Planning and Environmental Consultants

Construction and Environmental Management Plan

Proposed Bridge Replacement, Hartley Bridge, Carrick-on-Shannon, Co. Leitrim.

DOCUMENT DETAILS

Client:	**Leitrim County Council**
Project Title:	**Proposed Bridge Replacement, Hartley Bridge, Carrick-on-Shannon, Co. Leitrim.**
Project Number:	**181209**
Document Title:	**Construction and Environmental Management Plan**
Document File Name:	**CEMP F - 2021.09.15 - 181209**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Final	01/10/2020	SC, EH	MW, OC

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1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by McCarthy Keville O' Sullivan Ltd. (MKO) on behalf of Leitrim County Council for works which comprise proposed bridge replacement works at Hartley Bridge, Carrick-on-Shannon, Co. Leitrim. The proposed works involve the construction of a new bridge, demolition of a pre-existing bridge and associated road realignment works at Hartley Bridge, Carrick on Shannon, Co. Leitrim (Grid Ref: E193904 N301894).

This CEMP provides the environmental management framework to be adhered to during the proposed works and it incorporates the mitigating principles and measures required to ensure that the work is carried out in a way that minimises the potential for environmental impacts to occur. The appointed primary contractor will be contractually obliged to comply with all such measures.

This CEMP is intended as a single, amalgamated document that can be used during the works, as a single consolidated point of reference relating to all construction, environmental and drainage requirements for the Planning Authority, developer and contractors alike.

1.1 Scope of the Construction and Environmental Management Plan

This report is presented as a guidance document for the proposed works comprising construction of a new bridge, demolition of a pre-existing existing bridge and associated road realignment works. The proposed development site is at an existing local road (L3400) crossing on the River Shannon, in the townland of Hartley, Co. Leitrim.

Where the term 'site' is used in the CEMP it refers to the works area where bridge construction, demolition, and road realignment works will be carried out. The CEMP clearly outlines the environmental mitigation measures and monitoring proposals that are required to be adhered to in order to complete the works in an appropriate manner.

The CEMP is divided into ten sections, as outlined below:

- **Section 1** provides a brief introduction as to the scope of the report.
- **Section 2** outlines details of the site and the proposed works, detailing the targets and objectives of this plan along with providing an overview of methodologies that will be adopted throughout the project.
- **Section 3** sets out details of the environmental controls to be implemented on site including site drainage measures, and a waste management plan.
- **Section 4** sets out a fully detailed implementation plan for the environmental management of the project outlining the roles and responsibilities of the project team.
- **Section 5** outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.
- **Section 6** consists of a summary table of all mitigation proposals to be adhered to during the construction and demolition phases.
- **Section 7** consists of a summary table of all monitoring requirements and proposals to be adhered to during the construction and demolition phases.
- **Section 8** sets out a programme for the timing of the works.
- **Section 9** outlines the proposals for reviewing compliance with the provisions of this report.

2. SITE AND PROJECT DETAILS

2.1 Site Location

The site of proposed works is Hartley Bridge, on the River Shannon, north of Carrick-on-Shannon, Co. Leitrim. The bridge also crosses into Co. Roscommon on the western side of the river (Grid Ref: E193904 N301894). The proposed works are located approximately 2.8km north of Carrick-on-Shannon town. The site location is provided in Figure 2-1.

2.2 Description of Proposed Works

In 2016, Leitrim Country Council (LCC) commissioned a structural assessment and report for the existing Hartley Bridge which found the bridge to be in poor condition and unfit for purpose. As a result, it is proposed to construct a new bridge, demolish the old bridge, realign the local road (L3400) on approach to remove the existing bend to the east of the river, and tie-in with the existing road network. The road realignment works on approach to the bridge comprise approximately 135m on the western bank and 110m on the eastern bank. A layout of the proposed development is shown in Figure 2-2. The bridge navigation details are shown in Figure 2-3. Draft bridge design detailed drawings as prepared by PUNCH Consulting Engineers are included in Appendix 2.

