



## River Mall (Templemore) Drainage Scheme

### Construction Environmental Management Plan

September 2016

TOBIN CONSULTING ENGINEERS



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## Construction Environmental Management Plan

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**PROJECT:**

**River Mall (Templemore) Drainage Scheme**

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## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	PURPOSE OF CEMP .....	1
1.2	SCOPE OF CEMP .....	1
1.3	‘LIVE’ DOCUMENT .....	1
1.4	IMPLEMENTATION .....	2
1.5	ENVIRONMENTAL TRAINING AND AWARENESS .....	3
1.6	CONSTRUCTION WORKS PROGRAMME .....	3
<b>2</b>	<b>SITE INFORMATION/ SCHEME DESCRIPTION .....</b>	<b>4</b>
2.1	SCHEME DESCRIPTION .....	4
2.1.1	<i>Overview of proposed scheme.....</i>	<i>4</i>
2.1.2	<i>Thalweg or Inset Fish Channel .....</i>	<i>5</i>
2.1.3	<i>The inlet to the Flood Diversion Route and Control Weir.....</i>	<i>5</i>
2.1.4	<i>Upstream of the Town - Inlet Channel; with Sediment and Debris Traps .....</i>	<i>5</i>
2.1.5	<i>Culverts .....</i>	<i>7</i>
2.1.6	<i>Upstream Defences .....</i>	<i>7</i>
2.1.7	<i>Downstream Defences.....</i>	<i>8</i>
2.1.8	<i>Water Framework Directive .....</i>	<i>8</i>
2.1.9	<i>Summary .....</i>	<i>9</i>
2.2	SENSITIVE RECEPTORS .....	13
<b>3</b>	<b>CONTROL OF THE CONSTRUCTION PROCESS.....</b>	<b>14</b>
3.1	ROLES AND RESPONSIBILITIES.....	14
3.2	REPORTING .....	16
3.3	MONITORING, CONTINUAL IMPROVEMENT AND REVIEW .....	16
3.4	ENVIRONMENTAL COMPLAINTS AND INCIDENTS .....	17
<b>4</b>	<b>CONSTRUCTION WORKS MANAGEMENT .....</b>	<b>18</b>
4.1	DURATION AND PHASING OF CONSTRUCTION WORKS.....	18
4.2	CONSTRUCTION FACILITIES .....	18
4.3	HOURS OF OPERATION .....	19
4.4	CONSTRUCTION EQUIPMENT .....	19

4.5	SITE SECURITY ARRANGEMENTS AND PUBLIC HEALTH AND SAFETY .....	20
4.5.1	<i>Permits / Approvals.....</i>	20
4.5.2	<i>Safety and Security.....</i>	20
4.5.3	<i>General Site Management and Upkeep .....</i>	21
4.5.4	<i>Emergency Plan .....</i>	21
4.6	SITE ACCESS AND EGRESS .....	21
4.7	EXCAVATION QUANTITIES AND MATERIALS .....	22
4.8	MATERIAL DISPOSAL / REUSE .....	22
4.9	CONSTRUCTION RESTORATION.....	23
<b>5</b>	<b>ENVIRONMENTAL CONTROL MEASURES.....</b>	<b>24</b>
5.1	NOISE AND VIBRATION .....	24
5.1.1	<i>Objectives.....</i>	24
5.1.2	<i>Operating Hours .....</i>	24
5.1.3	<i>Noise Controls .....</i>	24
5.1.4	<i>Vibration Controls .....</i>	25
5.2	MANAGEMENT OF DUST DURING CONSTRUCTION .....	26
5.2.1	<i>Objectives.....</i>	26
5.2.2	<i>Identification of Dust Sources .....</i>	26
5.2.3	<i>Dust Mitigation Measures .....</i>	26
5.3	SOILS AND WATER MANAGEMENT.....	27
5.3.1	<i>Objectives.....</i>	27
5.3.2	<i>Soil Management Controls.....</i>	27
5.3.3	<i>Water Management Controls .....</i>	27
5.4	MANAGEMENT OF EXCAVATED MATERIALS.....	28
5.4.1	<i>Objectives.....</i>	28
5.4.2	<i>Working Areas .....</i>	28
5.4.3	<i>Temporary Storage of Soil .....</i>	28
5.5	WASTE AND MATERIALS REUSE MANAGEMENT .....	28
5.5.1	<i>Objectives.....</i>	28
5.5.2	<i>Permits/Approvals.....</i>	28
5.5.3	<i>General Waste Management .....</i>	28
5.6	TRAFFIC MANAGEMENT .....	29
5.6.1	<i>Objectives.....</i>	29
5.6.2	<i>Traffic Management Plan.....</i>	30
5.6.3	<i>Road network/ Site Access .....</i>	30

5.6.4	<i>Training and Awareness</i> .....	30
5.6.5	<i>Matters for consideration</i> .....	30
5.6.6	<i>Deliveries to and from the site</i> .....	31
5.6.7	<i>Road closures to facilitate works</i> .....	32
5.6.8	<i>Construction of road ramps</i> .....	32
5.6.9	<i>Traffic Management Signage</i> .....	32
5.6.10	<i>Traffic Speed Limits</i> .....	32
5.6.11	<i>Road Cleaning</i> .....	32
5.6.12	<i>Traffic Management Mitigation Measures</i> .....	32
5.7	<b>ECOLOGY</b> .....	33
5.7.1	<i>Objectives</i> .....	33
5.7.2	<i>Matters for consideration</i> .....	33
5.7.3	<i>Ecological mitigation measures</i> .....	33
5.8	<b>LANDSCAPE MANGEMENT</b> .....	36
5.8.1	<i>Objectives</i> .....	36
5.8.2	<i>Matters for consideration</i> .....	36
5.8.3	<i>Landscape Mitigation Measures</i> .....	37
<b>6</b>	<b>INSPECTION AND MONITORING</b> .....	<b>38</b>
6.1	<b>OBJECTIVES</b> .....	38
6.2	<b>MATTERS FOR CONSIDERATION</b> .....	38
6.2.1	<i>Archaeological Monitoring</i> .....	38
6.2.2	<i>Archaeological Testing</i> .....	39
6.2.3	<i>Ecological Monitoring/ Inspection</i> .....	39
6.2.3.1	Templemore Lake .....	40
6.2.3.2	Retained hedgerows/trees/woodland .....	40
6.2.3.3	Otter survey .....	40
6.2.3.4	Birds .....	40
6.2.3.5	Translocation of fish .....	40
6.2.3.6	Water quality controls.....	40
6.2.4	<i>Dust Monitoring</i> .....	41
6.2.5	<i>Traffic</i> .....	41
6.2.6	<i>Environmental Site Auditing/Inspections</i> .....	41
<b>7</b>	<b>CONCLUSIONS</b> .....	<b>43</b>

## TABLES

Table 2-1	Key Sensitive Receptors identified in the EIS .....	13
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**FIGURES**

Figure 2-1 Upstream Defences and the River Diversion..... 11

Figure 2-2 Downstream Works..... 12

## 1 INTRODUCTION

This Construction Environmental Management Plan (CEMP) has been prepared on behalf of the Office of Public Works (OPW). It defines the project specific environmental measures that are to be implemented and the procedures to be followed for the scope of constructions works for the River Mall (Templemore) Flood Relief Scheme.

Please note is it intended this CEMP will be reviewed and updated as appropriate once planning approval is granted, the construction team has been appointed and necessary consultations have occurred.

This CEMP has been written on the assumption that the OPW carry out the works directly.

Following a history of flooding in Templemore, the OPW has designed River Mall (Templemore) Flood Relief Scheme to protect Templemore Town up to the 1 in 100 year flood event.

### 1.1 PURPOSE OF CEMP

The purpose of this document is to communicate the key environmental obligations that apply to all contractors, their sub-contractors and employees while carrying out any form of construction activity as part of the River Mall (Templemore) Flood Relief Scheme.

### 1.2 SCOPE OF CEMP

This CEMP defines the approach to environmental management at the site during the construction phase. Compliance with the CEMP, the procedures, work practices and controls will be mandatory and must be adhered to by all site personnel and contractors employed during the construction phase. The CEMP seeks to:

- Provide a basis for achieving and implementing the construction related mitigation measures identified in the Environmental Impact Statement (EIS);
- Comply with all conditions (if any) attached to the planning approval; and
- Promote best environmental on-site practices for the duration of the construction phase.

### 1.3 'LIVE' DOCUMENT

This CEMP is considered a 'live' document and as such will be reviewed on a regular basis. The CEMP will be subject to continual review to address, for example:

- Any conditions stipulated in the planning approval;



- Any requirements/issues highlighted through consultations prior to works e.g. by Inland Fisheries Ireland, Tipperary County Council etc.;
- To ensure it reflects best practice at the time of construction;
- To ensure it incorporates the findings of any pre-construction site investigations; and
- To accommodate, where appropriate, the working practices of the OPW on-site.

The OPW prior to commencement of construction works will be required to include further details and/or confirmation under the following headings:

- Details of working hours and days;
- Details of emergency plan. This emergency plan will be prepared in compliance with the relevant Safety and Health in Construction Regulations. The emergency plan must include contact names and telephone numbers for Tipperary County Council (all sections/departments); ambulance; fire brigade and the Garda authorities;
- Details of fuel storage areas (including location and bunding);
- Haul/ temporary access routes;
- Wheelwash details (including measures to reduce and treat runoff);
- Dust management to prevent nuisance;
- Site run-off management;
- Noise management to prevent nuisance;
- Ecological management (aquatic and terrestrial);
- Landscape management;
- Construction lighting details;
- Signage;
- Traffic Management Plan;
- Parking areas for construction and personnel vehicles; and
- Project procedures and method statements.

Note the above is not an exhaustive list and may be added to within the works contract.

## 1.4 IMPLEMENTATION

Key to this CEMP is the dedication of a Project Environmental Consultant (nominated by the OPW) who will regularly liaise with and update the OPW and associated team on all environmental issues relating to the site.

In terms of overall environmental responsibility, everyone on site is responsible for ensuring that their actions constitute good environmental practice. All site personnel are charged with following good practice and encouraged to provide feedback and suggestions for improvements. All site personnel are also required to ensure compliance with the requirements of this CEMP.

