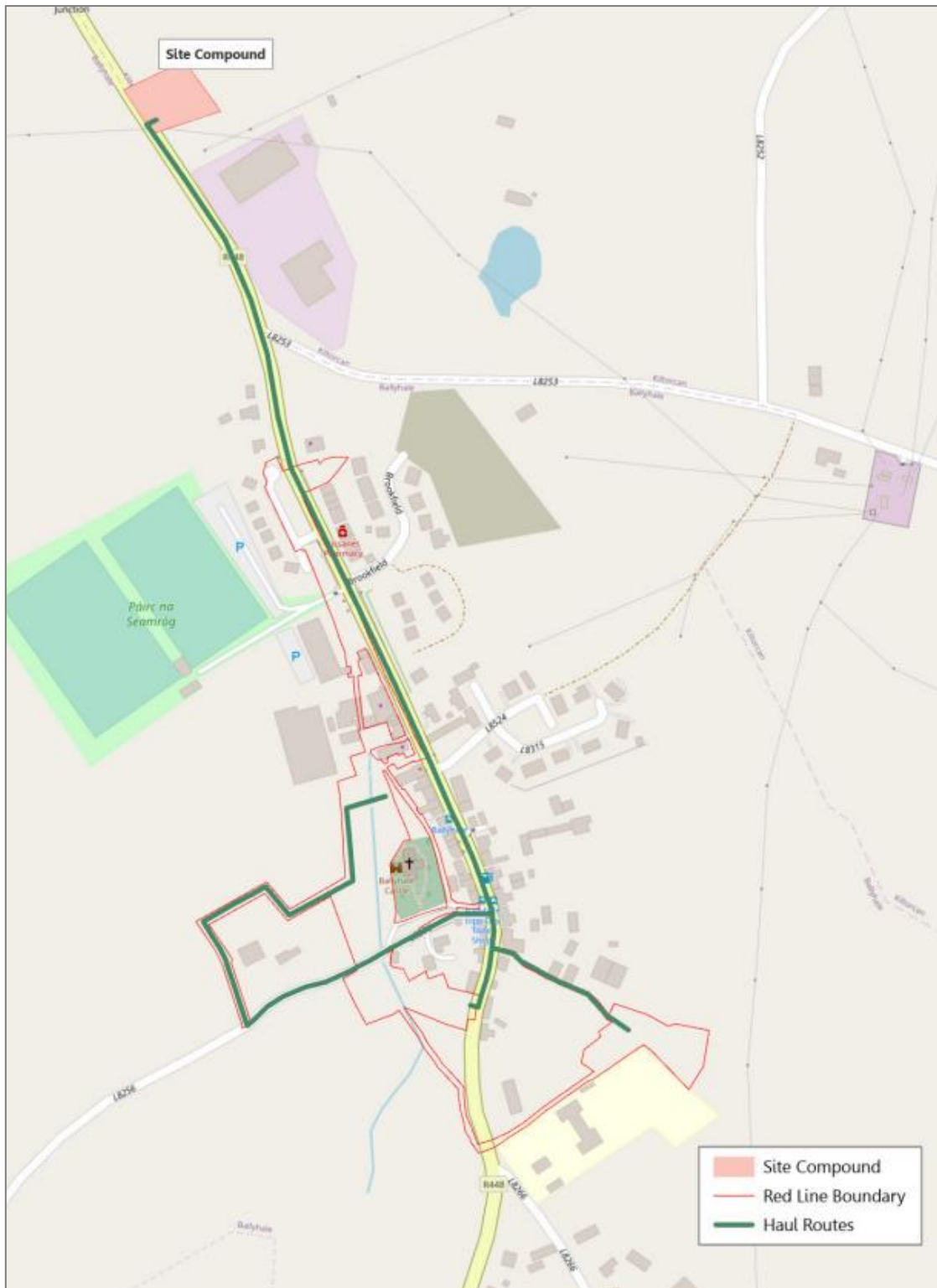


Figure 5-2: Indicative Haul Routes

5.5 Site Clearance and Demolition

The works area will be required to be cleared of vegetation in a phased approach to avoid leaving exposed ground for long periods of time. The contractor shall minimise the vegetation clearance carried out and only clear what is strictly necessary to facilitate

the works. Tree and shrub removal will be 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 nesting birds are present. If any are encountered, the vegetation clearance will be delayed until the protected fauna have moved away from the area, a derogation licence will be sought only where no alternatives exist.

Minor demolition is proposed including replacement of existing walls and existing channel structures. It is anticipated that most of the waste generated from demolitions will be segregated wherever possible for reuse or recycling in accordance with the relevant legislation and guidelines and the project's Construction Waste Management Plan. All unused demolition waste will be removed off-site to a licensed facility.

5.6 Earthworks

Excavated material will be generated from the stripping of surface and excavation of subsoil layers for the construction of the proposed foundations and channel works. Earthworks material will also be imported to form embankments. All imported material shall be sourced from a licensed supplier and be tested to ensure it is free from contamination.

Bunds will be placed around areas of exposed soils such as excavations / material stockpiles. This will prevent clean water entering the area and dirty water from leaving the area. The bunds will be made of a non-erodible material such as strawbales / geotextiles.

Excess material will be disposed offsite to a suitably licensed facility in accordance with current waste management legislation & the project's Construction Waste Management Plan.

5.7 In Channel Works

The proposed in stream works will be constructed during the instream open season (between 1st July – 30th September only). Weather conditions will be monitored throughout the construction period by the contractor and works will not be carried out during extreme rainfall or high flow events.

Construction and operational controls will be incorporated into the proposed development project to minimise the potential negative impacts on the ecology within the Zone of Influence (Zol) including the Knockwilliam Stream, Little Arrigle Stream, River Nore, and River Barrow.

The contractor shall prepare detailed method statements for all elements of instream works and all in-stream works will comply with current best practice, notably 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).

Where specified in Chapter 6 Biodiversity, Electro fishing will be carried out subject to licence.

For any construction work within or directly adjacent to the water the following mitigation measures will apply

- Works to be carried out in the dry (offline or outside the water flow) in all cases.
- "Dry" works areas will be achieved either via full isolation of the channel section via Gravity Pipe/Flume or via partial isolation using cofferdams. See schematic diagrams below;

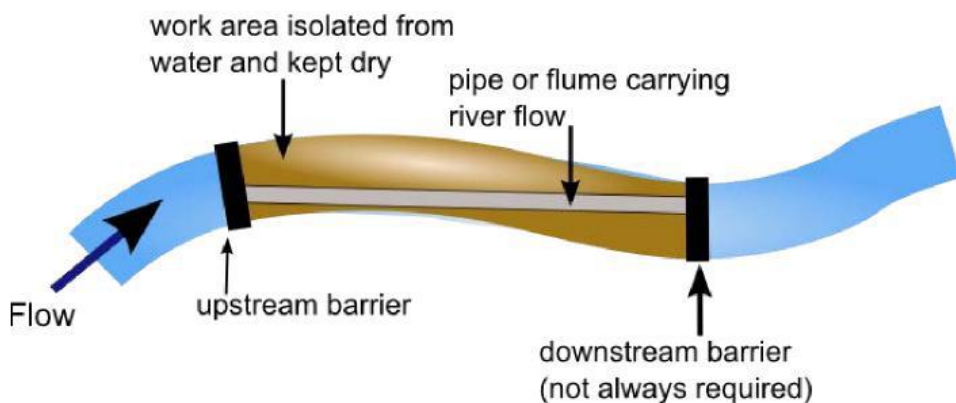


Figure 5-3: Full Isolation Gravity/Flume pipe
[Source SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods]

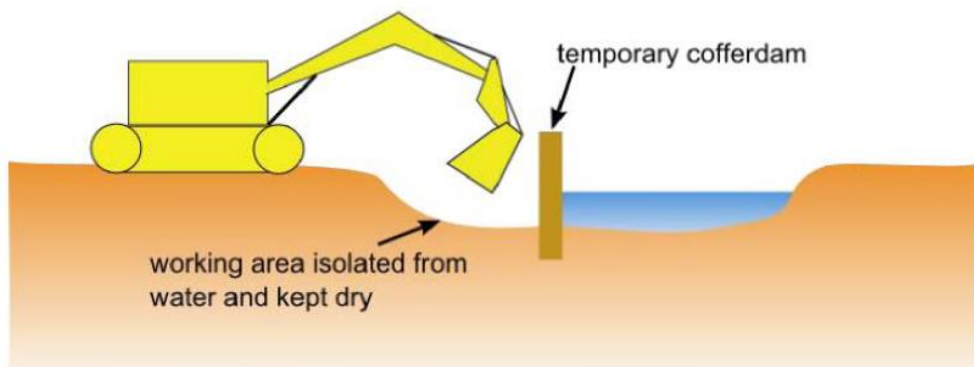


Figure 5-4: Partial Isolation Cofferdam

[Source SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods]

To minimise trash and sediment accumulation at the upstream end, flume pipes will be inspected (including the inlet and outlet) regularly for damage or blockage. The contractor will clear blockages and repair any damage immediately.