The proposed development consists of the following:

1. The demolition of the existing Hartley bridge over the River Shannon.
2. Construction of new 3-span, 75m total length, replacement bridge structure, 25m downstream of the existing bridge crossing.
3. Construction of the realigned (vertical and horizontal) L3400 on approaches to the new bridge structure.
4. Decommissioning of defunct sections of the L3400.
5. All ancillary works associated with the above works, including:
    a. Temporary Site Compound
    b. Drainage and other Utility Works
    c. Road Safety Barriers
    d. Fencing

2.3 Targets and Objectives

The proposed works will be completed to approved European and National standards, which include specified materials, standards, specifications and codes of practice. The proposed works methodologies have considered environmental issues and adopt appropriate preventative measures.

The key site targets are as follows:

- Adopt a sustainable approach to the proposed works and, ensure sustainable sources for materials supply where possible;
- Keeping all watercourses free from obstruction and debris;
- Avoidance of any pollution incident or near miss as a result of working in, or around existing watercourses, and having emergency measures in place;
- Correct fuel storage and refuelling procedures to be followed;
- Air and noise pollution prevention to be implemented;
- Good waste management and house-keeping to be implemented;
- Adopt reuse and recycle opportunities for a materials where possible, e.g. excavated stone, soil and subsoil material;
- Avoidance of vandalism;

- Monitoring of the works and any adverse effects that it may have on the environment; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows:

- Keep impact of works to a minimum on the local environment, watercourses, habitats and wildlife;
- Comply with all relevant water quality legislation;
- Ensure works and activities are completed in accordance with mitigation and best practice approaches as presented in the accompanying Natura Impact Statement (NIS), this CEMP, and associated planning documents;
- Ensure works and activities have minimal impact/disturbance to local landowners and the local community; and,
- Ensure works and activities have minimal impact on the natural environment.

NOTE:

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MALIN HEAD DATUM IS APPROXIMATELY 2.7m ABOVE THE POOLBEG LIGHTHOUSE DATUM
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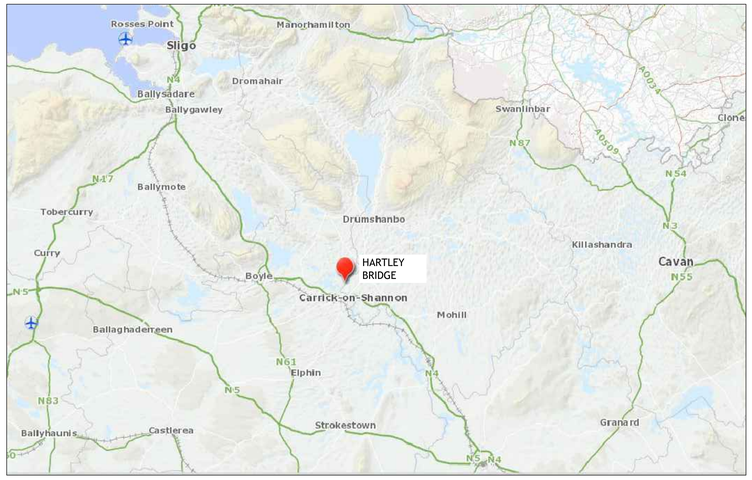
ALL WATER LEVELS TO BE CONFIRMED WITH WATERWAYS IRELAND

LEGEND:

PROPOSED SITE BOUNDARY

MAP OF IRELAND LOCATION
N.T.S



HARTLEY BRIDGE LOCATION
N.T.S

SITE LOCATION
1:2500

Figure 2-1

COLOUR DRAWING ☒

Date Drawn: July 2020
Drawn By: S Buckley
Date Issued:
Issued By:

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Client: Comhairle Chontae Liatroma Leitrim County Council