## 1.5 ENVIRONMENTAL TRAINING AND AWARENESS

To ensure that environmental issues are communicated and properly addressed and controlled during the construction works, the CEMP and its contents will be communicated to all site personnel, including management staff and operatives. The CEMP will form part of the site induction by the Site Manager which is mandatory for all employees, contractors and visitors attending the site.

Specific training shall be provided to nominated on-site personnel to effectively deal with any occurrences or emergency which could reasonably be anticipated to give rise to pollution. Environmental toolbox talks will be provided to all site teams and sub-consultants as required. Training and tool box talks will be targeted at particularly sensitive environmental issues such as:

- Works within the existing river;
- Water Pollution: Silt;
- Water Pollution: Cement & Concrete;
- Spill Control;
- Ecology (aquatic and terrestrial);
- Archaeology;
- Traffic Management; and
- Waste Management.

## 1.6 CONSTRUCTION WORKS PROGRAMME

A provisional programme for the proposed construction works for the Templemore FRS is provided in Appendix 1 herein. This programme shows site setup commencing in March 2017 with the completion of works scheduled for October 2018. As noted therein the programme is subject to change and will be updated on a monthly basis.

## 2 SITE INFORMATION/ SCHEME DESCRIPTION

The proposed flood relief scheme is located in Templemore Town, County Tipperary. The site location from north to south of Templemore Town includes poorly drained agricultural farmland (which is part of the Mall River floodplain), the town of Templemore including roads and paved areas beside buildings, passing through into more improved farmland south of Templemore Town.

Templemore is located approximately 12km north of Thurles, and approximately 18km south of Roscrea. The area surrounding Templemore is relatively flat, ranging from approximately 115mOD to 122mOD. A mountain range which includes the Devilsbit, Kilduff, and Borrisnoe Mountains occurs to the northwest of Templemore Town, the closest of these mountains being Devilsbit Mountain (480m OD), which is located approximately 6km northwest of the town centre. The source of the Mall River, which drains a catchment area of approximately 22km<sup>2</sup>, is located on Devilsbit Mountain.

### 2.1 SCHEME DESCRIPTION

The proposed flood relief scheme diverts the Mall River within the town through a long diversion channel approximately 805m in length that begins in Shortt's Field and finishes approximately 230m downstream of Small's Bridge, as shown on Figures 2-1 and 2-2.

#### 2.1.1 Overview of proposed scheme

A 4m wide connector channel will start approximately 70m upstream of Shortt's Bridge and run directly south to the line of upstream defences in Shortt's Field (refer to Figure 2-1). A culvert is placed in-line with the flood defence embankment in Shortt's Field and the diversion channel route starts here with a bed level of 109.18m OD. The route will then proceed south-southeast for approximately 78m until it reaches the drain at Young's garage compound. It takes an easy bend (approximately 30 degrees) and heads directly south for approximately 40m to line up with the school yard boundary wall, where it returns to its original direction for approximately 50m to reach Richmond Road by cutting through the workshop of Hassett's garage (refer to Figure 2-1).

Its bed level is 108.48m OD as it crosses the road just west of two houses using a culvert with a 15m carriageway. It then maintains its line for 26m south of the road. To minimise land take, this stretch just north and south of the road has vertical sides 8.4m apart. It turns directly south for 172m and, as shown, a 4.5m-wide access bridge is required here to avoid land severance. It changes again to line-up just west of a line of electricity poles and follows their south-easterly direction for 120m to Church Avenue. The exact route depends on practicalities such as the electricity poles and hugging field boundaries to reduce land loss. Its route through these gardens and those to the south of the road has vertical sides 8.4m apart (to minimise land take). To reduce the cost of bridging the avenue's 13.5m carriageway, this route meets the road at right angles; its bed level here is 107.8m OD. The overflow from the chamber (just to the west) will be redirected to the diversion, just downstream of the culvert.

It then cuts through the private gardens on the south side of the road and curves to the southeast where it again needs a 4.5m-wide access bridge to avoid land severance (refer to Figure 2-1). It runs just over 190m to meet the river about 230m downstream of Small's Bridge, with a bed level of 107.33m OD. The intention is to align the channel as far as possible to the direction of the main channel. The opposite bank of the Mall to the outlet may have to be reinforced to protect it from erosion; this could be achieved using a placed stone revetment or gabions. This will also reduce reflected wave effects that could result in erosion to the bank further downstream.

### *2.1.2 Thalweg or Inset Fish Channel*

The excavated river and diversion channel could result in wide, shallow flow conditions unfavourable for fish. River excavation will inset a 0.3m deep, 2m wide Thalweg (the connected line of low-points that runs down along a channel with deeper water and faster flow during general flow conditions) to improve aeration and fish movement. This thalweg will be designed and constructed in consultation with Inland Fisheries Ireland.

### *2.1.3 The inlet to the Flood Diversion Route and Control Weir*

The 4m wide connector channel will start approximately 70m upstream of Shortt's Bridge and run directly south to the line of upstream defences in Shortt's Field (refer to Figure 2-1). At the upstream end, it will share the present riverbed level of 109.84m OD, however, at its downstream end, its bed level will be 0.5m higher than the diversion channel's level of 109.07m OD, as a consequence, a control weir is needed to protect this step-down in bed level. The weir will be approximately 0.75m in height. A fish pass will be installed in this area in consultation with Inland Fisheries Ireland.

### *2.1.4 Upstream of the Town - Inlet Channel; with Sediment and Debris Traps*

The 70m-long Inlet is a 4m-wide Connector Channel that properly starts 50m upstream of Shortt's Bridge and runs southeast to the sediment (gravel) trap above the flood defences in Shortt's field (see Figure A.2a). At the upstream end, it will share the present riverbed level of 109.8m OD while, at its downstream end, its bed level is 109.2m OD.

Gravels deposited during a flood can significantly decrease the protection afforded by a scheme and possibly lead to its failure. An upstream sediment trap should be capable of depositing out the sediment load that would otherwise deposit within the protected area, so its flow velocities should be small; but it should not remove sediments that are capable of being safely transported downstream.

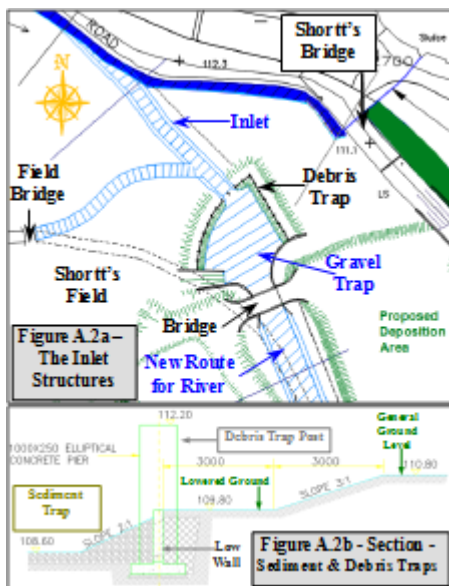
Deposition of sediments is a feature of the Mall River. As discussed, ongoing energy losses from water forced through the two right-angle bends at Shortt's Bridge, has raised bed levels by 0.5 to 0.75m and, in turn, this has increased the frequency and depth of flooding within the town.

Given its ease of access, the prime location for a Sediment Trap is just upstream of the new route for the river and the defence embankment (see Figure A.2a). Inland Fisheries Ireland (IFI) are not in favour of solutions that would need a weir. As such, the trap is formed by widening out the 25m stretch downstream of the Connector Channel to a maximum of 24m. As a significant amount of flood flow will enter the diversion from the floodplains, the perimeter of this widened section must be protected by a wall that just rises from the bed to a metre below ground level (see Figures A.2b and A.2c). This carries a second function, as shown in the figures, it will provide the foundations for the Debris Trap.

Flood debris such as branches, or even whole trees, is a feature of floods, and its negative consequences could cause a significant decrease in the protection afforded by a scheme and possibly lead to failure and flooding in the town. So, debris moving down the river and its floodplains that might otherwise get caught in the bridges must be trapped at the scheme's upstream extent. The perimeter of the Sediment Trap is the best location for a Debris Trap.

This structure will tie into the side-protection walls upstream of the bridge that sits inline with the upstream flood defences and will comprise a line of posts (about two metre in height), set 3m apart (see Figure A.2a). The east side (left bank) will trap debris carried by the wave of water that might result from a breach of the Town Lake impoundment; the remainder will trap debris carried down the floodplain. Even if the inlet channel becomes blocked, reasonable upstream flood levels can be maintained; as water can flow in the lowered strip outside the piers in all but the most extreme (and unlikely) debris situation (see Figures A.2b and A.2c).

Existing field drainage runs south and exits Shortt's fields. This will be re-routed to the inlet using a new 4m-wide channel and a field-access bridge will maintain land access.



### 2.1.5 Culverts

The proposed scheme includes for a new culvert to be placed in-line with the new defence embankment in Shortt's Field. It also includes for culverts at Richmond Road, Church Avenue and four 4m carriageway, private access culverts; one in each of the areas of open land below the new bridges and two (replacement) culverts over the Mall River below the diversion. These culverts will need to pass the full climate change flow of 21.63m<sup>3</sup>/s.

### 2.1.6 Upstream Defences

The town centre sits on the river's floodplain, so a flood defence line will run north of the town to shut off floodplain flows (refer to Figure 2-1). Embankments will have a rounded berm, with a 4m-wide crest and 1 in 5 side slopes on their open sides, but 1 in 3 (or less) where adjacent to a property boundary, if space is an issue. Landscaping can be employed to allow them better integrate with their surroundings.

An embankment (1.5m above ground level at most) will run approximately 150m from Blackcastle Road, through the river, to high ground to the south east of the lake in the Town Park. The primary function of the embankment will be to divert waters away from the town in case of a breach of the lake's impoundment (i.e. dam break).

A ramp will be constructed across Blackcastle Road to divert flood waters away from the town in case of a dam break. The exact location and slopes are a matter of road safety and will be finalised in detailed design stage. The building of this ramp will require the removal and rebuilding of road walls on either side; approximately 43m alongside Shortt's Field and approximately 66m on the riverside.