When removing flume pipes at the end of the works, the contractor will remove any accumulation of silt or trash against the barrier and dispose of it appropriately. The contractor will remove the downstream barrier before removing the upstream barrier.

5.8 Preconstruction Condition Surveys

Surveys shall be carried out before the works commence to ensure the site can be reinstated to its pre-works condition and for monitoring purposes. These surveys should include:

- Photographs of the site;
- Information on existing vegetation/habitat (included in Biodiversity Chapter of EIAR);
- Surveys of existing Watercourse conditions (substrate type, substrate size distribution, planform)
- Where works are proposed adjacent to existing structures. Pre-construction Property Condition Surveys shall be carried out. These shall be carried out by a Chartered Engineer and be in accordance with guidance set out in TII Specification for Road Works Series 100.
- Where works are proposed in channel, pre-construction archaeological assessment is required.

5.9 Landscaping & Demobilisation

On completion of the main flood relief works all disturbed areas shall be fully reinstated and permanent landscaping works shall be installed in accordance with landscape plans for the project. All temporary fencing and temporary site compounds shall be removed and lands fully reinstated.

5.10 Working Hours

Working hours will be strictly in accordance with the granted planning conditions with no works on Sundays or Bank Holidays. If work is required outside of these hours, written approval will be sought by the contractor from the Local Authority.

It is anticipated that normal working hours will be 07:00 to 19:00 Monday to Friday and 08:00 to 17:00 on a Saturday. Working outside these hours will be subject to agreement with the Local Authority.

5.11 Existing Services

The contractor will be responsible for ensuring that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant service provider and local authority.

All works in the vicinity of utilities will be carried out in ongoing consultation with the relevant utility company and/or local authority and will be in compliance with any requirements or guidelines they may have.

The contractor shall note the position of all existing overhead power lines. Works within the hazard zone of the existing power lines shall be undertaken in accordance with the ESB code of practice for avoiding danger of overhead electricity lines. The contractor must ensure a site-specific risk assessment and method statement has been completed and agreed with ESB networks before any works take place in the hazard zone of an overhead power line.

6.0 TRAFFIC AND TRANSPORT

The contractor shall comply with particular mitigation measures for this topic as set out in the EIAR for the development. The primary measures are set out below.

6.1 General Site Access/Egress.

Since the project footprint is spread out throughout a number of discrete works sites, storage and loading/unloading on site will be constrained at certain locations. The contractor shall carefully manage access/egress and deliveries to take account of the constrained nature.

As part of the Contractor Construction Management Plan for the works a Construction Traffic Management Plan (CTMP) will be prepared, the details of which will be agreed in full with Kilkenny County Council prior to the commencement of construction activities on site. The principal objective of the CTMP is to ensure that the impacts of all building activities generated during the construction of the proposed development upon both the public (off-site) and internal (on-site) workers environments, are fully considered and proactively managed / programmed respecting key stakeholders thereby ensuring that both the public's and construction workers safety is maintained at all time, disruptions minimised and undertaken within a controlled hazard free / minimised environment. The CTMP will be prepared in accordance with the principles outlined below and held on site.

- Department of Transport Traffic Signs Manual 2010 – Chapter 8 Temporary Traffic Measures and Signs for Roadworks
- Department of Transport Guidance for the Control and Management of Traffic at Road Works (2010)
- Any additional requirements detailed in the Design Manual for Roads and Bridges (DMRB) & Design Manual for Urban Roads & Streets (DMURS)

The Tmp shall take account of local usage patterns of existing residential and commercial developments in the area;

Construction Traffic will consist of the following categories;

- Private vehicles owned and driven by site staff and management.
- Construction vehicles e.g. excavation plant, dump trucks.
- Materials delivery vehicles involved in site development works.

An appropriate control and routing strategy for HGVs shall be implemented for the duration of site works as part of the CTMP. It is not proposed to utilise any roads with

weight/height restrictions as part of the routing of HGVs during the construction phase. HGVs will be routed to use the regional road network and avoid local roads such as Chapel lane.

6.2 Staff and Parking

On-site employees will generally arrive before 07:00, thus avoiding the morning peak hour traffic. Construction employees will generally depart after 17:00.

Where practicable Contractor's staff will commute by shared vehicle, public transport or other modes. The Contractor may provide off-site parking at a suitable location where travelling by public transport is not practicable for workers. Construction vehicles will not be permitted to park on the public roads unless designated or permitted to do so.

6.3 On-Site Accommodation

Facilities will be provided by the contractor within the confines of the site hoarding as follows;

- Adequate materials drop-off and storage area;
- Staff welfare facilities i.e. toilets etc.

6.4 Construction Activities

HGVs are anticipated to be more numerous during the following work elements:

- Excavation stage where waste and soil is removed from site;
- Bringing bulk construction materials to site;

6.5 Minimisation of Movement and Impact

Construction vehicle movements and their impact will be minimised through;

- Consolidation of delivery loads to / from the site and management of large deliveries on site to occur outside of peak periods;
- Use of precast / prefabricated materials where possible;
- Adequate storage space on site to be provided;
- Scheduling of movements to outside peak traffic times and school pick-up / drop-off times.
- Scheduling of deliveries to minimise number of HGV's at site during a single period.

6.6 Public Roads

The following measures will be taken to ensure that the site and surroundings are kept clean and tidy;

- A regular programme of site tidying to be established to ensure a safe and orderly site;
- Mud spillages on roads and footpaths outside the site to be cleaned regularly and will not be allowed to accumulate;
- Wheel-wash facilities or similar will be provided for vehicles exiting the site if deemed appropriate or when significant vehicle movements are planned (e.g. disposal of topsoil from site);
- Dedicated road sweeper will be put in place if site conditions require.

7.0 BIODIVERSITY

The contractor shall comply with particular mitigation measures for this topic as set out in the EIAR for the development. The primary measures are set out below.

7.1 General

A project ecologist shall be appointed for the construction stage to ensure compliance with the measures set out in the EIAR. All works in the riparian corridor will be carried out in consultation with and to the satisfaction of IFI, NPWS and the project ecologist, following the best practice guidelines for construction in the vicinity of watercourses.

Due to the presence of sensitive species downstream of the works (Otter (*Lutra lutra*) and Freshwater Crayfish (*Austropotamobius pallipes*), the fact that the subject site is located within a designated Freshwater Pearl Mussel (*Margaritifera (Marga ritifera)* *Margaritifera*) sensitive area, in addition to having a direct hydrological pathway to Natura 2000 sites downstream and the necessity to comply with Water Pollution Acts. It has been deemed necessary to limit the potential impact of the works and implement mitigation measures as follows:

7.2 Works Within Riparian Corridor

A silt interception system will be prepared in consultation with the project ecologist. The purpose of this is to ensure that silt is removed from runoff prior to entering the stream throughout the construction process. The following measures will be carried out to ensure that the site runoff is suitably contained during construction.

- Site works will commence with the submission of a construction methodology to IFI. It should be noted that the watercourse works are designed to be fisheries compliant and will contain features for biodiversity enhancement. Following agreement of the methodology with IFI the excavation of the riparian works will be carried out in the dry, isolated from the existing watercourse. Diversion of the watercourse will not involve over pumping and will involve a combination of diversions into existing elements of the watercourse and passive piping.
- Pumps will be placed within the dry works area should any seepage, rainwater or groundwater enter the works area. These are to be connected to silt busters/or to the onsite swales as directed by the project ecologist (and not directly back to the stream without filtering)

- Stockpiling of loose materials will be kept to a minimum of 20m from watercourses and drains.
- Only when all dry works have been completed and inspected by the ecologist and IFI will the stream become live. A gradual switchover will be implemented and the stream will flow through the newly installed elements under supervision of project ecologist.
- It is important that the area cleared within the potential flood zone is landscaped immediately following the works to limit any silt entering the stream during a flood.
- The placing of silt fences in the riparian corridor will be carried out to prevent runoff entering the riparian corridor. It is important that the bases of these are buried deeply in the soil as this area has the potential to be flooded and they could cause downstream impacts if not installed correctly. There will be no machinery access into the live watercourse.
- A project ecologist will be onsite during all instream works. The ecologist will monitor twice daily turbidity, pH and oxygen levels both upstream and downstream of the proposed works and submit weekly reports to NPWS and IFI for the duration of the works.
- The ecologist will have the ability to cease all works immediately without delay and request additional measures to be implemented in the event of elevated siltation or reduced oxygen levels in the watercourse.
- Following the completion of this element of the project this area of the site will be closed off to machinery access and relandscaped.
- Abstraction of water from watercourses is not to be permitted.
- Permanent flow diversion is proposed from a small section of the stream (church channel). Prior to diversion, Electrofish the water within the full extent of the works location to 50m downstream (if required by IFI), at the start of the project. Remove any fish and transport downstream.