Job: HARTLEY BRIDGE REPLACEMENT
Title: SITE LOCATION

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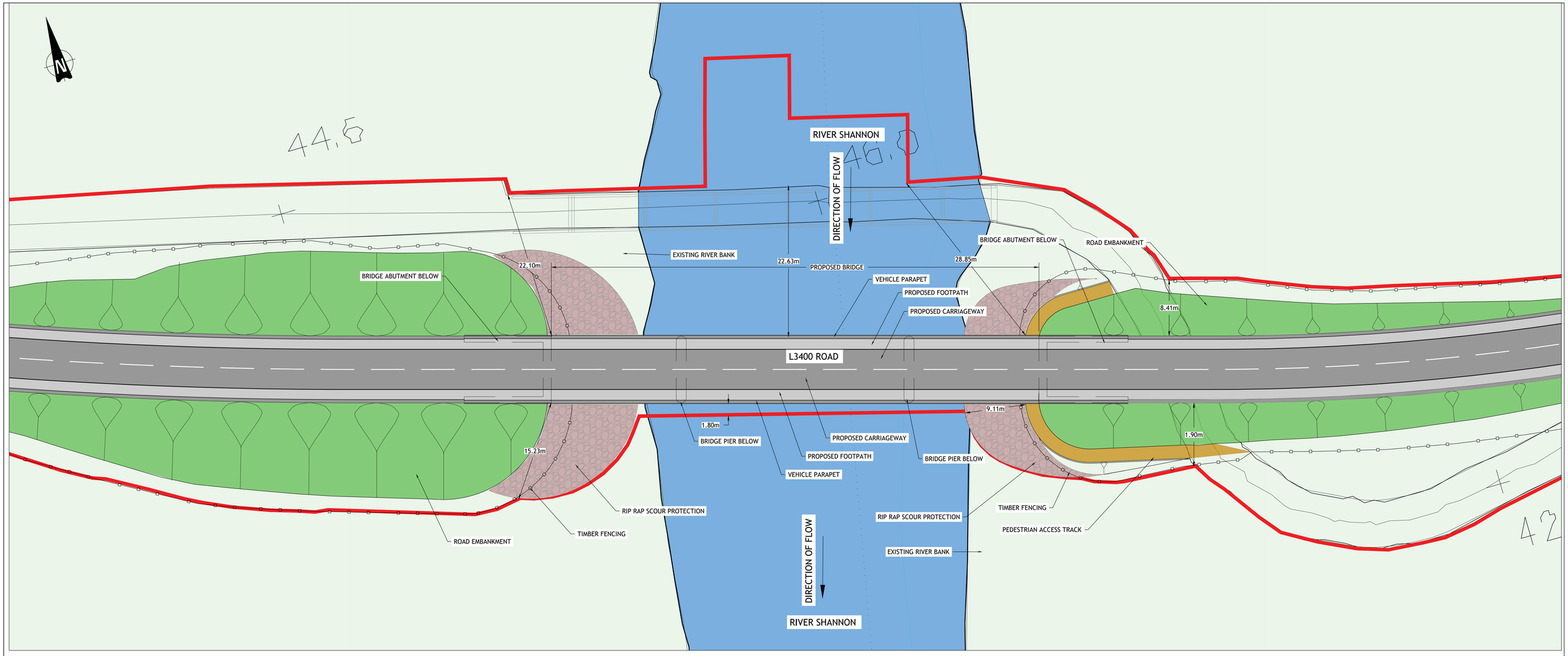
Stage: PLANNING
Scale @ A0: As Shown
Technician Check: S Buckley
Engineer Check: J Roche
Approved:
Drawing No: 182-164-101 Rev: PL0



PROPOSED BRIDGE PLAN
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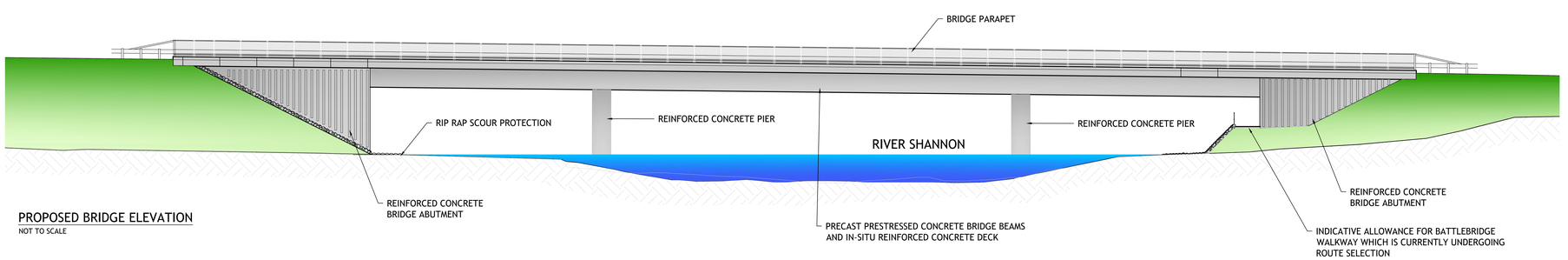
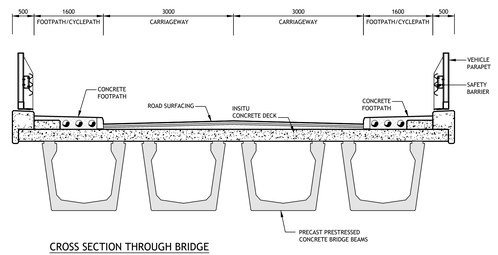