To close off flood defences at the upstream end of the town, an embankment (approximately 1.4m above ground level at most) is to be constructed to prevent flow from Shortt's Field entering Richmond Road. It will begin a little south of Shortt's Bridge and run 195m due west from Blackcastle Road to high ground (refer to Figure 2-1).

#### *2.1.7 Downstream Defences*

Just upstream of its re-entry point, a 90m long embankment will shut off the redundant river and tie into high ground to the east. Further east, the Railway View Estate will be defended by an embankment that runs approximately 110m along its southwest side and then turns and runs approximately 217m along the southeast and finishes at the road (refer to Figure 2-2).

The opposite river bank of the Mall to the outlet will have to be reinforced to protect it from erosion. This will be achieved using a placed stone revetment or gabions. This will also reduce reflected wave effects that could result in erosion to the bank further downstream.

Starting at the confluence (approximately 230m downstream of Small's Bridge) with a bed level of 107.3m OD, the riverbed will be re-profiled to finish at 106.1m OD 480m further downstream. The riverbed will be widened to 7.5m base-width from the diversion for approximately 450m and from there a transition returns to the existing 4.5m base wide over a further 250m (or so).

Channel maintenance is being designated from just upstream of the scheme works to where the Mall discharges to the Suir to prevent future growth of woody vegetation encroaching into the river or crowding-out the flowing floodplain.

#### *2.1.8 Water Framework Directive*

The European Communities Directive 2000/60/EC, which established a framework for community action in the field of water policy (commonly known as the WFD), requires 'good status' for all European waters by 2015 and where relevant deferred deadlines of 2021 and 2027. This is to be achieved through a system of river basin management planning and extensive monitoring. In 2004, a characterisation and analysis of all River Basin Districts (RBD) in Ireland was undertaken as required by Article 5 of the WFD. The Mall River is located in the Suir Upper Water management unit. In this characterisation study, the impacts of a range of pressures were evaluated including diffuse and point



pollution, water abstraction and morphological pressures (e.g. water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015, 2021 and 2027. Measures to address and alleviate these pressures are to be included in a formal programme of measures to be submitted to the European Commission. In relation to protected areas under the WFD, it indicates the following:

- There are no 'Registered Protected Areas' (RPA) nutrient sensitive rivers at or downstream of the proposed scheme works;
- There are RPA habitat rivers at or immediately downstream of the proposed scheme works; and
- There are no RPA nutrient sensitive lakes at or downstream of the proposed scheme works.

Based on the available information, the Mall River catchment is 'at Poor Status' in relation to Surface Water. It is proposed to restore the Mall River to good status by 2021. Based on the available information, the groundwater is 'at Good Status'. It is proposed to maintain the groundwater at good status. The main pressures on the Mall River are agricultural and waste water treatment plants (Suir upper water management Unit - SERBD, 2010).

#### 2.1.9 Summary

To summarise, the proposed flood relief scheme involves:

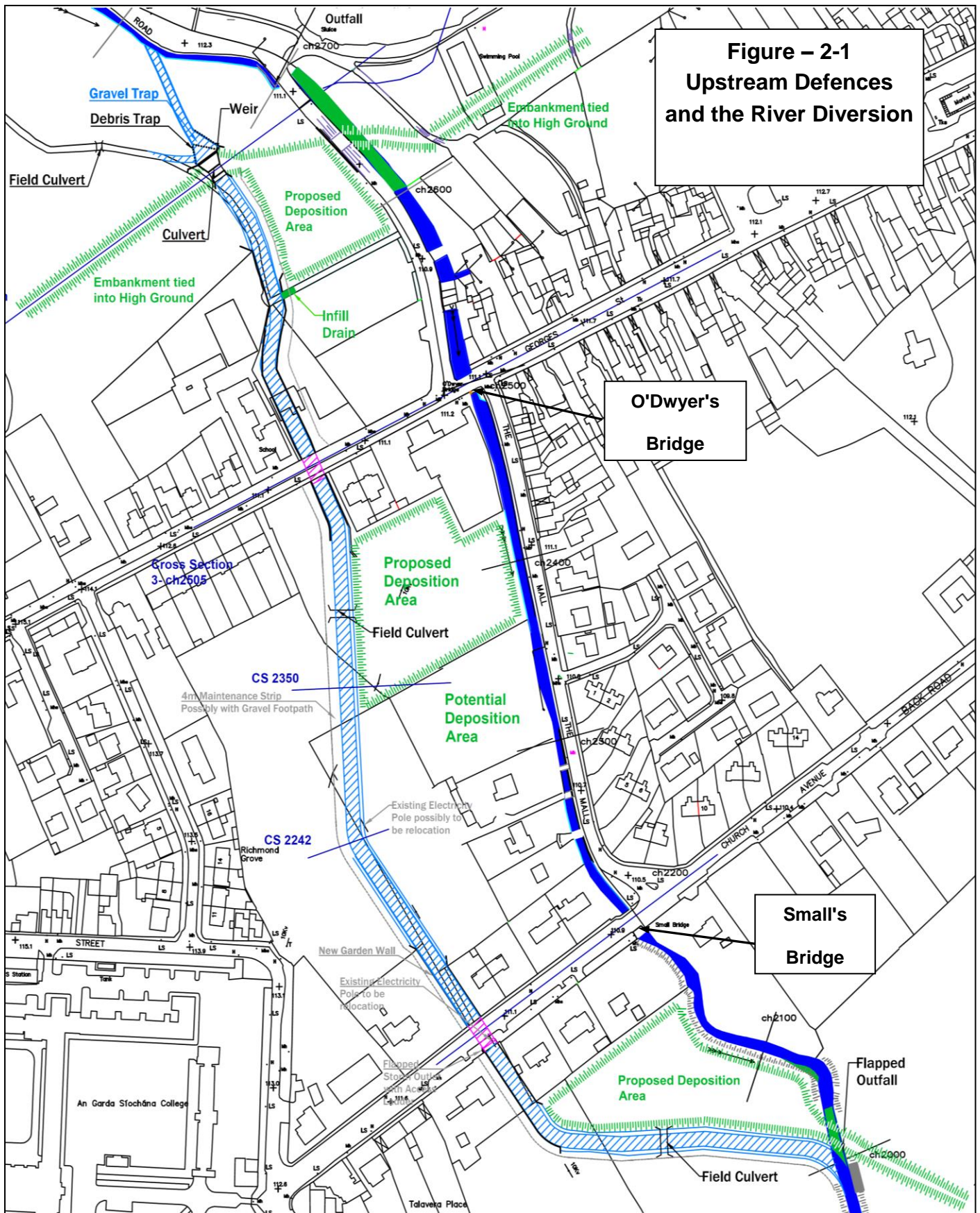
- A 70m-long inlet channel with debris and gravel traps and a small drop weir.
- A new outflow from the town lake to run under Blackcastle Road to the inlet channel.
- A flood –defence line north of the town, in-line with a culvert over the new diversion.
- Relocating the river by constructing a new 805m long channel (with a 7.5m base-width) that begins in Shortt's Field and finishes approximately 230m downstream of Small's Bridge.
- The road and access bridges will need to pass the full Climate Change flow of 21.63m<sup>3</sup>/s.
- As the bypassed stretch of the river is no longer required, there are no residual flood risks from wall failure, etc and no need to sluice its drainage outlets.
- At Richmond Road and Church Avenue, separated by 8.4m, walls along both banks of the diversion both up- and downstream.
- Re-grading 480m of the channel from the new confluence to 740m below Small's Bridge. Over the same reach, widening the river to 7.5m and a further 250m from there to transition back to the existing 4.5m base width.
- A 90m-long embankment on the left bank (east side) below properties at Small's Br.
- A 320m-long embankment to defend the Railway View Estate area.
- To improve aeration and fish movement along the excavated river and diversion, a fish channel (Thalweg) will be dug and partially backfilled with gravels. While this will likely be about 0.3m



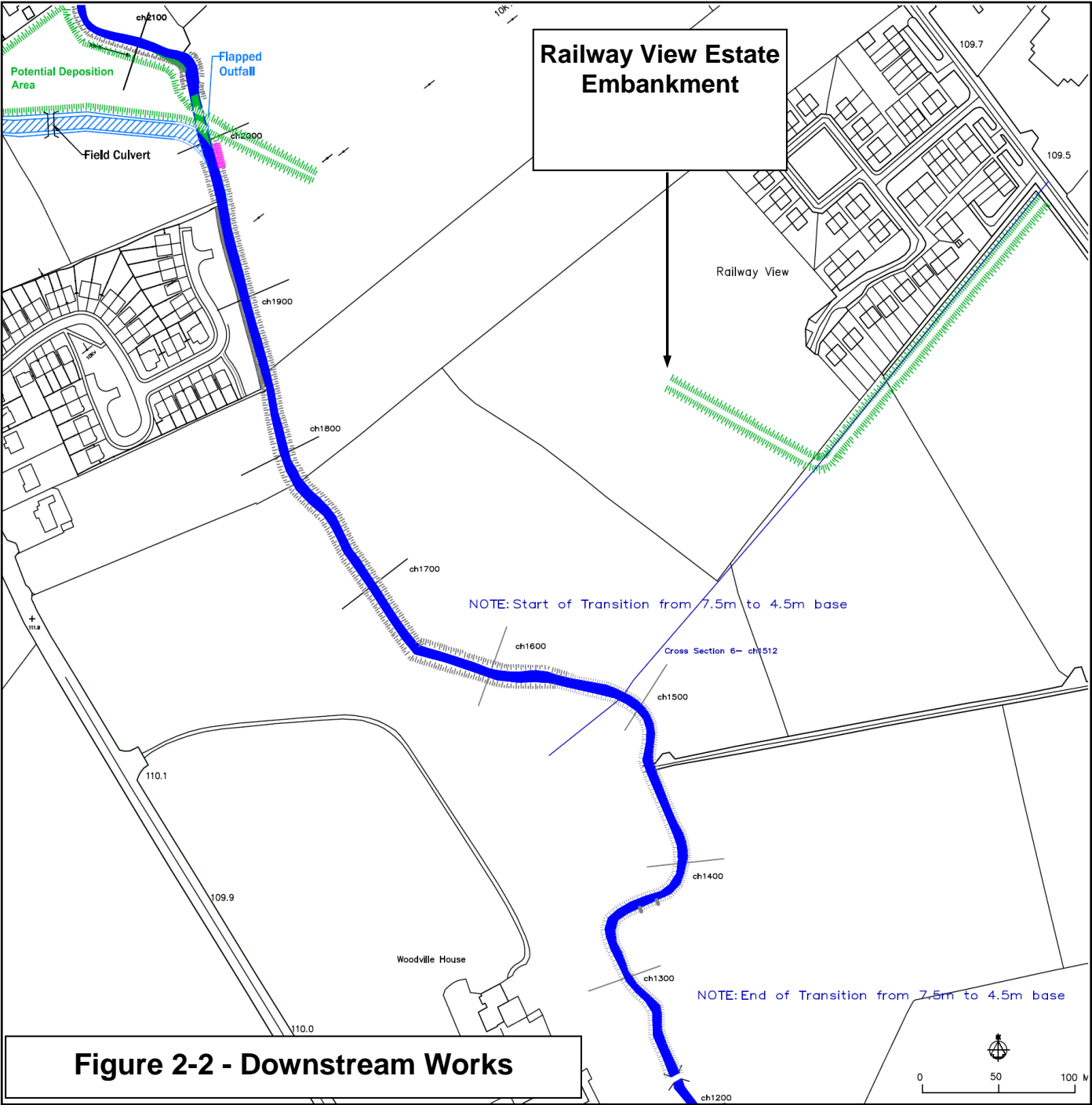
deep with a 2m wide bed and up to 5 to 1 side slopes, it will be designed and constructed in consultation with the IFI and along the channel may be higher or lower and its width may vary.