7.3 Storage/Use of Materials, Plant & Equipment

- Materials, plant and equipment shall be stored in the proposed site compound location.

- Plant and equipment will not be parked within 50m of the watercourse at the end of the working day.
- Hazardous liquid materials or materials with potential to generate run-off shall not be stored within 50m of the watercourse.
- All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed development site compound. The capacity of the bunded area shall conform with EPA Guidelines – hold 110% of the contents or 110% of the largest container whichever is greater.
- Fuel may be stored in the designated bunded area or in fuel bowsers located in the proposed compound location. Fuel bowsers shall be double skinned and equipped with certificates of conformity or integrity tested, in good condition and have no signs of leaks or spillages;
- Smaller quantities of fuel may be carried/stored in clearly labelled metal Jeri cans. Green for diesel and red for petrol and mixes. The Jeri cans shall be in good condition and have secure lockable lids. The Jeri cans shall be stored in a drip tray when not in use. They will not be stored within 50m of the watercourse.
- Drip trays will be turned upside down if not in use to prevent the collection of rainwater; Waters collected in drip trays will be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements;
- Plant and equipment to be used during works, will be in good working order, fit for purpose, regularly serviced/maintained and have no evidence of leaks or drips;
- No plant used shall cause a public nuisance due to fumes, noise, and leakage or by causing an obstruction;
- Re-fuelling of machinery, plant or equipment will be carried out in the site compound as per the appointed Construction Contractor re-fuelling controls;
- All persons working will receive work specific induction in relation to material storage arrangements and actions to be taken in the event of an accidental spillage. Environmental toolbox talks / briefing

sessions will be conducted for all persons working to outline the relevant environmental control measures and to identify any environment risk areas/works.

7.4 Other Measures

Where possible, site clearance works should proceed outside the nesting season, i.e. from September to February inclusive. If this is not possible, vegetation must first be inspected by a suitably qualified ecologist. If a nest is encountered then works must stop, until such time as nesting has ceased. Otherwise, a derogation licence must be sought from the NPWS.

Though no invasive species have been identified on site – Contractor shall ensure that invasive species are treated appropriately (consult specialist invasive species contractor for suitable methods dependent upon the species) and avoid import or spreading these species during any works/activities.

A preconstruction survey for mammals and amphibians shall be carried out within the works extents to ensure no changes have occurred since EIAR stage surveys.

8.0 NOISE AND VIBRATION

The Contractor shall ensure that the level of noise and vibration resulting from the construction of the works does not constitute a nuisance, and that noise and vibration emissions conform to the requirements of BS 5228: 2009 Code of Practice for Noise and Vibration Control on Construction and open sites, Part 1: Noise and Part 2: Vibration. All plant shall be adequately silenced to conform to the requirements of BS 5228. Contractor shall operate in accordance with the Safety, Health and Welfare at Work (General Application) Regulations 2007, part 5 Noise and Vibration.

Short-term vibration levels and continuous vibration guideline levels as measured in buildings shall be less than the guideline values in BS 5228.

Vibration limits to be applied for infrastructure works are those specified in the NRA document Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, Revision 1, 2004). Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of;

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

Table 2: Allowable vibration during road construction in order to minimise the risk of building damage

The contractor shall comply with particular mitigation measures for this topic as set out in the EIAR for the development. The primary measures are set out below.

- Working hours during site construction operations will be restricted to daytime 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 Kilkenny County Council.
- 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. 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 receivers.
 - 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.
- 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, further mitigation measures 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.

9.0 AIR QUALITY AND CLIMATE

The contractor shall comply with particular mitigation measures for this topic as set out in the EIAR for the development. The primary measures are set out below.

The Contractor shall take all necessary steps to control dust. The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. A Dust Management Plan shall be produced by the contractor. The contractor will include measures such as:

- Wetting of haul road and storage areas;
- Covering or dousing of any dry, imported or excavated material;
- Reducing the duration for stockpiling in fill materials;
- Use of a wheel wash for construction traffic.

Specific dust control measures to be employed are highlighted below.

- Procedures within the Dust Management Plan will be strictly monitored and assessed.
- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.
- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads will be restricted to essential site traffic only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.

- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- The Contractor shall put in place a regime for monitoring dust levels in the vicinity of the site during the works. The level of monitoring and adoption of mitigation measures will vary throughout the construction works depending on the type of activities being undertaken and the prevailing weather conditions at the time. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods or additional mitigation shall be implemented.
- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.

10.0 WATER

The contractor shall comply with particular mitigation measures for this topic as set out in the EIAR for the development. The primary measures are set out below.

It is noted that certain measures for Biodiversity protection (Section 7.0) also relate to the Water Environment

Construction stage drainage shall be encompassed by a robust Sustainable Drainage System (SuDS) design which will be used to control drainage and silt management on the site. Drainage measures to include;

- During construction, contaminated surface water runoff in working areas will be collected by temporary drainage systems installed by the contractor and then treated or desilted on-site before discharge to the Ballyhale River. No outflows or dewatering flows from the works area will discharge directly into watercourses.
- Where pumps are used, they will be placed in a sump that isolates them from the base of the excavation in a perforated container.

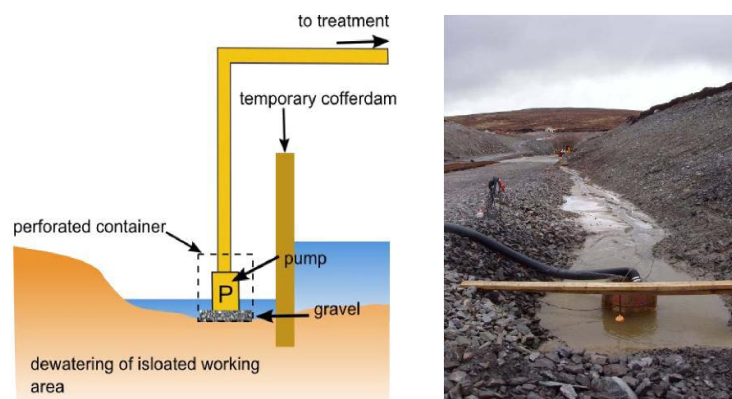


Figure 10-1 Submersible Pump on a gravel base and perforated container [Source SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods]

- Construction drainage ditches will take the form of wide, flat-bottomed swales designed to convey flows at a low velocity.
- Providing settlement tanks where runoff from the works area areas is attenuated and treated prior to discharge to watercourses.



Figure 10-2 Settlement Tanks [Source SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods]

- Discharges will travel over vegetated buffer strip at low velocities prior to discharge to maximise filtration and settlement.
- Silt fencing or other appropriate measures shall be put in place downstream of exposed soils or soil stockpiles.

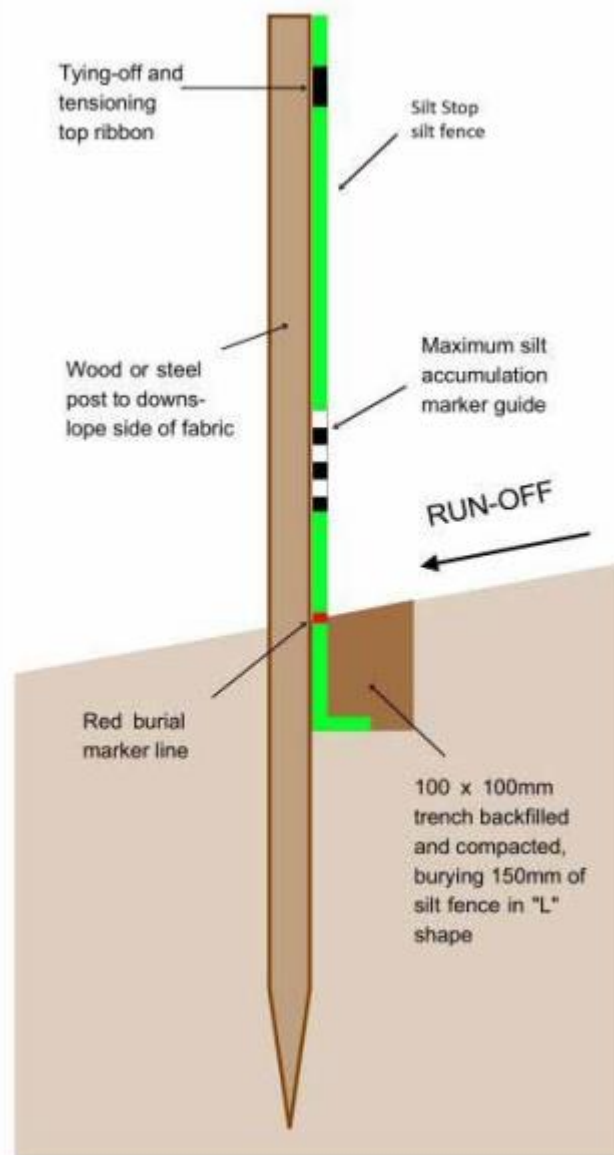


Figure 10-3 Silt Fence Cross Section [Source Hy-Tex Terrastop Silt Fence Construction Methods]