PROPOSED BRIDGE ELEVATION
NOT TO SCALE



CROSS SECTION THROUGH BRIDGE
SCALE 1:50

LEGEND:

PROPOSED SITE BOUNDARY

Figure 2-2

COLOUR DRAWING ☒

Date Drawn: July 2020
Drawn By: IB, Skoric
Date Issued:
Issued By:

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Client: Comhairle Chontae Liatroma Leitrim County Council

Job: HARTLEY BRIDGE REPLACEMENT
Title: PROPOSED BRIDGE PLAN, ELEVATION AND SECTION

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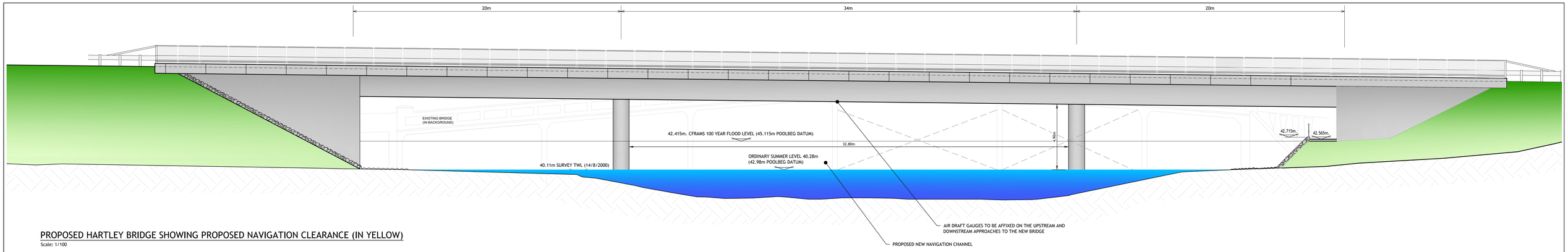
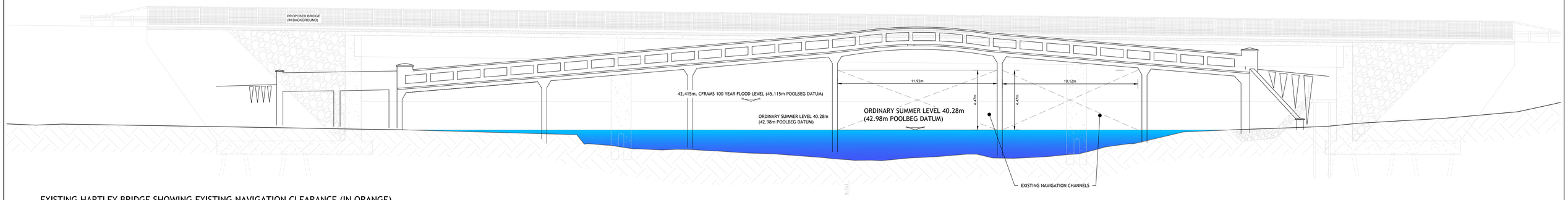