- The channel from the upstream works to where the Mall discharges to the Suir is being designated for maintenance to prevent further growth of woody vegetation encroaching into the river or crowding –out the flowing floodplain.
- Impacts to the landscape will be reduced by using high quality finishes to works, grassed finishes to embankments and open channel sections, and by planting replacement and new vegetation; including in-channel, where possible.

**Figure 2-1 Upstream Defences and the River Diversion**



**Figure 2-2     Downstream Works**



**Figure 2-2 - Downstream Works**

## 2.2 SENSITIVE RECEPTORS

Table 2-1 below lists a number of receptors that have been identified in the Environmental Impact Statement (EIS) as being potentially sensitive to the construction works.

**Table 2-1 Key Sensitive Receptors identified in the EIS**

<b>Key Sensitive Receptor</b>	<b>Reference chapter in EIS</b>
Adjacent residential and business properties	Chapter 5 Human Beings/ Socio-Economic
Templemore Wood proposed Natural Heritage Area (pNHA)	Chapter 6 Terrestrial Ecology & EIS Figure 6-1
Lower River Suir Special Area of Conservation (SAC)	Chapter 6 Terrestrial Ecology, EIS Figure 6-1 & Natura Impact Statement
Existing River Mall	Chapter 6 Terrestrial Ecology & EIS Figure 6-2
Otter	Chapter 6 Terrestrial Ecology
Fish (including white-clawed crayfish, salmon, trout, brook lampreys)	Chapter 7 Aquatic Ecology
Users of local road network	Chapter 13 Material Assets / Traffic
Archaeologically sensitive areas (Sites 1-8 noted within EIS)	Chapter 14 Cultural Heritage & EIS Figures 14-6 and 14-7



### 3 CONTROL OF THE CONSTRUCTION PROCESS

#### 3.1 ROLES AND RESPONSIBILITIES

The anticipated roles and responsibilities are outlined below. All roles and responsibilities are subject to confirmation by the OPW prior to the commencement of the construction phase. It should be noted that all members of staff are responsible for ensuring the requirements of the CEMP are followed.

##### **OPW**

The OPW will have an overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project requirements. They (and in relevant any individual sub-contractors appointed by the OPW) will be contractually responsible for delivering the CEMP.

The principal duties and responsibilities of the OPW in relation to the implementation of the CEMP will include:

- Provision of Construction Method Statements;
- Overall responsibility for the construction works and implementation of the CEMP;
- Resource allocation including appointment of a Site Manager;
- Participation in the regular review of the CEMP for suitability, adequateness and effectiveness; and
- Set the focus of environmental policy, objectives and targets for the site staff.

##### **Site Manager**

The principal duties and responsibilities of the Site Manager in relation to the CEMP will include:

- Implementing the CEMP, monitoring the performance of subcontractors and maintaining records to demonstrate compliance with and implementation of the Construction Method Statement;
- Ensuring all site staff receive an induction prior to starting work on-site and are provided with the relevant information concerning environmental sensitivities and protection measures;
- Review of all risk assessment method statements and ensuring an appropriate programme of tool box talks are developed and effectively communicated;
- Working closely with the assigned Project Environmental Consultant to ensure environmental monitoring programmes, inspections etc are undertaken as required;
- Ensuring that all relevant permits and consents are in place in advance of works commencing and that their requirements are adhered to; and

- Dealing with all queries and complaints from the public. The Site Manager will be responsible for responding to each of these. The Site Manager will also be responsible for maintaining a register of complaints together with details of follow up actions which have been undertaken.

### **Project Environmental Consultant**

The Project Environmental Consultant will be responsible for the following activities:

- Assisting the OPW with ongoing consultation e.g. with Inland Fisheries Ireland;
- Working closely with the OPW to review and update the CEMP as appropriate throughout the construction phase;
- Advising the OPW on all environmental matters;
- Carry out environmental surveys (e.g. dust, noise, water etc.) as necessary;
- Liaising with the Project Archaeologist regarding any archaeological monitoring and supervision works to be carried out;
- Generate environmental monitoring reports showing results of environmental surveys;
- Ensuring adherence to mitigation measures as detailed in the Environmental Impact Statement and any planning approval conditions; and
- Investigate incidents of significant, potential or actual environmental damage, ensure corrective actions are being carried out and recommend means to prevent recurrence.

### **Project Archaeologist**

The Project Archaeologist will report to the Project Environmental Consultant. The Project Archaeologist will be responsible for advising on all archaeological monitoring activities, supervising works and distributing information relevant to monitoring. Their responsibilities and duties will include the following:

- Liaison with the National Monuments Service of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs as required, including applying for a testing licence in sufficient time prior to the construction phase;
- Liaison with the Site Manager and Project Environmental Consultant to note where there are sites located in close proximity to the proposed development that could be inadvertently impacted during the construction phase;
- Monitor all ground disturbance works associated with the construction phase; and
- Ensure appropriate course of action is taken in the event that archaeological material is discovered during the works.

### **Project Ecologist**

The Project Ecologist will report to the Project Environmental Officer and is responsible for the protection of habitats and species encountered during the construction phase. The responsibilities and duties will include the following:

- Provision of specialist input and supervision of construction activities in relation to sensitive habitats and species;
- Provision of specialist advice on ecological monitoring, and conduct surveys (e.g. otter survey), monitoring and site inspections as set out in the Environmental Impact Statement;
- Liaise with the National Parks and Wildlife Services (NPWS) and Inland Fisheries Ireland as required.

### **All Staff and Subcontractors**

All staff and subcontractors have the responsibility to:

- Work to agreed methods and procedures to eliminate and minimise environmental impacts;
- Note areas of sensitive receptors (see Section 2.2);
- Understand the importance of avoiding pollution on-site, including water, noise and dust, and how to respond to an event of an incident to avoid or limit environmental impact;
- Report all incidents immediately to the Site Manager; and
- Co-operate as required with site inspections and audits.

## **3.2 REPORTING**

Environmental reporting procedures will be defined by the Project Environmental Consultant who will hold the overall responsibility for providing feedback to the OPW and Site Manager on environmental matters.

## **3.3 MONITORING, CONTINUAL IMPROVEMENT AND REVIEW**

The Project Environmental Consultant will be responsible for maintaining a register of all environmental monitoring, which should be made available for auditing and inspection. Results will inform actions taken to mitigate any forthcoming risks and continue best practice.

To ensure the CEMP remains 'fit for purpose' for the duration of the construction phase it should be reviewed and updated where necessary to ensure that it remains suitable to facilitate efficient and effective delivery of the project environmental commitments.

The OPW will be informed of any revisions to the CEMP and written approval sought.

### 3.4 ENVIRONMENTAL COMPLAINTS AND INCIDENTS

The Site Manager will develop and implement an appropriate complaints procedure and maintain a register detailing information on any complaints received and follow up actions taken. If the grievance cannot be adequately addressed by the Site Manager, the complaint/concern will be escalated to an appropriate contact within the OPW.

A register of any incidents on site will also be developed and maintained by the Site Manager.

The Site Manager will notify the Project Environmental Consultant regarding any environmental complaints received and incidents that occur on site.



## 4 CONSTRUCTION WORKS MANAGEMENT

### 4.1 DURATION AND PHASING OF CONSTRUCTION WORKS

The estimated construction period for the project is 12 months, as per indications provided by the OPW, however, it may be phase over a number of years; excluding planned stoppages and any periods lost due to bad weather. This allows for several elements of the work which are highly weather dependent and also allows for probable environmental time constraints.

An overview of the main elements of the construction works is provided below.

- **Consultation:** Consultation with relevant statutory authorities (including Inland Fisheries Ireland) to agree a works programme and detailed design which minimises impacts to aquatic ecology.
- **Site Compound & Site Set-Up:** An area will be designated as a temporary construction compound area – for site office, material storage, waste collection, refuelling area, etc. Identify and mark any restricted areas. Designate spoil storage areas. Provide fuel bunds. Provide vehicle cleaning equipment. Display site contacts/site information board.
- **Site Inductions:** Site inductions will be held on site at the commencement of construction works. Through site inductions, all site personnel will be made aware of the CEMP, project environmental issues/ sensitive receptors and environmental standards.
- **Site clearance of vegetation.** Clearance of woody vegetation will only extend to areas required within the site works area.
- **Sediment Control:** Sediment/silt control devices will be constructed at strategic locations to prevent siltation and associated water quality deterioration.
- **Construct new weir and culverts.** Utilise excavated material for new embankments. Import material if required.
- **Excavation work of the existing Mall River and adjacent areas.** Other proposed works include a road ramp, weir, fish pass, gravel trap, debris trap, culverts, channel constriction, possible bridge underpinning and reinforcement and works to the channel walls.