The installation of silt fencing will follow the following procedure:

1. Fence Line – Mark out the area required for the silt fence ensuring the fence is central and at right angles to flow of water.
2. Trenching – Dig a 100mm x 100mm trench to allow for the Silt Fence to be buried in an “L” shape as noted in Figure 10-3.
3. Fence Stakes – Position posts on the downslope side of the fence with a maximum of 1.5m post spacing and a minimum of 0.5m burial, securing the fence.
4. Attached the Silt Fence – Tension the top end by looping the ribbon bad over the post.
5. Backfill and Compaction – Backfill the trench line and firmly compact.

6. Inspection – Regularly inspect the Silt Fence and remove trapped silt when it reaches the top of the Silt Accumulation Line and repair any damage to the silt fence.



Figure 10-4 Silt Fence Installed alongside Riverbank [Source Thrace Synthetic]

- Vegetation will be established as soon as possible on all exposed soils.
- Other measures to be employed throughout the construction and operational phases to minimise pollution risk include;
- Due consideration will be given to the prevailing ground and weather conditions when programming the execution of the works.
 - Foul Drainage from all site offices and facilities will be contained and disposed of in an appropriate manner to prevent pollution of rivers and local watercourses in accordance with the relevant statutory bodies.
 - Refuelling of construction machinery shall be undertaken in designated areas located away from surface water drainage in order to minimise potential contamination impacts on the water environment. Spill kits shall be kept in these areas in the event of spillages.
 - Oil and fuel stored on site for construction will be stored in designated areas. These areas shall be bunded (to min 110% of chemical volume) and will be located away from surface water drainage.
 - Pouring of concrete including wash down and washout of concrete from delivery vehicles to be controlled in an appropriate facility to prevent contaminating run-off and groundwater.
 - All batching and mixing activities shall be located in areas well away from watercourses and drains.

- Any surface water abstracted from a river for use during construction will have an applicable licence agreement in place and will be fitted with a filter to prevent the intake of fish.

For any construction work within or directly adjacent to the water the following mitigation measures will apply

- Works to be carried out in the dry (offline or outside the water flow) in all cases.
- “Dry” works areas will be achieved either via full isolation of the channel section via Gravity Pipe/Flume or via partial isolation using cofferdams. See schematic diagrams below.

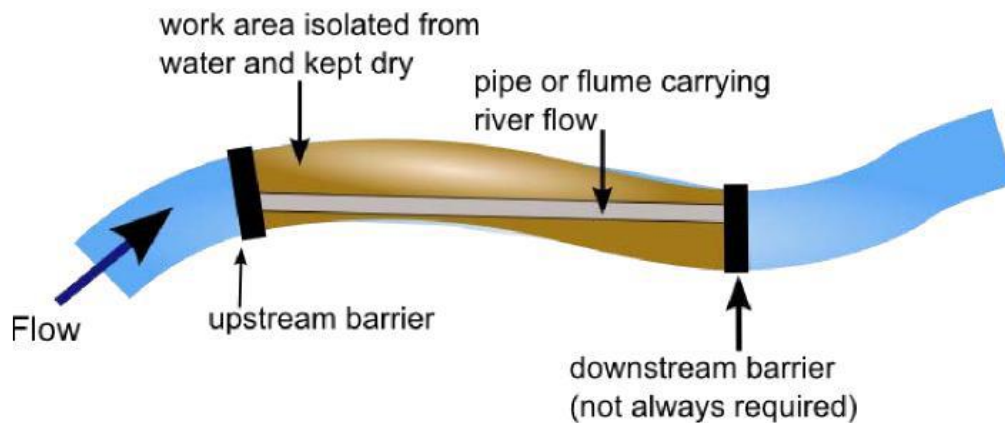


Figure 10-5: Full Isolation Gravity/Flume pipe
[Source SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods]

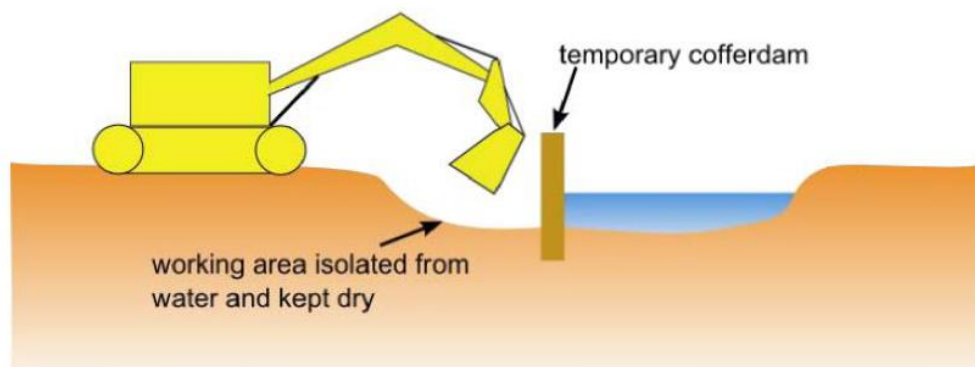


Figure 10-6: Partial Isolation Cofferdam
[Source SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods]

- Relevant fisheries authorities shall be informed of all in-stream construction work scheduled to take place. Any in-stream or culverting works shall be

undertaken in consultation and with the agreement of the relevant statutory body and during the permitted times of the year.

- Hydrophilic grout / quick setting mixes / rapid hardener additives shall be used to promote the early set of any wet concrete required. Other materials such as biodegradable shutter oils will be considered.
- There shall be no use of persistent pesticides, herbicides or artificial fertilisers in any landscaping or subsequent maintenance within a 10m buffer of a watercourse.

Routine monitoring of water quality will be carried out at appropriate upstream and downstream locations prior, during and post construction. The water monitoring will be compared against the baseline results and current Environmental Quality Standards (EQS). Thresholds levels are noted below;

- The pH of any and all discharges made from and during construction works shall be in the range of 6.0 – 9.0. Units and not alter the pH of any receiving fisheries waters by more than +/- 0.5 pH units.
- The level of suspended solids in any discharge as a result of construction work shall not exceed 25mg/l, nor result in the deposition of silts on gravels or any element of the aquatic flora or fauna.

11.0 LAND AND SOILS

The contractor shall comply with particular mitigation measures for this topic as set out in the EIAR for the development. The primary measures are set out below.

The following mitigation measures in relation to geology & soils shall be implemented.

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.
- At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. Topsoil stripping will not take place during inclement weather.
- Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. Topsoil stockpiles will also be located so as not to necessitate double handling.
- The design of site levels have been carried out in such a way as to minimize the interaction with rock.
- The duration that rock layers are exposed to the effects of weather will be minimized by back filling excavations as soon as practicable after construction.
- Stockpiles of excavated and crushed rock will be protected for the duration of the works.
- Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to water bodies).
- Earthwork's plant and vehicles exporting soil and delivering construction materials to site will be confined to predetermined haul routes around the site.
- Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site.
- Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods.
- In order to mitigate against spillages contaminating underlying soils and geology, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.

- Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (when not possible to carry out such activities off site).
- An Emergency Response Plan detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes will be prepared prior to construction.
- Pouring of concrete including wash down and washout of concrete from delivery vehicles will be controlled in an appropriate facility to prevent contamination.
- Regular samples will be taken from soils affected by earthworks which shall be analysed for contamination.
- All materials exported from site to be in accordance with the Waste Management Acts.
- Imported materials to be suitably separated to avoid contamination or mixing.
- For imported materials, the use of local quarries or locally available material should be prioritised.
- Any potential for use of surplus material within local sites shall be pursued at construction and detailed design stage (subject to compliance with Waste Management Acts). If any material is to be reused on another site as a by-product (and not as waste), this will be done in accordance with Article 27 of the Waste Directive Regulations.