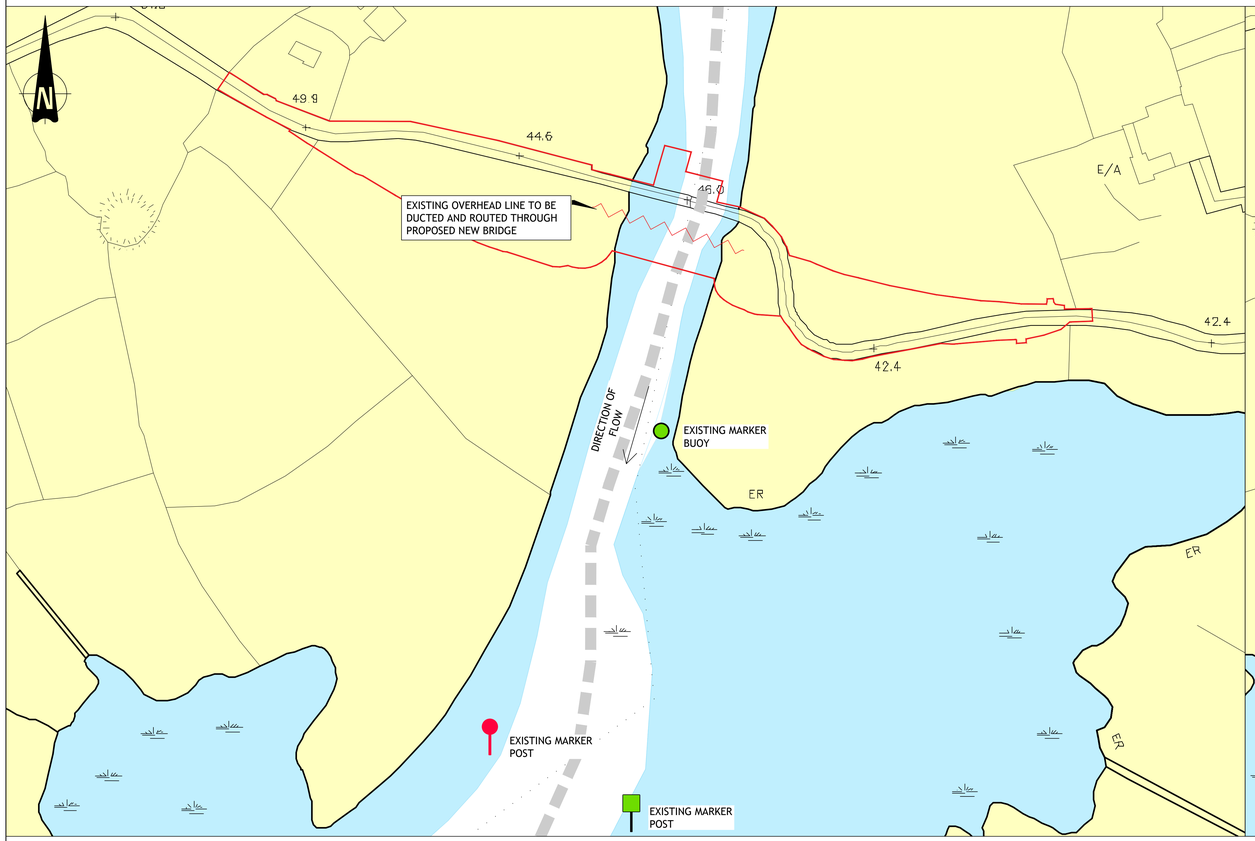
PROPOSED HARTLEY BRIDGE SHOWING PROPOSED NAVIGATION CLEARANCE (IN YELLOW)