### 4.2 CONSTRUCTION FACILITIES

OPW has purchased a bungalow on Church Avenue for sanitary and canteen purposes for on-site workers over the course of the construction programme. . A site office and reception will also operate from this building.

Additional temporary prefabricated building(s) may also be required. If such prefabricated buildings are required then any effluent or dirty water generated within the temporary buildings will be drained to an

effluent holding tank. This tank will be emptied periodically and the effluent exported by a permitted haulier to an approved wastewater treatment plant.

Any temporary buildings associated with construction of the development shall comply with the Safety, Health and Welfare Regulations. On completion of the works, the OPW will ensure they are removed entirely and restore the surface of the land to its original condition or other reasonable conditions.

Parking facilities for construction vehicles and private transportation will be located within the development site.

### 4.3 HOURS OF OPERATION

Construction work will be confined to the hours of 8am to 6pm, Monday to Friday and 8am to 12 noon on Saturday. Works will not be permitted outside of these hours. In some instances, approval to vary the prescribed hours may be sought based on the following considerations:

- Nature, location and extent of work to limit potential nuisance;
- Location of the site in relation to 'sensitive' zones;
- The urgency or emergency nature of the works;
- Safety requirements such as risk to the public/workers;
- Sequential/timing issues;
- Traffic management considerations;
- Noise reduction measures;
- Measures taken to address any potential complaints;
- Requirements of other authorities (e.g. ESB, Eircom); and
- Public interest.

### 4.4 CONSTRUCTION EQUIPMENT

During the construction programme, the following plant and equipment will be required on site for use or as contingency.

Plant Equipment	Activity
Excavators, rock breaking and piling attachments (for excavators), mobile crane, pumps, well pointing equipment (for dewatering if required), roller, compacting plates, mats (for excavators), lorries, low loader, dump trucks, dumpers, tractors and trailers, signage and traffic lights, hand held equipment and tools, scaffolding, shuttering and formwork, lighting, generators, cement mixers, power washers, fencing equipment, road saw, blawnax (for laying asphalt), road sweeper	Dredging works within Mall River. Bank grading works on Mall River. Ongoing stream maintenance on Mall River. Cut and fill works for new culverts. New flood defence embankments. Equipment for channel works and wall pointing. Creation of new access tracks. Temporary traffic controls. Fencing for health and safety maintenance.

## 4.5 SITE SECURITY ARRANGEMENTS AND PUBLIC HEALTH AND SAFETY

The following section details plans to ensure the general public is adequately protected from activities occurring within the site during construction. The OPW will implement documented strategies in compliance with Safety and Health Regulations to provide a safe and secure site. The works area will be maintained in such condition so as to ensure public safety and local amenity.

### 4.5.1 Permits / Approvals

Permits / approvals which may be applicable to the works include:

- Permits for openings to public roads, footpaths and grassed areas; and
- Permits for abnormal loads.

The requirement of these permits will be reviewed prior to construction and regularly thereafter to ensure that the programme is achieved and any new consent requirements are identified as early as possible.

### 4.5.2 Safety and Security

Only authorised persons will be allowed on site. The site will be secured by a fence, hoarding or another suitable site barrier system, which will advise against unauthorised entry. Before and during construction work, all excavations will be fenced so they do not pose a danger to life or property.

Adequate lighting, safety signage and traffic controls will be provided at all times. Traffic controls and the Traffic Management Plan will comply with Chapter 8 of the "Traffic Signs Manual" published by the Department of the Environment, Heritage and Local Government (DoEHLG) and/or Council requirements.

During construction, open ends of the culverts will be securely fenced off.

Security measures will be in place at all times when the site is not in operation. Security measures will be provided to safeguard site materials and equipment.

Signage specifying security measures and key contact details will be erected on the perimeter of the construction site (i.e. attached to the site entrance gate, fence or hoarding).

All chemicals will be properly stored in secure areas. Required quantities of chemicals will be nominated and procedures will be put in place for the location of storage facilities, secure access and spillage procedures.

#### *4.5.3 General Site Management and Upkeep*

All works and potential impacts of construction will largely be contained within the confines of the works area. All precautions for public protection within the street/public domain will comply with the Building Regulations, local law and Safety, Health and Welfare requirements. Raw materials stored on the site will be adequately secured to prevent unnecessary and unsightly dispersal of the materials around the site and public areas. Trees/vegetation that is to remain will be protected where they are near the proposed demolition, excavation and construction works.

Trucks leaving the site will be adequately cleaned to ensure soil, mud and other site debris is prevented from spilling onto adjoining roads and footpaths. Roads and footpaths will be cleaned on a regular basis as required.

#### *4.5.4 Emergency Plan*

The OPW will be responsible for developing a detailed emergency plan and relaying it to the construction works team. This emergency plan will be prepared in compliance with relevant Safety and Health in Construction Regulations. The Emergency Plan will be activated in the event of flood events, fire, chemical spillage, cement spillage, collapse of structures, failure of equipment etc. The Emergency Plan must include contact names and telephone numbers for Tipperary County Council (all sections/departments); Ambulance; Fire Brigade and the Garda Authorities.

## **4.6 SITE ACCESS AND EGRESS**

The various site road types will be constructed in accordance with the following specifications:

- Temporary access/haul roads will be designed and constructed to accommodate the existing ground conditions. This will reduce consolidation and avoid any permanent damage to the land;

- Haul roads which will be required in a number of areas will be designed and constructed using well-graded crushed rock, reinforced with geogrid layers. The roads will be up to 6m wide and approximately 300mm deep to accommodate the safe passage of all vehicles. These temporary roads will be subject to weekly inspection and maintenance works as required; and
- On completion of the excavation and construction activities, all temporary access roads will be removed and the land reinstated.

A wheelwash (es) will be provided at public road access points during the construction phase. All vehicles must exist through the wheelwash to ensure that vehicles leaving the works area do not carry excess soil and material onto the adjoining public road infrastructure.

#### 4.7 EXCAVATION QUANTITIES AND MATERIALS

The excavation, transport and disposal of excavated material and import of concrete material, generated for the works will be the largest element of work.

The total excavation will be approximately 20,586m<sup>3</sup> for the length of the scheme (includes 70m of inlet). This represents an average 25.57m<sup>3</sup> per metre of the excavation.

#### 4.8 MATERIAL DISPOSAL / REUSE

Material will be reused as far as possible. Excavated material is to be incorporated into the embankments and final landscaping of the works area or spread locally. This will depend however on the suitability of the excavated material, and unsuitable material will be removed off site for disposal in permitted facilities.

Any material requiring disposal offsite will be disposed of at an appropriate permitted or licensed facility based on Waste Management Acts 1996 as amended. If low levels of contamination are encountered during the construction works, soil testing and a risk assessment of material shall be undertaken to assess its potential for use. In the event that disposal offsite is required, the material shall be tested for disposal at an appropriate waste management facility in accordance with the Waste management Act 1996 as amended.

Material dredged from the river bed will be regraded as far as possible into one side only of the river bank. Excess material will be utilised in the embankments or removed from site. Material dredged from the river bed will be very wet. This material will be stockpiled to reduce the water content to an acceptable limit for transport.

Stockpiling on site will be employed as the first option. However, this is dependent on land availability and any discharge constraints on the latent liquid. A further consideration is timescale, for example,

drying time of the material and how long it will have to remain stockpiled prior to removal off-site. This is to be reviewed as construction works progress.

A temporary access/haul road will be constructed, where required, to allow transfer of material to more distant embankments at the south of the works area. In addition a temporary clear span bridge over the river south of the town will be required to access embankments on the left bank of the river.

Transport of excess materials will be undertaken using low ground pressure vehicles. Any excess excavated material will be deposited in a stockpile area, where it will be loaded into rigid bodied road trucks for removal offsite.

#### 4.9 CONSTRUCTION RESTORATION

The commitments to restoration and aftercare are as follows:

- During all stages of construction within the site, all reasonable measures will be adopted to confine workings to within as defined a construction corridor as possible, so as to minimise impacts on the surrounding environment;
- The excavation programme will be designed to take cognisance of the soft ground conditions existing within parts of the site;
- The construction programme and measures will also take account of the environmental sensitivities existing within the site;
- On cessation of works, the lands within the works footprint will be landscaped, sympathetic to the surrounding landscape character;
- All exposed soil surfaces will be seeded; and
- The OPW will work in association with the Project Environmental Consultant to ensure that all appropriate mitigation measures relating to restoration and aftercare as recommended in the Environmental Impact Statement are undertaken. These recommendations will be reviewed, if necessary, throughout the construction phase.

## 5 ENVIRONMENTAL CONTROL MEASURES

### 5.1 NOISE AND VIBRATION

#### 5.1.1 Objectives

The following section details plans to minimise the impact of noise on the immediate environs due to construction activities associated with the River Mall (Templemore) Flood Relief Scheme.

#### 5.1.2 Operating Hours

It is proposed that working hours during the construction phase will be confined to the day time period, commencing at 8am to 6pm, Monday to Friday and 8am to 12 noon on Saturday, with no work on Sundays or Public Holidays. It should be noted that in some instances, approval to vary the prescribed hours may be sought based on the following considerations:

- Nature, location and extent of work to limit potential nuisance;
- Location of the site in relation to 'sensitive' zones;
- The urgency or emergency nature of the works;
- Safety requirements such as risk to the public/workers;
- Sequential/timing issues;
- Traffic management considerations;
- Noise reduction measures;
- Measures taken to address any potential complaints;
- Requirements of other authorities (e.g. ESB, Eircom); and
- Public interest.