12.0 ARCHAEOLOGY & CULTURAL HERITAGE

The contractor shall comply with particular mitigation measures for this topic as set out in the EIAR for the development. The primary measures are set out below.

12.1 Archaeological Heritage

There are three sites of Archaeological Heritage interest/potential located within the defined Cultural Heritage Study Area; CH-1 (SMR No: KK031-034) includes four individual elements – Church, Graveyard, Font and Castle (unclassified); the latter is considered to be the tower of a medieval church; CH-2 (SMR No: KK031-070) is a Souterrain and CH-3 (SMR No: KK031-090) is a burnet mound. The Zones of Archaeological Potential/Notification (ZAP/ZAN) established for CH-1 & CH-2 are located within the extent of the development planning boundary.

In general, it is not considered likely that any direct or indirect (visual) impacts will occur to any identified monuments as a result of the development proceeding, as proposed.

It is considered that there is potential that human remains/graves might exist outside the existing western and northern boundary walls of the graveyard, as presently defined. Consequently, in order to ensure that any potential subsurface remains of archaeological interest are identified and recorded, a programme of archaeological testing will be undertaken in this area in advance of the commencement of works and following completion of the CPO Process. Furthermore, as a general precautionary measure, archaeological monitoring shall be undertaken with respect to the construction of the contractor's compound, berm/embankments, and new channel, the removal of existing Church Walkway and its replacement, creation of the public realm walkway and all associated construction access routes.

The watercourses within the overall defined Cultural Heritage Study Area comprise the Ballyhale River, including an associated channel which flows northwards outside the western boundary to the catholic church and graveyard; sections of both channels are positioned within the Zone of Archaeological Notification (ZAN) associated with CH-1. The watercourses are presently very overgrown and not accessible to survey; consequently, all clearance, deepening and bank regrading works in watercourses shall be subject to archaeological monitoring and all spoil shall be raked-over and subject to metal detecting.

12.2 Architectural Heritage

A total of eleven individual structures of Architectural Heritage interest have been identified; four of the structures are included in the Record of Protected Structures

(RPS) of the Kilkenny County Development Plan 2011-2027 and nine are included in the non-statutory National Inventory of Architectural Heritage (NIAH); furthermore CH-1a (Church) and CH-1d (Castle [church tower]) are also included in the Archaeological Inventory, as well as the RPS, with CH-1a and CH-4 (House) also included in both the RPS and NIAH listings. Aside from Ballyhale Bridge (CH-10), none of these structures have the ability to be directly or indirectly (visually) impacted by any elements of the proposed project works due to their respective locations with regard to the various elements of the development.

It is proposed to realign the river channel adjacent Ballyhale Bridge (CH-10) and improve the inlet conditions (G-002) and install a pool and boulder pass upstream (G-004). In addition, a new overflow culvert (P-002), with a flow control structure/overflow weir at its western terminal, will be constructed to the immediate north of the existing northern arch of the bridge; this will entail removal of part of the west-facing wall façade and parapet to the bridge, which will then be reinstated and extended using a mixture of the existing/original stone and new matching stone. A detailed methodology for such works will be prepared by a conservation engineer for agreement with the Kilkenny County Council Conservation Officer.

Locations of the cultural heritage sites and zones of notification are shown in Figure 12-1.



Figure 12-1 Locations of Cultural Heritage Sites and Zones of (Archaeological) Notification (circled) with respect to the main proposed development extent – excluding contractor compound

Without the adoption and implementation of a suitable mitigation strategy, any subsurface archaeological features or artefacts that might be located within the areas highlighted above, might not be identified and recorded during the construction phase of the scheme.

Consequently, in light of the above, the following construction-stage mitigation measures shall be implemented: -

- Prior to the commencement of development, a suitably qualified and licence-eligible archaeologist shall be appointed. The archaeologist should prepare a methodology for approval by the Project Archaeologist before the application is submitted to the National Monuments Service. The methodology and licence application will be to obtain an excavation licence to undertake the works listed in 2 & 3

below and a detection licence with respect to the works listed in 4 below.

- A programme of archaeological testing and metal detecting shall be undertaken with respect to the proposed flood embankment to rear of properties (E-004); such testing should be undertaken following transfer of the land ownership to Kilkenny County Council (i.e. post-planning decision).
- A programme of archaeological monitoring shall be undertaken with respect to the construction of the contractor's compound, E-002 (berm/embankment) D-001 (new channel), E-003 (removal of existing walkway and replacement) and LW-001 (public realm walkway) and all associated construction access routes.
- All clearance, deepening and bank regrading works in watercourses (e.g. G-001; D-002, X-003, G-002, G-003 & G-004) shall be subject to archaeological monitoring and all spoil shall be raked-over and subject to metal detecting.
- In the event of archaeological material being uncovered during the course of such monitoring, the archaeologist shall be empowered to have works stopped in the vicinity of such material and shall inform the Project Archaeologist and the National Monuments Service, Department of Housing, Local Government and Heritage. Further mitigation measures will be agreed with the Project Archaeologist and the NMS. Likewise, should archaeological/historical artifactual material be recovered during such works, the requirements of the National Museum of Ireland with regard to such items should be implemented.
- Following completion of the monitoring and any other possible archaeological investigations, the archaeologist shall prepare draft reports and summaries as appropriate, for submission to the Project Archaeologist for review. The approved reports and summaries will be submitted to a full and final report for submission to the Planning Authority and the Department of Housing, Local Government and Heritage and National Museum of Ireland.

13.0 WASTE MANAGEMENT

The following measures are to be implemented during the construction phase in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle waste in such a manner as to minimise the effect on the environment:

- Building materials should be chosen with an aim to 'design out waste'.
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that, Concrete rubble; Plasterboard; Metals; Glass; and Timber, at a minimum, will be segregated:
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

14.0 METHOD STATEMENTS

The general construction process for key elements of the project is set out below.

All elements of work will need to monitor weather conditions to ensure suitable conditions and carry out any in-stream works during the summer months when there is low flow to ensure no adverse environmental effects to the downstream SAC.

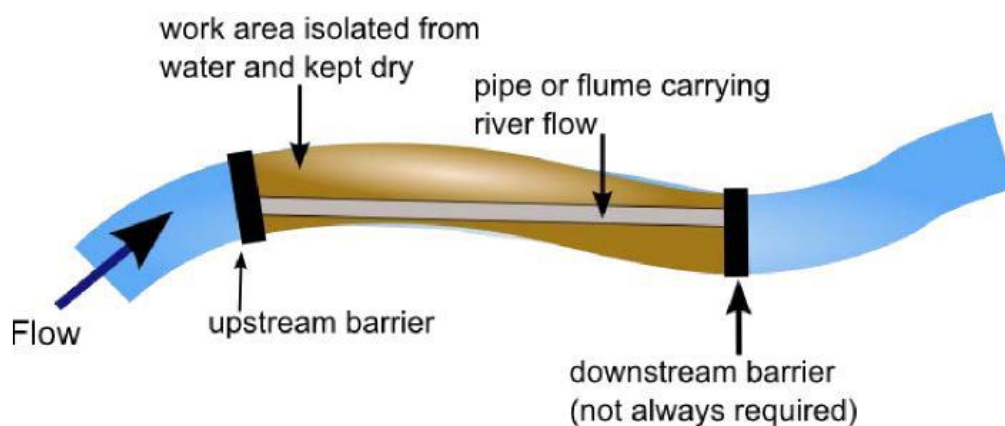
The contractor shall prepare detailed method statements for all elements of instream works. All in-stream works will comply with current best practice, notably the Inland Fisheries Ireland Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) and Transport Infrastructure Ireland's Guidelines for the crossing of watercourses during the construction of national road schemes (TII 2008).

Where deemed necessary by IFI, Electro fishing will be carried out subject to licence.

14.1 Flow Bypass Methods (General)

For any construction work within or directly adjacent to the water the following mitigation measures will apply

- Works to be carried out in the dry (offline or outside the water flow) in all cases.
- "Dry" works areas will be achieved either via full isolation of the channel section via Gravity Pipe/Flume or via partial isolation using cofferdams. See schematic diagrams below.