Scale: 1/100



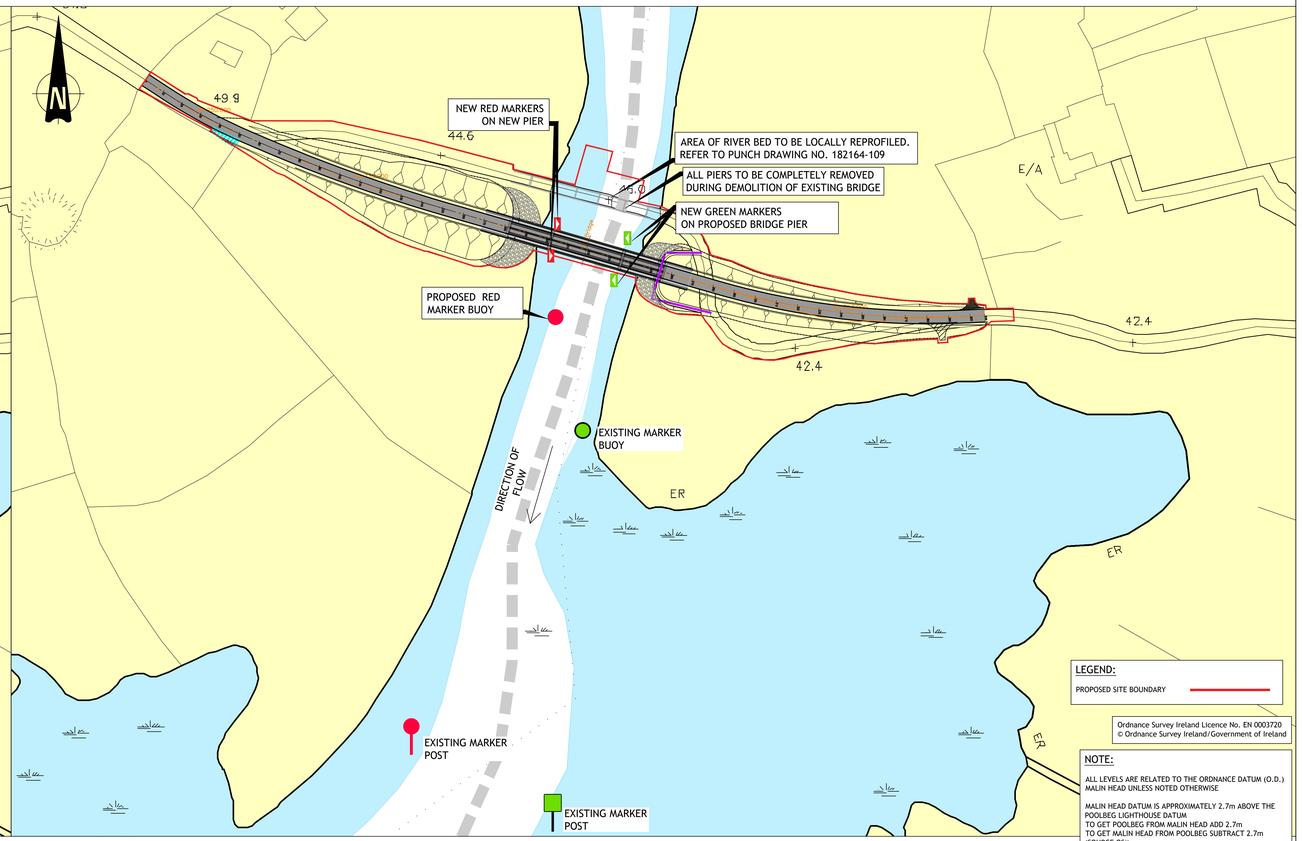
EXISTING HARTLEY BRIDGE SHOWING EXISTING NAVIGATION CLEARANCE (IN ORANGE)

Scale: 1/100



EXISTING HARTLEY BRIDGE NAVIGATION MARKS

SCALE 1:1000



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(SOURCE OSi)

ALL WATER LEVELS TO BE CONFIRMED WITH WATERWAYS
IRELAND

PROPOSED HARTLEY BRIDGE NAVIGATION MARKS

SCALE 1:1000

Figure 2-3

COLOUR DRAWING ☒

Date Drawn:	September 2020
Drawn By:	S Buckley
Date Issued:	
Issued By:	

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Scale @ A0:	As Shown
Technician Check:	S Buckley
Engineer Check:	J Roche
Approved:	
Drawing No:	182-164-108
Rev:	PL0

2.4 Overview of the Proposed Construction Methodology

2.4.1 Introduction

An experienced main contractor will be appointed for the proposed works. The appointed contractor for the works will be required to comply with this CEMP. An overview of the proposed Construction Methodologies is provided below.

2.4.2 Overview of Construction Works Methodology

The proposed anticipated construction works methodology for the replacement Hartley Bridge is summarised under the following main headings:

1. Mobilisation and Enabling Works
2. Raised Embankments on Approaches to Abutments Phase 1
3. Piled River Crossing Foundations for Piers and Abutments
4. Cast in-situ River Crossing Abutment Walls, Wing Walls and Pier Walls
5. Installation of Precast W Beams for Centre Span and Side Spans.
6. Cast in-situ River Crossing Bridge Deck
7. Cast in-situ River Crossing Diaphragms
8. Installation of Precast Parapet Upstands and Metal Parapets on Bridge Deck and Wing Walls
9. Raised Embankments on Approaches to Abutments – Phase 2
10. Completion of Roadway and Safety Barriers
11. Completion Works
12. Demobilisation

Elevation and plan views of the proposed bridge design are provided in Figure 2-4.