#### 5.1.3 Noise Controls

Measures will be implemented to minimise the impact of noise emissions at sensitive locations during the construction phase. Such measures will include the following:

- Construction contractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations and the Safety, Health and Welfare at Work (Control of Noise at Work) Regulations;
- All plant items used during the construction phase should comply with standards outlined in the 'Safety, Health and Welfare at Work (Control of Noise at Work) Regulations' and the 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations'. Reference will be made to BS 5228: Part 1: 2009 (Noise Control on Construction and Open

Sites - Part 1. Code of Practice for Basic Information and Procedures for Noise Control) and will include the following mitigation measures:

- Training of site staff in the proper use and maintenance of tools and equipment;
  - The positioning of machinery on site to reduce the emission of noise and to site personnel;
  - Sources of significant noise will be enclosed where practicable;
  - Machines that could be in intermittent use will be shut down between work periods or will be throttled down to a minimum;
  - Plant known to emit noise strongly in one direction will, when possible, be orientated so that the noise is directed away from noise sensitive areas; and
  - Plant and/or methods of work causing significant levels of vibration at sensitive premises will be replaced by other less intrusive plant and/or methods of working where practicable.
- Inherently quiet plant will be selected where appropriate;
  - Screening and enclosures will be utilised in areas where construction works are continuing in one area for a long period of time or around items such as generators or high duty compressors. For maximum effectiveness, a screen will be positioned as close as possible to either the noise source or receiver. The screen will be constructed of material with a mass of  $>7\text{kg/m}^2$  and should have no gaps or joints in the barrier material. This can be used to limit noise impact to any noise sensitive receptors;
  - Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery and mobile equipment will be throttled down or switched off when not in use;
  - Accordingly, where possible all construction traffic to be used on site will have effective well-maintained silencers; and
  - All mobile plant will be maintained to a high standard to reduce any tonal or impulsive sounds.

#### 5.1.4 Vibration Controls

Any construction works that have the potential to cause vibration at sensitive receptors will be carried out in accordance with the below limit values at the most affected sensitive receptor.

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
8mm/s	12.5mm/s	20mm/s



## 5.2 MANAGEMENT OF DUST DURING CONSTRUCTION

### 5.2.1 Objectives

The following section details plans to ensure that air quality (airborne dust and pollutants) within the environs of the proposed flood relief scheme are maintained at acceptable levels throughout the construction period.

### 5.2.2 Identification of Dust Sources

The main activities that may give rise to dust emissions during construction include the following:

- Materials handling and storage; and
- Movement of vehicles (particularly Heavy Goods Vehicles) and mobile plant.

### 5.2.3 Dust Mitigation Measures

The following mitigation measures will be implemented on site during the construction phase, as required:

- Vehicles exiting the site will be diverted through a wheelwash. This will ensure that dust emissions are not generated from the tyres of vehicles emanating from the site. It will also prevent vehicles from carrying excess material onto public roads;
- Site roads shall be regularly cleaned and maintained as appropriate;
- Hard surface roads shall be swept to remove mud and aggregate materials from their surface as a result of the development works;
- Any un-surfaced roads shall be restricted to essential site traffic only;
- Any road that has the potential to give rise to fugitive dust may be regularly watered, as appropriate, during extended dry and/or windy conditions;
- On-site speed limits will be stipulated to prevent unnecessary generation of fugitive dust emissions;
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind;
- A complaints register will be maintained on-site and any complaints relating to dust emissions will be immediately dealt with;
- In periods of dry weather when dust emissions would be greatest, a road sweeper, which would also dampen the road, will be employed in order to prevent the generation of dust;
- Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods; and
- If appropriate, dust monitoring will be carried out during the construction phase of the scheme. If the level of dust is found to exceed 350mg/m<sup>2</sup>day in the vicinity of the site, further mitigation measures will be incorporated into the construction of the proposed flood relief scheme.

## 5.3 SOILS AND WATER MANAGEMENT

### 5.3.1 Objectives

The following section details measures to ensure soil and water resources are protected during the construction of the proposed flood relief scheme.

### 5.3.2 Soil Management Controls

- Works will be undertaken in accordance with CIRIA 650 'Environmental good practice on site'.
- To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within specially constructed dedicated temporary bunded areas.
- Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area, away from surface water gullies or drains.
- Spill kits and hydrocarbon adsorbent packs will be stored in a designated area and operators will be fully trained in the use of this equipment.
- Where excavation are undertaken <5m from existing structures, the design may require an number of measures to provide stability of the excavations including sheet piling and auger piling adjacent to existing structures. A detailed condition survey should be conducted on properties within 5m of the diversion prior to and post construction.

### 5.3.3 Water Management Controls

- Any raw materials, fuels and chemicals, will be stored within bunded areas to guard against potential accidental spills or leakages.
- All equipment and machinery will have regular checking for leakages and quality of performance.
- All potential run-off is to be diverted through appropriate settlement tanks/grit traps.
- Measures to be used to protect the water environment during the construction works will follow the relevant section of the NRA's documents '*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (NRA, 2005). The fisheries board documents "*Maintenance and protection of the inland fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board*" (Kilfeather, 2007) and '*Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites*' (Murphy, 2004) would also be followed where relevant.
- The river channel works will be carried out during dry weather and halted during heavy rainfall events to reduce suspended solids in the river and flowing to other parts e.g. the River Suir.
- Spoil and removed vegetation material from the river is to be stored no less than 5m back from the river and vegetation within this 5m buffer zone is to be retained, in order to reduce the run-off of suspended solids back into the watercourse.

- All in-stream works must be carried out in accordance with an approved method statement and under the direction of Inland Fisheries Ireland personnel.

## 5.4 MANAGEMENT OF EXCAVATED MATERIALS

### 5.4.1 Objectives

The following section details plans to manage the excavation, temporary storage, movement and placement of materials that will occur during the construction of the proposed flood relief scheme.

### 5.4.2 Working Areas

Once surface water management control measures are in place, top soil, surface vegetation and overburden will be stripped off the surface of each construction area and stored appropriately. The construction footprint and ground/habitat disturbance will be minimised wherever possible.

Working areas will be carefully planned to encompass the minimum area necessary to facilitate good working practices and to achieve suitable gradients for reinstatement, landscaping and restoration purposes.

Working areas, including access roads, will be clearly defined on site.

### 5.4.3 Temporary Storage of Soil

The total excavation will be approximately 20,586m<sup>3</sup> for the length of the scheme (includes 70m of inlet). This represents an average 25.57m<sup>3</sup> per metre of the excavation. There will therefore be a requirement to temporarily store excavated soil on site prior to its permanent placement (as detailed in Section 4.8). Three proposed deposition areas have been identified which shall be used to store soil. The locations of these deposition areas are shown on Figures 2.1 and 2.2. Appropriate silt fencing will be erected by the OPW around each temporary deposition area.

## 5.5 WASTE AND MATERIALS REUSE MANAGEMENT

### 5.5.1 Objectives

The following section details plans to maximise the re-use and/or recycling of construction materials throughout the construction of the proposed flood relief scheme.

### 5.5.2 Permits/Approvals

In relation to waste and materials reuse management, only approved waste collection permit holders will be contracted for the collection of waste from the site during the construction phase.

### 5.5.3 General Waste Management

To effectively manage waste on site, the following measures will be adopted:

**Waste Minimisation**

- Reduce waste or surplus materials on site by avoiding over-estimation of purchasing requirements, minimising packaging materials and buying environmentally approved and recycled content products;
- Ensure materials are not delivered to site damaged and unusable;
- Where possible, establish a 'take back' system with suppliers;
- Where possible, purchase environmentally approved and recycled content products; and
- Limit the amount waste going to landfill by reusing and recycling where possible.

**Waste Storage & Segregation**

- Ensure all wastes are handled and stored correctly;
- All wastes will be segregated and labelled appropriately;
- Provisions will be made for collection of rubbish from canteens, offices etc.;
- Waste will be stored in appropriate containers which take into consideration the physical properties, chemical composition, quantities and hazardous nature of the waste;
- Waste containers will be secure to prevent the uncontrolled release of waste and stored in designated areas, with necessary containment and protection measures to prevent uncontrolled releases; and
- Storage and collection provisions will be made for recyclable materials including cardboard, glass, metal, plastic, green waste and other materials.

**Reuse & Recycling**

- Provisions will be made for the re-use or recycling of any timber, paper, cardboard, glass and other materials, where appropriate.

**Waste Removal & Disposal**

- All waste (materials that cannot be reused or recycled) from the site will be removed off site by a suitably approved and licensed waste contractor to a licensed waste disposal facility.

**5.6 TRAFFIC MANAGEMENT****5.6.1 Objectives**

The following section details plans during the construction phase to ensure that the impacts to the public road network during the construction phase of the project are minimised and that transport related activities are carried out as safely as possible and with the minimum disruption to other road users.

### 5.6.2 Traffic Management Plan

The OPW will prepare a Traffic Management Plan for approval by Tipperary County Council once detailed project designs are available and in advance of any construction works commencing.

### 5.6.3 Road network/ Site Access

The town of Templemore is situated on the N62 National route which joins Athlone with Thurles and is the centre point on the N62 linking the M7 (Dublin to Limerick) with the M8 (Dublin to Cork). The main traffic route through the town is along the Main Street onto George Street, crossing over Mall River and onto Richmond Road. A number of smaller roads lead off these major roads to provide access to local residential areas such as The Mall, Church Avenue and Talavera. It is proposed the construction areas will be accessed via the N62 road.

### 5.6.4 Training and Awareness

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

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

### 5.6.5 Matters for consideration

The below listed construction activities will impact on local traffic within the area.

- The proposed river diversion channel crosses underneath two roads within the town, the first crossing passes under the N62 Richmond Road between Richmond Grove and The Mall, the second crossing is located on the local road, Church Avenue.
- Two upstream embankments are to be constructed; west of Blackcastle Road at Shortt's Field and east of Blackcastle Road to the southeast of the lake at Town Park. Access ramps are to be provided at a grade of 1 in 20 over the embankment along the existing footpaths at the back of the park.
- Two downstream embankments are to be constructed at Smalls Bridge and Railway View Estate.
- A ramp is also to be constructed on Blackcastle Road.
- Approximately 5,892m<sup>3</sup> of material will be transported off site.

#### 5.6.6 Deliveries to and from the site

There will be deliveries required to and from site throughout the estimated twelve month duration of works which will include concrete, structural reinforcement, materials for temporary road construction, road surfacing materials and precast culvert units. The most substantial element of work will be the removal of soil from the riverbed and banks between months 2 and 12 of the construction phase.