*Figure 14-1: Full Isolation Gravity/Flume pipe
[Source SEPA Engineering in the Water Environment Good
Practice Guide Temporary Construction Methods]*

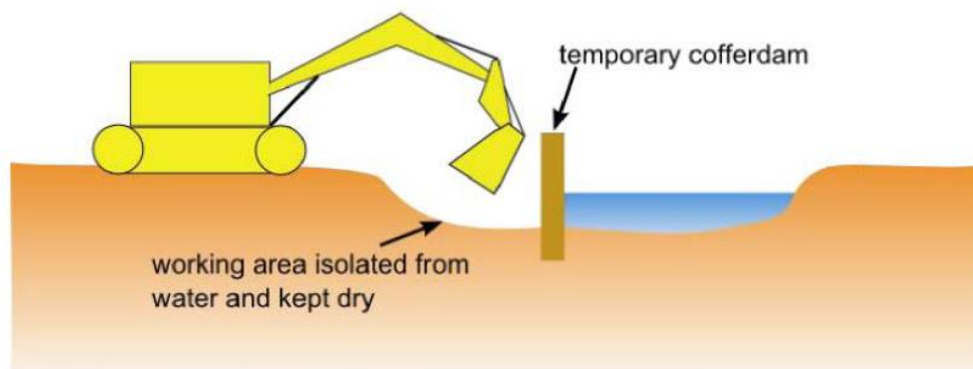


Figure 14-2: Partial Isolation Cofferdam
[Source SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods]

- Relevant fisheries authorities shall be informed of all in-stream construction work scheduled to take place. Any in-stream or culverting works shall be undertaken in consultation and with the agreement of the relevant statutory body and during the permitted times of the year.

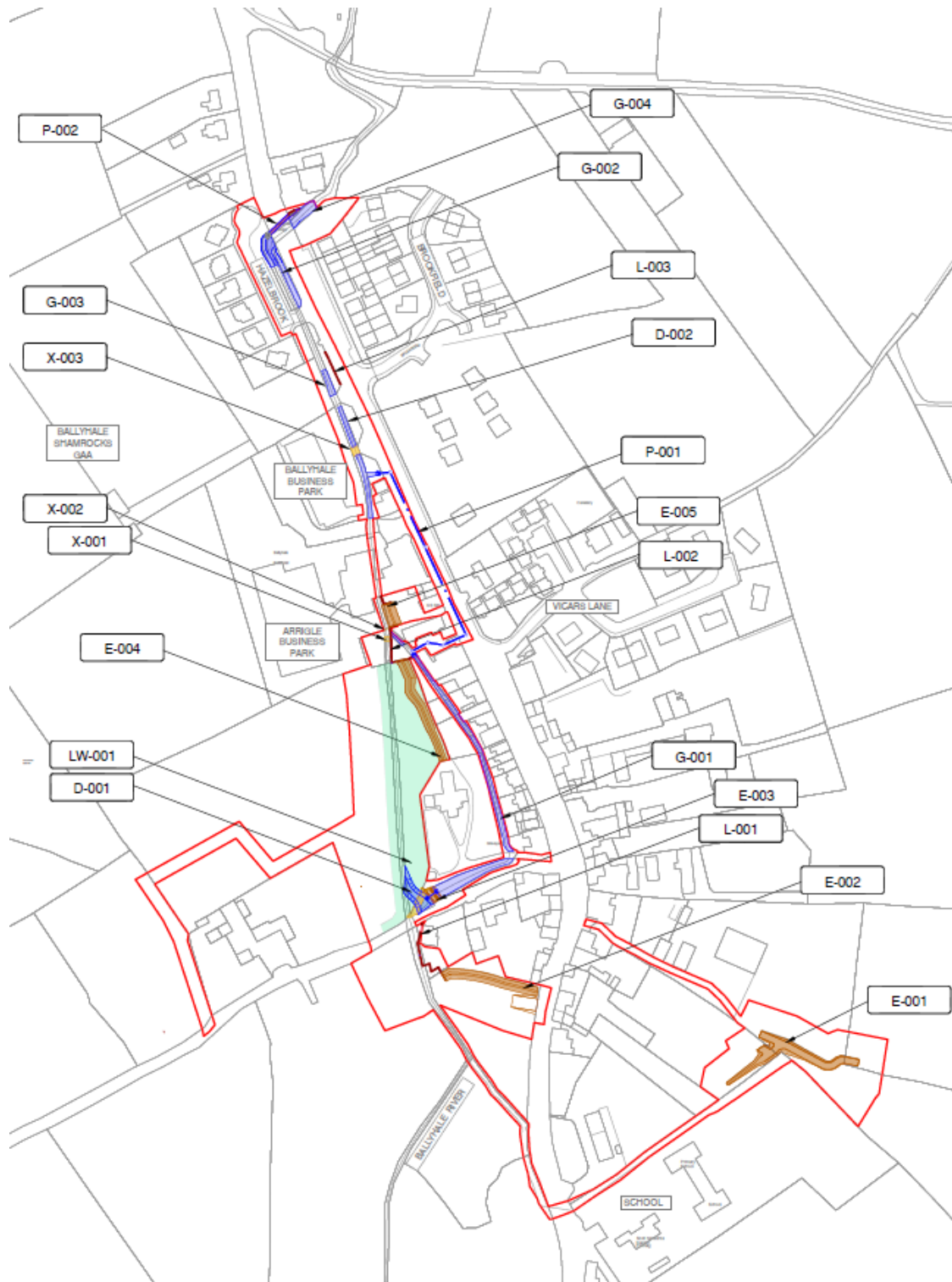


Figure 14-3: Schematic Works Plan

14.2 Embankment Works (E-001, E-002, E-004, E-005)

- Vegetation within the embankment footprint will be cleared and removed from site and disposed of in accordance with the relevant waste management legislation.
- The topsoil will be stripped and stored for reuse or the excess material will be disposed of offsite. Unsuitable material occurring in embankment footprint shall be removed. All material removed from site will be disposed of in accordance with relevant waste management legislation.
- The embankment material shall then be spread in layers not exceeding 250 mm compacted thicknesses suitably compacted to the required degree of compaction. The embankment will be constructed to the desired height as per the longitudinal and cross sections of the embankment as per the contact drawings. Soil for embankment to be approved by Employers Representative/Designer. Soil to be either suitable material excavated as part of works or imported low permeability material.
- Topsoil will be spread on the embankment core from the stockpiled material to a layer of 150mm. The topsoil will be gently firmed before adding additional layers. The finished depth of topsoil should be 150mm for the grass areas.
- Embankments shall be seeded or protected via geotextiles as soon as possible. The optimum grass seeding periods are between 1st March – 31st May or 1st September and 31st October. Meadow grass seeding optimum seeding periods are April and September.

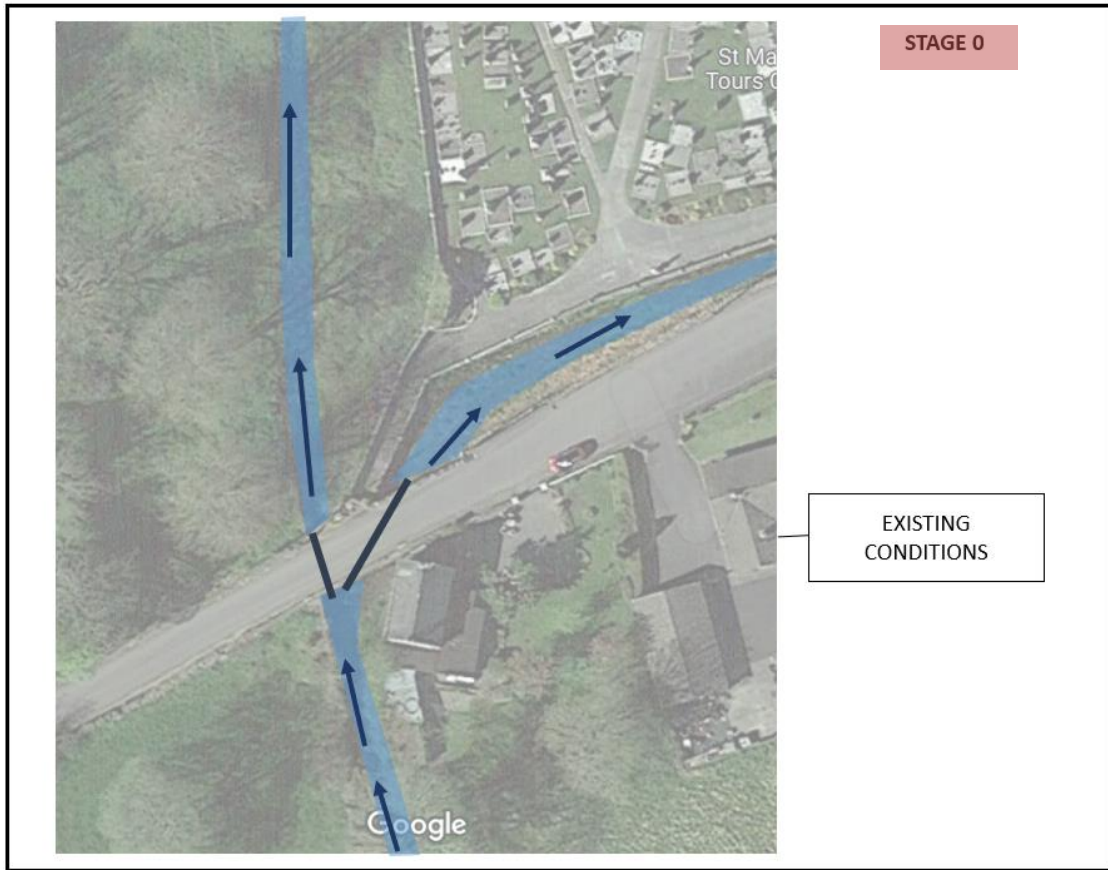
14.3 Pedestrian Access and New Channel (E-003, D-001)