2.4.2.1 Mobilisation and Enabling Works

Temporary construction compounds, laybys and enabling works will be constructed as follows:

- Prior to the outset of works erect a silt fence along both sides of the river channel to prevent run-off entering the river. This will comprise wooden posts and geotextile membrane buried in an 'L' shape to a minimum depth of 250mm. The silt fence will act in filtering any potential surface water run-off from the site generated during the proposed works.
- Fence off the proposed works area with temporary fencing, no works will be undertaken outside of the fenced area.
- Clearly mark/identify access routes. Access during construction to any working areas will be restricted to land within the outlined works area.
- Install silt fencing alongside the works area where required as a water quality protective measure.
- Construct compound/layby area near the road above flood level on both sides of the River Shannon.
- On approach to bridge 25m out from abutment wall excavate material to 1.5m above formation level.
- Compact exposed ground.
- Build 500mm stone platform 5m to front (river side), 10m to sides and 15m to back of abutment wall location.
- Connect compound to stone platform with compacted stone access strip for site traffic and lifting machinery.

2.4.2.2 Raised Embankments Approaches to Abutments Phase 1

Embankments required to facilitate heavy plant use near the riverbank will be constructed as follows in Phase 1.

- Topsoil and weak material will be removed as far as solid ground. All waste material will be reused, recycled or removed to a licenced waste facility as appropriate.
- Compact exposed ground.
- Place CL.6N1 fill and compact in 250mm layers until within 500mm of proposed finished road level. When 25m from abutment wall, ramp top of embankment down to the top of the stone platform required to support heavy machinery and lifting equipment near the riverbank.

Embankment approaches to abutment walls will be constructed as follows in Phase 2.

- Complete approach embankments from road tie-ins to abutment walls with CL.6N1 fill, compacting in 250mm layers up to road sub-base level.
- Complete road sub-base, services, and footpaths up to movement joints on approaches.

2.4.2.3 Piled Reinforced Concrete Foundations for Piers and Abutments

Internal piling required to support the proposed bridge will be constructed as follows:

- A barge with piling rig will be used for the internal piers.
- Drive H-piles for pier.
- Drive sheet piles for cofferdam pier; top of cofferdam at +41.000 metres ordnance datum (mOD).
- Dewater cofferdam and excavate to formation level, installing waling beams as required.
- Keep cofferdam dry using pumps with appropriate silt bags attached; allow cofferdam to be inundated during a flood.
- Pump clean water from inside the cofferdam each morning in advance of the works proceeding. This will be pumped directly to the River Shannon.
- Pump any dirty water that requires pumping to dry ground over 30m from the river via a silt bag, this will filter any sediment that remains. Enclose the discharge area with a perimeter of silt fencing.
- Monitor the point of discharge and the silt bag and silt fencing and move as necessary to avoid erosion of the ground and potential sediment run-off occurring. Excavate cofferdam and prepare pile heads.
- Substrate at base of cofferdam will be compacted and 175-200mm blinding concrete placed to formation level @ +37.900 mOD.
- Place spacers, reinforcement cage, shutter and pour 1250mm deep pile cap with wall starters.
- When pilecap has cured, strike shutter and backfill with stone to 150mm below top of pile cap at +39.000 mOD to create working platform.
- Pour concrete in stages along the 10m section of the pier and allow to set before proceeding to the next layer of concrete. Continue until the pier reaches the finished height of 8m (beneath bridge deck).
- Install gabions at the base of the pier along its entire length for additional support as described in Stage 11.

Plate 2-1 Example of concrete pour across river to piled cofferdam

Abutment piling required to support the proposed bridge will be constructed as follows:

- A mobile piling rig will be used for the abutments.
- Drive H-piles for abutment.
- Drive sheet pile cofferdam for abutment; top of cofferdam at +41.000 mOD.
- Dewater cofferdam and excavate to 100mm below formation level, installing waling beams as required.
- Keep cofferdam dry using pump with appropriate silt bags attachments; allow cofferdam to be inundated during a flood.
- Excavate cofferdam and prepare pile heads.
- Substrate at the base of the cofferdam will be compacted and 75-100mm concrete blinding will be placed to formation level @ +38.540 mOD.
- Place spacers, reinforcement cage, shutter and pour 1000mm deep pile cap with 150mm kicker and wall starters for abutment and wing walls.
- When pile cap has cured, strike shutter and paint buried faces with waterproof epoxy paint.
- Backfill with stone to top of foundation at 39.540 mOD (150mm below top of wall kicker).