It has been estimated that a total of up to 20,586m<sup>3</sup> of material will be excavated for construction of the diversion with approximately 3,652m<sup>3</sup> being reused as backfill material. A further 5,053m<sup>3</sup> of the excavated material will be used for the construction of embankments and 5,989m<sup>3</sup> will be used in deposit areas if possible, therefore the remaining 5,892m<sup>3</sup> will be transported off site.

Removal of excavated material offsite to permitted licensed disposal sites equates to, on average, three truck loads removed daily assuming a 10m<sup>3</sup> capacity heavy goods vehicle (HGV) over ten months (200 working days) of the construction period.

The reuse of the excavated materials is to be within the development site confines. During the one month construction of the Townpark Embankment, three truck movements daily will haul material from the temporary storage stockpile to the embankment location along a short length of public road.

Assuming that culvert sections would be delivered on a 12m flatbed HGV in standard 2m lengths, this would create 17 HGV movements to the site. In-situ concrete deliveries at 10m<sup>3</sup> per load would account for 35 ready mix lorry deliveries to and from the site.

It has been estimated that 882m<sup>3</sup> of stone aggregate for the access road / four metre wide maintenance strip will be required, creating 89 truck movements to and from the site in the first month of construction.

The peak HGV movements during the construction programme correlate to the month during the construction of the Townpark Embankment, ongoing excavation of the channel and ongoing material deliveries (i.e. culvert, concrete, etc). The daily peak is 16 HGVs movements accessing and departing the site via the public road. The remaining construction months have an average of 10 movements each, with five arrivals and five departures daily.

The Annual Average Daily Traffic (AADT) on the N62 is 5737 with a 5.5% HGV (June 2014), the relatively small number of vehicles travelling to and from the works during the peak month of construction increases the current volume of traffic on the road network by 0.6% AADT.

#### *5.6.7 Road closures to facilitate works*

The construction of the culvert at N62 (Richmond Road) and Church Avenue will require lane closures to facilitate the installation of the culvert units over half road widths to facilitate traffic movement. It is not envisaged that any road closures will be required as part of the construction works to install the culvert units. However, a temporary traffic diversion along The Mall, Church Avenue and Manna South will be put into operation should a temporary road closure be required.

#### *5.6.8 Construction of road ramps*

The construction of the ramp on the Blackcastle Road will require road closures. A temporary traffic diversion will be put into operation for the duration of the road closure.

#### *5.6.9 Traffic Management Signage*

The OPW will undertake consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements. Such signage shall be installed prior to the works commencing on site.

Proposed signage may include warning signs to provide warning to road users for the works access/egress locations and the presence of construction traffic. All signage shall be provided in accordance with the Department of Transport's Traffic Signs Manual, November 2010 – Chapter 8- Temporary Traffic Measures and Signs for Roadworks.

#### *5.6.10 Traffic Speed Limits*

Adherence to posted/legal speed limited will be emphasised to all staff and contractors during the induction training.

Consultation will be undertaken in advance of works with Tipperary County Council and any recommended speed limits, specifically for construction vehicles, will be adhered to by staff/contractors.

#### *5.6.11 Road Cleaning*

Regular visual cleaning surveys of the road network in the vicinity of the site will also be carried out. Where identified/ required, the OPW will carry out road sweeping operations, employing a suction sweeper, to remove any project related dirt and material deposited on the road network by construction related vehicles. A wheel wash facility shall also be used at the construction works site entrance.

#### *5.6.12 Traffic Management Mitigation Measures*

The OPW will ensure that traffic management mitigation measures detailed within the Environmental Impact Statement are considered within the Traffic Management Plan, including those listed below.

- The final detailed design of the scheme will consider Environmental Impact Statement consultation responses by the National Roads Authority (now known as Transport Infrastructure Ireland). Further consultation will be undertaken at appropriate stages following correspondences as appropriate.
- The deliveries to and from site will be undertaken to an agreed programme prior to works commencing to minimise disruption to the roads network particularly during times of peak traffic flow.
- Where possible, measures will be adopted to ensure that construction traffic travels minimal distances along sensitive routes (residential or congested roads) and those vehicles will be kept clean when on public highways.
- The OPW will liaise with Tipperary County Council and Transport Infrastructure Ireland and advance notice will be given to the general public through local media before any road closures take place.
- All possible service diversions should take place in advance of road closure for construction of the culvert.

## 5.7 ECOLOGY

### 5.7.1 Objectives

The following section details plans to manage the impact on the terrestrial and aquatic ecology during the construction of the proposed flood relief scheme.

### 5.7.2 Matters for consideration

Several ecological receptors are present within the study area. Matters, with regards to ecology, that are to be considered during the construction phase are as follows:

- Templemore Lake;
- Vegetation that is to be retained;
- Otter;
- Habitat reinstatement/ replanting;
- Birds and their nesting places (breeding season);
- Pollution controls; and
- Fish management.

### 5.7.3 Ecological mitigation measures

The following mitigation measures will be implemented on site during the construction phase, as required:



- The edge of the proposed embankment beside Templemore Lake will be a minimum of 5m from the boundary. No material will be stored in this buffer zone.
- Vegetation that is to be retained will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation.
- No construction materials will be stored within 5m of retained hedgerows/trees/woodland habitat.
- An experienced Ecologist will be on site when required during construction works to provide ecological advice to avoid and/or minimize ecological impacts.
- Measures to be used to protect aquatic ecology during the construction works will follow the relevant section of the NRA's documents '*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (NRA, 2005)<sup>1</sup> and '*Guidelines for the treatment of otters during the Construction of National Road Schemes*' (NRA, 2006)<sup>2</sup>.
- During vegetation clearance along drains and the Mall River, an Ecologist will resurvey this area for otter. If an otter holt is found, appropriate mitigation following NRA *Guidelines for treatment of otters prior to construction of road schemes* (NRA 2006) will be implemented. This will include assessing breeding activity within the site and a license application to the NPWS, if required.
- The Mall River corridor will not be blocked off especially at night. This will allow otters to transit between areas north and south of the works. This is particularly important in Templemore Town as there will be increased risk of collision with cars if they cannot follow the river.
- In consideration of bats, the loss of potential forage habitat (riparian woodland and sections of hedgerow) during construction works will be compensated by native tree planting, the mix of which will be similar to existing tree/ shrub species.
- It is recommended that woody vegetation removal be undertaken outside of the main bird nesting period which begins on March 1<sup>st</sup> and continues until August 31<sup>st</sup>. A licence is required from the National Parks and Wildlife Service under the Wildlife Acts 1976 and 2000 if any habitat (e.g. scrub, trees, hedgerows) to be removed is known to contain nesting birds. If this work is undertaken outside the breeding season (i.e. 1st March to 31st August), then such a licence would not be required and would ensure compliance with the Wildlife Act 1976 and Wildlife (Amendment) Act 2000.
- Following the construction phase, replanting using native woody vegetation of local provenance, currently existing on site will be implemented, where hedgerow and riparian vegetation removal was significant. Where this is likely to recover, natural re-colonisation is preferable.

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<sup>1</sup> NRA (2005) Guidelines for the crossing of watercourses during the construction of national road schemes. National Roads Authority.

<sup>2</sup> NRA (2006b) Guidelines for the treatment of otters during the Construction of National Road Schemes. National Roads Authority.

- Sections of the new embankments will be planted with unimproved grassland species of local provenance to promote biodiversity. Where appropriate sections of the new embankments may be planted with low growing native woody vegetation such as Hazel, Blackthorn or Hawthorn.
- The detailed design of the flood channel will be designed to be a physically diverse river corridor. Suitable guidance to follow is '*The New Rivers and Wildlife Handbook*' by Purseglove, J. (1995). The river channel should be designed with biodiversity in mind, and not just be aimed at salmonids. However, guidance for designing / enhancing rivers for salmonids can be found in the book "*Channels & Challenges. Enhancing salmonid rivers* " by O'Grady (1996) and elements of this book should also be used to inform the design of the channel.
- The 'old' channel will be modified to ensure that fish can no longer enter it and become trapped after a flood event.
- Any piped waste water discharges will be assessed in terms of waste assimilation capacity of the receiving water and treatment such as oil/water separation will be provided.
- The timing of the works will be agreed in advance with the National Parks and Wildlife Service and Inland Fisheries Ireland.
- To protect salmon and trout it will be necessary to time works outside the window of October to May.
- Brook lampreys spawn in the spring and early summer months and the timing of works will also take this species into account.
- No in-stream excavations or other works involving interference with the bed, bank or soil will take place outside of the immediate areas where the flood channel joins the Mall River.
- The appointed contractor will be required to provide a detailed method statement showing how water quality impacts and habitat loss during the works will be minimised. The methodology will be approved by both the National Parks and Wildlife Service and Inland Fisheries Ireland prior to any works taking place.
- A translocation plan will need to be designed, agreed with Inland Fisheries Ireland and implemented by a licensed aquatic Ecologist prior to river water being diverted into the new channel.
- The CEMP will be used to control sediments during the works; this will include the installation of properly designed silt curtains and a monitoring programme for suspended solids in the river, to be agreed with the National Parks and Wildlife Service and Inland Fisheries Ireland.
- The Project Ecologist will ensure that measures to be used to protect aquatic ecology during construction works will follow the relevant section of the NRA's documents 'Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes' (NRA, 2005). The fisheries board documents "Maintenance and protection of the inland fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board" (Kilfeather, 2007) and 'Requirements for the Protection of Fisheries Habitat

during Construction and Development Works at River Sites' (Murphy, 2004), will also be followed where relevant.

- A silt fence (or equivalent barrier) will be used to surround the works area. This will be installed in the river prior to any works commencing on site.
- Material removed will be stockpiled within a bunded area / or within a geotextile barrier.
- All necessary measures will be taken to prevent the release of oil, fuels or other pollutants into the Mall River.
- The works will be carried out during dry weather and halted during heavy rainfall to reduce suspended solids in the river.
- Spoil and removed vegetation material from the river will be stored no less than 5m back from the river and vegetation within this 5m buffer zone is to be retained, in order to reduce the run-off of suspended solids back into the water course.
- Machinery being used to excavate the river may contain fragments of exotic invasive flora. This machinery will need to be cleaned prior to starting excavation.