- The river instream works will only take place during the instream open season (1st July – 30th September). The weather will be monitored during this period to determine a period of low flow within the channel.
- Appropriate preconstruction surveys should be carried out before the works (Section 5.8) The contractor shall put in place temporary works measures as necessary to ensure no undermining of existing structures.
- A temporary flow bypass system will be put in place following one of the measures listed in Paragraph 13.1.
- Vegetation within the footprint of the proposed works will be removed from site and disposed of in accordance with the relevant waste management legislation. The riverbed material will be stripped and stored for reuse within the site. Unsuitable material occurring in the works footprint shall be removed. All

material removed from site will be disposed of in accordance with relevant waste management legislation.

- The contractor will undertake a pre-construction Property Condition Survey of the adjacent church shrine and protect it in place throughout the works.
- The existing pedestrian walkway will be demolished and the stonework material stored for reuse within the proposed pedestrian walkway. The excess material will be removed from site and disposed of in accordance with the relevant waste management legislation.
- The contractor will excavate down to the required formation levels of the pedestrian walkway, new channel and the low flow route.
- The low flow pipeline will be installed at the base of the pedestrian access along the line of the existing channel and the pedestrian bridge will be built up as per the drawings to the required levels.
- The walls of the pedestrian bridge will be constructed as per the relevant drawings and the new walls will tie into the existing roadway and church ground boundary walls with recovered material or material as per direction and approval of the Engineer.
- When the permanent works are complete the bed and banks will be reinstated
- When the works are complete temporary dams will be removed from the river to restore the river to free flow conditions.

A schematic staging for these works is outlined below.



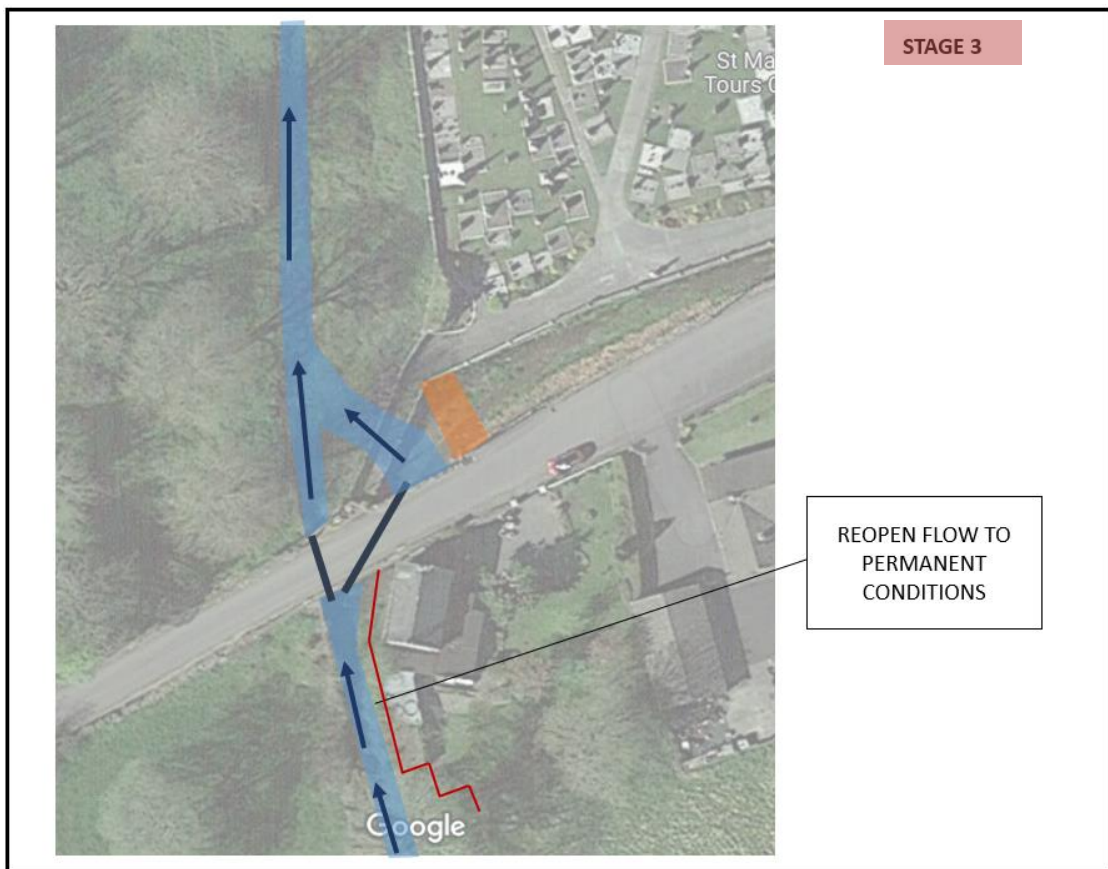
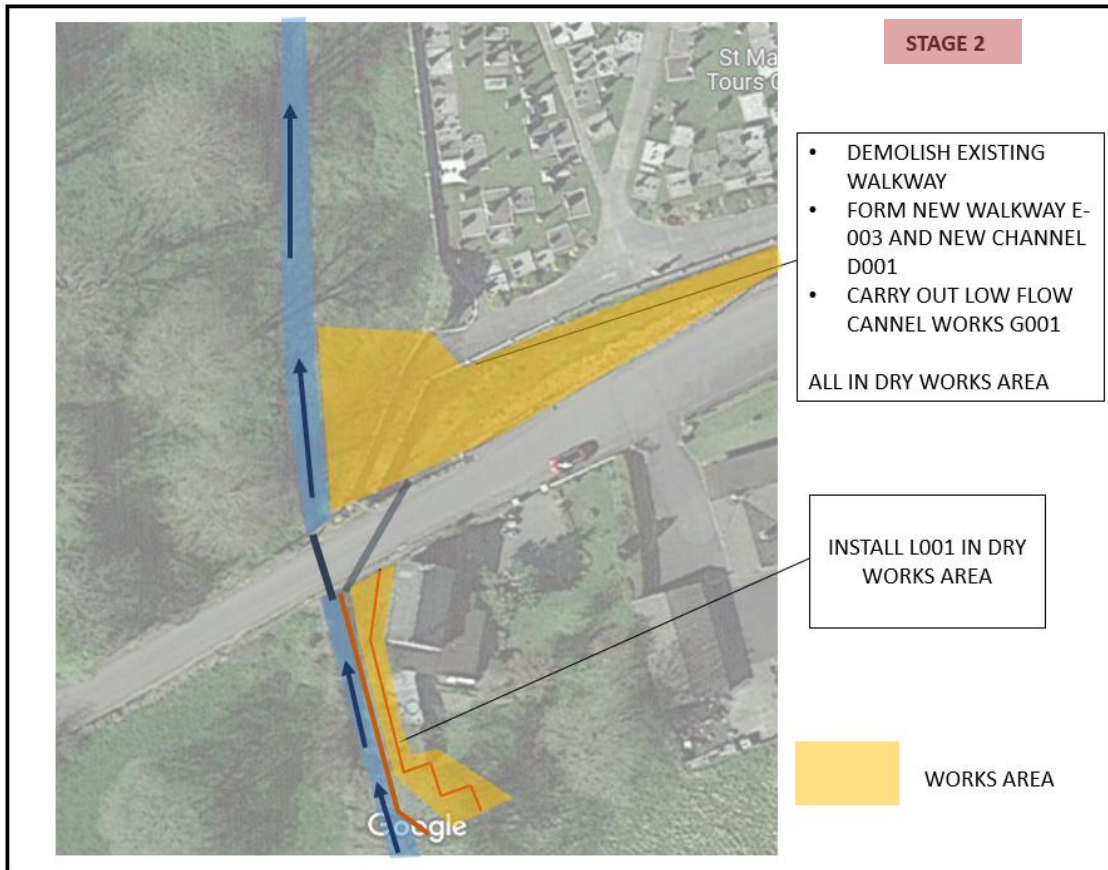