## 5.8 LANDSCAPE MANAGEMENT

### 5.8.1 Objectives

The following section details plans to manage the impact on the local landscape during the construction of the proposed flood relief scheme.

### 5.8.2 Matters for consideration

The series of proposed embankments to both the north and south of the town will not only change the local topography of the area concerned, but will also require the removal of trees and mature hedgerows. To the north of the town, the raising of walls, river walls, and the introduction of a road ramp will change details in the fabric of the landscape. The raised road surfaces will change both the physical road level and also the user experience. However, the overall landscape change is not considered significant, considering the underlying context of an urban and agricultural landscape which undergoes change over time.

Where the river diversion crosses Richmond Road in the north and Church Avenue in the south, the removal of existing vegetation of trees, hedgerows and ornamental planting will result in landscape change to the areas concerned. The open channel between these two areas will involve the removal of existing trees and hedgerows in the landscape. While the short term landscape impact is moderate to high and localised, replacement of this removed vegetation will greatly reduce landscape impact in the long term.

### 5.8.3 *Landscape Mitigation Measures*

The following mitigation measures will be implemented on site during the construction phase, as required:

- The proposed flood defence ramps will be designed to have gradual slopes and appropriate materials in order to minimise visual impact.
- Use materials, pointings and finish to match the existing walls.
- The flood defence embankments will be rounded off at the top with a shallow grade and softened with a seed mix to match the existing groundcover vegetation/grass.
- The footprint for the embankment within the park will be designed to protect existing mature trees.
- Mature trees that are to be retained will be fenced off during the construction phase.
- Where removal of trees during construction is necessary they will be replaced with like size and type plants.
- Provide new native planting in the vicinity of the weir where existing planting will be removed during construction.
- Route of diversion should follow any existing field boundaries in order to minimise any severance of land/properties.
- Where removal of vegetation cannot be avoided, it should be replaced where possible in the same location or nearby, and to the same size, on completion of construction works.
- Where possible, materials used in reinstatement of roads, pathways, and walls will be consistent with existing surfaces and materials.
- Construction works will be carried out speedily to minimise the impact on road users.

## 6 INSPECTION AND MONITORING

### 6.1 OBJECTIVES

Inspection and monitoring of the environmental effects of construction activities will enable the effectiveness of environmental mitigation to be evaluated. It will also allow environmental problems to be identified and responded to at an early stage. The following section outlines the monitoring activities proposed for implementation on site to optimise environmental performance during the construction phase of the development.

### 6.2 MATTERS FOR CONSIDERATION

#### 6.2.1 *Archaeological Monitoring*

An experienced Project Archaeologist will be appointed prior to the commencement of works. Archaeological monitoring will be carried out in areas of moderate archaeological potential (see Section 2.2), excavation locations associated with construction works and within the existing river channel.

All construction related topsoil stripping, excavation and ground disturbance works will be monitored in full by the appointed Project Archaeologist.

Prior to construction works an underwater archaeological survey will be undertaken where the river is to be widened and the river bed regraded, including a dive wade / survey. This is to ascertain if notable archaeological deposits or stray finds remain in situ in the river banks or river bed.

During the construction phase a suitably qualified underwater archaeologist will monitor dredging works and river widening works under licence to the Underwater Section of the National Monuments Service of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

The OPW will be responsible for communicating a schedule of ground disturbance and river drainage works to the appointed Project Archaeologist in a timely manner, such that monitoring may be coordinated with development works.

If archaeological features or potential archaeological features are found during the course of works, site personnel are required to stop work immediately and contact the Site Manager and Project Archaeologist for instruction. The appointed Project Archaeologist has the authority to immediately stop works in the area. All instructions/advice provided by the appointed Project Archaeologist must be adhered to.

If newly recorded sites are detected they will be fenced off and excluded from construction works. In accordance with the requirements of the Department of Arts, Heritage, Regional, Rural and Gaeltacht

Affairs, satisfactory arrangements will be provided for the recording and removal of any archaeological material, which may be considered appropriate to remove in consultation with the relevant authorities.

Upon completion of works, the appointed Project Archaeologist will submit a written monitoring report to the OPW and the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. This report will comment on the degree to which works associated with the proposed flood relief scheme will affect any archaeological remains.

### *6.2.2 Archaeological Testing*

The Environmental Impact Statement has identified a site of archaeological potential (Site 3) in the townland of Belleville. Archaeological testing is to be undertaken in this area to ensure that any archaeological deposits are identified as early as possible, thereby ensuring that any loss from the archaeological record is minimised.

Under licence to the National Monuments Service of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, the Project Archaeologist will observe normal construction works in this area. Construction works in this area are to be undertaken using toothless grading bucket, thereby ensuring the early identification of archaeological deposits and minimal loss to the archaeological record.

If possible this testing should be undertaken preconstruction, to ensure that sufficient time can be allowed within the construction schedule for the excavation of any archaeological deposits discovered.

### *6.2.3 Ecological Monitoring/ Inspection*

An experienced Project Ecologist will be appointed for the construction phase to ensure the ecological mitigation measures identified within the Environmental Impact Statement are implemented.

In consultation with the OPW, authority will be given to the Project Ecologist to authorise, oversee and identify actions, including any temporary stoppage of works, to ensure satisfactory construction arrangements and any necessary mitigation for the protection of site ecology (terrestrial and aquatic). It is proposed that the Project Ecologist will also carry out or supervise the monitoring programmes relating to the protection of site habitats and species.

Site monitoring by the assigned Project Ecologist is required so as to advise the site staff regarding pollution controls, fish management, minimising localised tree clearance impacts, habitat reinstatement (replanting) and conducting updated pre works otter and bird surveys. Specific ecological monitoring required is discussed below.

#### **6.2.3.1 Templemore Lake**

The Project Ecologist will supervise works in this area to ensure that a 5m buffer (minimum) from lake to the proposed embankment boundary is maintained. This is to avoid indirect impacts such as silt runoff to Templemore Lake.

#### **6.2.3.2 Retained hedgerows/trees/woodland**

The Project Ecologist will inspect works in areas where adjacent hedgerows, trees and woodland habitats are to be retained to ensure they are marked/ fenced off. This is to avoid indirect damage to these habitats. No materials should be stored within 5m of retained hedgerows/trees/woodland. Materials, especially soil and stones, can prevent air and water circulating to the roots of trees/shrubs.

#### **6.2.3.3 Otter survey**

During vegetation clearance along drains and the Mall River, the Project Ecologist will resurvey this area. If a holt is found, appropriate mitigation following NRA *Guidelines for treatment of otters prior to construction of road schemes* (NRA 2006) will be implemented. These surveys will include assessing breeding activity within the site and submission of a license application to the National Parks and Wildlife Service, if required.

#### **6.2.3.4 Birds**

If vegetation removal works are to be undertaken between the 1<sup>st</sup> March and 31<sup>st</sup> August (i.e. the bird breeding season), the Project Ecologist will inspect these habitats (trees/scrub/hedgerows) to determine if any nest sites are present. If a nest is present within any habitat to be removed, then a licence application to the National Parks and Wildlife Service will need to be submitted.

#### **6.2.3.5 Translocation of fish**

In consultation with Inland Fisheries Ireland, the translocation of fish from the existing channel to the new channel will be undertaken using a specialist contractor engaged to do this work. This work will be supervised by the Project Ecologist to ensure approved methods, as per the provided and approved contractor method statement, are being used.

#### **6.2.3.6 Water quality controls**

The Project Ecologist will periodically inspect the silt fence/ curtains during the construction stage to ensure they are working effectively. The Project Ecologist will also carry out inspections on site to ensure that spoil and removed vegetation material from the river is to be stored no less than 5m back from the river and vegetation within this 5m buffer zone is to be retained. This is to reduce the run-off of suspended solids back into the water course.

#### 6.2.4 Dust Monitoring

During long periods of construction work activity dust monitoring is recommended near site boundaries/sensitive receptors. The TA Luft/VDI 2119/Bergerhoff Method of dust emission monitoring will be employed. It is recommended that the TA Luft total dust deposition limit value (soluble and insoluble) of 350 milligram per square metre per day be adopted. If dust levels are found to be higher than 350 milligram per square metre per day, further mitigation measures will be required.

#### 6.2.5 Traffic

Continuous monitoring by the Site Manager will be required to ensure that the Traffic Management Plan proposed does not result in unnecessary delays to traffic using the surrounding road network. This will be done by visual inspection of traffic queues during peak times and then an adjustment of the plan if required.

#### 6.2.6 Environmental Site Auditing/Inspections

The OPW will demonstrate how the requirements of this CEMP are being complied with. This will include a programme of inspections and environmental audits by both the OPW and appointed Project Ecologist, in consultation with the relevant site specialists.

Environmental audits will be undertaken on site on a regular basis, to ensure that the mitigation measures proposed in this CEMP are implemented. The topics for environmental inspection and monitoring during and, where appropriate, following construction will include, but not limited to, the following:

- Sediment control and water quality;
- Construction traffic management;
- Construction waste management;
- Construction noise management;
- Construction Air & Dust;
- Protection of Site Ecology;
- Protection of Site Archaeology;
- Material and plant storage areas;
- Fuel storage and handling;
- Site Reinstatement; and
- Complaints Management.

All audits will be completed by a suitably qualified person. Written records of environmental site audits reports are to be maintained on site and any required corrective actions or recommendations will be circulated to all the Project Team for implementation.



In addition to Environmental Site Audits correction actions, any additional monitoring or maintenance requirements specified by regulatory authorities will be fully complied with.

## 7 CONCLUSIONS

This CEMP has been developed to demonstrate the commitment to Environmental Management. It outlines the project specific environmental measures that are to be implemented and the procedures to be followed for the scope of constructions works to ensure that potential environmental impacts are effectively managed, minimised and / or eliminated.

The plan details the roles and responsibilities of the OPW, Site Manager and other staff and how these controls are to be implemented. The CEMP is an overarching document with a Construction Method Statement to be provided prior to commencement of each stage which will be required to accord with the requirements of the CEMP.

The CEMP will require regular monitoring prior to the commencement of each stage of works and through the construction period to ensure potential risks are adequately managed throughout the construction works phase.

## **APPENDIX 1**

### **PROVISIONAL CONSTRUCTION WORKS PROGRAMME**





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