Figure 14-4 Schematic E-003, D-001 construction staging

14.4 Flood Walls Adjacent to Properties (L-001, L-002)

- The river instream works elements will only take place during the instream open season (1st July – 30th September). The weather will be monitored during this period to determine a period of low flow within the channel.
- Appropriate preconstruction surveys should be carried out before the works (Section 5.8) The contractor shall put in place temporary works measures as necessary to ensure no undermining of existing structures.
- A temporary flow bypass system will be put in place following one of the measures listed in Section 14.1.
- Vegetation within the footprint of the proposed flood wall will be removed from site and disposed of in accordance with the relevant waste management legislation. The riverbed material will be stripped and stored for reuse within the site. Unsuitable material occurring in the works footprint shall be removed. All material removed from site will be disposed of in accordance with relevant waste management legislation.
- The sections of the existing boundary/bank will be removed and disposed of in accordance with relevant waste management legislation.
- An in-situ reinforced concrete foundation will be cast along the length of the proposed flood wall.
- The proposed wall will be constructed to the desired height as per the contract drawings.
- The flood wall will tie into the existing boundaries as noted on the corresponding drawings.
- When the permanent works are complete the bed and banks will be reinstated
- When the works are complete temporary dams will be removed from the river to restore the river to free flow conditions.

14.5 In-Channel Works (LW-002, G-001, D-002, G-002)

- The river instream works will only take place during the instream open season (1st July – 30th September). The weather will be monitored during this period to determine a period of low flow within the channel.
- A temporary flow bypass system will be put in place following one of the measures listed in Section 14.1
- Vegetation within the footprint of the proposed works will be removed from site and disposed of in accordance with the relevant waste management legislation. The riverbed and bank material will be stripped and stored for reuse within the

site. Unsuitable material occurring in the works foundation shall be removed. All material removed from site will be disposed of in accordance with relevant waste management legislation.

- Channels will be excavated and shaped to the required alignment. Approved bed material will be re-laid along the line of the channel and riprap placed along the banks.
- When the works are complete temporary dams will be removed from the river to restore the river to free flow conditions.

14.6 Piped Route (P-001)

- The works will be carried out after the installation of D001/E003 which will allow isolation of the church channel flows which will reduce incoming flows to those generated from its small natural catchment only. Suitable temporary diversion of the minor flows will be put in place to allow works to be completed in the dry.
- The upstream and downstream portion of works which are located in the river channel will only take place during the instream open season (1st July – 30th September). The weather will be monitored during this period to determine a period of low flow within the channel.
- Works within existing private commercial lands to be carried out in accordance with landowner requirements and are to be scheduled to minimise disturbance. Suitable safety and security fencing to be in place at all times. Area to be reinstated to allow for use by landowner as soon as practicable.
- Temporary traffic and pedestrian diversions shall be put in place ahead of works on public carriageway. The temporary traffic management measures for this work shall be included within the contractor's Traffic Management Plan /Construction and Environmental Management Plan and the contractor shall apply for a road opening license from KCC for the works. It is anticipated that the works would involve temporary closure of one side of the carriageway and an alternating one-way traffic management system on the other lane.
- The pipeline will be installed by excavating along the roadway in stages and installing pipeline at the desired falls. The completed sections are to be reinstated to match existing road.
- The outfall will be constructed in the dry and the existing boundary wall will be reinstated.
- The pipeline will be CCTV'd prior to removal of the flow bypasses to ensure the pipeline has been constructed as per the scheme drawings. The flow bypass

system will be removed from the upstream headwall of the pipeline to allow flow through the pipeline.

14.7 Obstruction Removal (X-001, X-002)

- The river instream works will only take place during the instream open season (1st July – 30th September). The weather will be monitored during this period to determine a period of low flow within the channel.
- A temporary flow bypass system will be put in place following one of the measures listed in Section 14.1.
- Remove the obstructions along channel length and dispose of material to an appropriately licensed facility.
- When the works are complete temporary dams will be removed from the river to restore the river to free flow conditions.

14.8 Weir Removal and Bridge Replacement (X-003)

- The river instream works will only take place during the instream open season (1st July – 30th September). The weather will be monitored during this period to determine a period of low flow within the channel.
- A temporary flow bypass system will be put in place following one of the measures listed in paragraph 13.1.
- Vegetation within the footprint of the proposed works will be removed from site and disposed of in accordance with the relevant waste management legislation. The riverbed and bank material will be stripped and stored for reuse within the site. Unsuitable material occurring in the works foundation shall be removed. All material removed from site will be disposed of in accordance with relevant waste management legislation.
- A Stop-Go System will be put in place across the existing entrance to allow for safe access to the Ballyhale Business Park and a safe working environment.
- Area to be excavated for foundations of the new portal frame culvert and culvert to be installed in sections. Reinstatement the bed and banks of channel at new elevation using approved river bed material.
- Road surface and entrance walls to be installed across the channel on the portal frame culvert.
- Existing entrance to be decommissioned and traffic will be directed over the newly installed culvert.
- The methodology for the removal of existing bridge and weir will be subject to a detailed structural demolition plan. Existing entrance bridge and weir to be

demolished within a dry working area. The material generated during the demolition works will be disposed of at an appropriately licensed facility.

- Channels will be excavated and shaped to the required alignment. Approved bed material will be re-laid along the line of the channel and riprap placed along the banks.
- When the works are complete temporary dams will be removed from the river to restore the river to free flow conditions.

14.9 Flood Wall adjacent to Hazelbrook (L-003)

- Vegetation within the footprint of the proposed works will be removed from site and disposed of in accordance with the relevant waste management legislation. Unsuitable material occurring in the works foundation shall be removed as per direction and approval of the Engineer and replaced by approved materials laid in layers and suitably compacted to the required and specified degree of compaction. All material removed from site will be disposed of in accordance with relevant waste management legislation.
- An in-situ reinforced concrete foundation will be cast along the length of the proposed flood wall.
- The proposed wall will be constructed to the desired height as per the longitudinal and cross sections as per the contact drawings.
- The flood wall will tie into the existing boundaries as noted on the drawings.

14.10 Fish Passage Works (G-003, G-004)

- The river instream works will only take place during the instream open season (1st July – 30th September). The weather will be monitored during this period to determine a period of low flow within the channel.
- A temporary flow bypass system will be put in place following one of the measures listed in Section 14.1
- Vegetation within the footprint of the proposed works will be removed from site and disposed of in accordance with the relevant waste management legislation. The riverbed and bank material will be stripped and stored for reuse within the site. Unsuitable material occurring in the works foundation shall be removed. All material removed from site will be disposed of in accordance with relevant waste management legislation.
- Suitable boulders gravels and geotextiles (where necessary) will be imported and placed to form the rock ramps/pools.

- Works shall be completed with supervision by Project Ecologist and in accordance with OPW's Design Guidance For Fish Passage On Small Barriers
- When the works are complete temporary dams will be removed from the river to restore the river to free flow conditions.

14.11 Main St Bridge Works (P-002)

- The in channel works upstream and downstream will be carried out as described in Section 14.5 & 14.10. These may be carried out before or after the new culvert installation.
- A temporary stream diversion to isolate the works area will be put in place following one of the measures listed in Section 14.1.
- The existing bridge is on the National Inventory of Architectural Heritage. Therefore, all works shall ensure the integrity of the existing twin arches. Preconstruction surveys shall be carried out to comprehensively record existing conditions.
- Demolition/excavation works to form the new opening will be subject to a specific contractor method statement incorporating the mitigation measures included in the EIAR and PCEMP. All stonework will be removed and retained for reinstatement works.
- Since the works require a new culvert crossing of the existing R448. Traffic Management Measures will be required to facilitate installation and reinstatement. It is anticipated that works will generally be carried out by closing and excavating one side of the road and implementing a one-way alternating lane arrangement on the other.
- The culvert will be delivered to site in precast sections which can be laid in place by crane/excavator and backfilled with suitable road construction materials. When one side is complete the alternating lane will move to the completed side and the remainder of the work would be completed. There may be a requirement for short term (<1 day) full closures to facilitate tie ins or resurfacing works. All works would be subject to the Road Opening License restrictions set by KCC.
- On completion of the culvert installation tie in works, stone cladding and fencing etc will be completed and river can be restored to free flow conditions.