2.4.2.4 Cast in-situ RC Abutment Walls, Wing Walls & Pier Walls

Abutment and wing walls will be constructed as follows:

- Slip-form reinforced concrete (RC) abutment walls and wing walls from kicker up to beam bearing level.
- When concrete walls have cured, strike shutters and paint buried surfaces with waterproof epoxy paint.
- Backfill above foundation behind abutment and wing walls to 150mm below top of concrete with CL.6N1 fill.
- Construct reinforcement cages for RC end diaphragms on land side of short-span W-Beams.

Pier walls will be constructed as follows:

- Slip-form RC pier walls from top of pile cap up to beam bearing level.
- Construct reinforcement cages for inner sections of RC pier diaphragms between adjacent spans.

2.4.2.5 Installation of Precast W-Beams for Centre Span & Side Spans

12 no. precast W-Beams will be installed as centre and side spans as follows:

- A lorry and barge will be used to transport the 4 no. 33.5m long, 75.3 tonne centre span W-Beams to site.
- A pair of 200 tonne high reach mobile cranes, one on each side of the river, on the stone platforms, will be used to lift these beams into position using a tandem lift.
- A lorry will be used to transport the 8 no. 19.65m long, 44.2 tonne side span W-Beams to site, 4 no. to each side (east and west).
- The 200 tonne mobile cranes will then be used independently to lift these beams into position.
- Cantilever falsework with edge protection will be fixed to the outside of the edge W-Beams prior to lifting.

2.4.2.6 Cast in-situ River Crossing Bridge Deck

The river crossing bridge decks will be constructed as follows:

- Place permanent glass fibre reinforced concrete (GRC) formwork between webs of W-Beams.
- Fix shuttering on the cantilever falsework for deck cantilever slab.
- Place deck rebar and pour 275mm thick slab from centre of span up to diaphragm construction joints.
- Commence with the central span.
- Concrete joints will be formed with grout checks.

2.4.2.7 Cast in-situ River Crossing Diaphragms

The river crossing bridge abutment diaphragms will be constructed as follows:

- Tie rebar for outer diaphragm rebar (between and inside webs of W-Beams) to end diaphragm rebar.
- Cast the abutment diaphragm and upper section of the two wing walls in one consistent pour from beam bearing level up to top of slab level.

The river crossing bridge pier diaphragms will be constructed as follows:

- Tie rebar for outer diaphragm rebar (between & inside webs of W-Beams) to inner diaphragm rebar.
- Cast the pier diaphragm from beam bearing level up to top of slab level.

2.4.2.8 Installation of Precast Parapet Upstands and Metal Parapets on Bridge Deck & Wing Walls

Precast parapet upstands and metal parapets will be constructed as follows:

- Once the deck slab, diaphragms and wing walls have cured, install 3m lengths of precast parapet upstands.
- Tie projecting rebar from upstands to stitch rebar in deck slab and wing walls, seal joints and cast RC stitches.
- When RC stitches have cured, bolt metal parapets to cast-in cradles in precast RC upstands.

2.4.2.9 Raised Embankments Approaches to Abutments - Phase 2

Embankment approaches to abutment walls will be constructed as follows in Phase 2:

- Complete approach embankments from road tie-ins to abutment walls with CL.6N1 fill, compacting in 250mm layers up to road sub-base level.
- Complete road sub-base, services, and footpaths up to movement joints on approaches.

2.4.2.10 Completion of Roadway

Roadway works will be constructed as follows:

- Apply bridge deck waterproofing, place service ducts, kerb drains, concrete footpaths up to movement joints.
- Lay road surfacing on bridge deck up to movement joints at abutment walls.
- Lay road surfacing on approach embankments from road tie-ins up to movement joints at abutment walls.
- Construct road safety barriers, end terminals and parapet transitions.
- Complete movement joints.

2.4.2.11 Completion Works

Finishing works will be carried out as follows:

- Remove all sheet piling.
- Place pier gabions, rock armour and backfill.
- Complete landscaping and paving.

2.4.2.12 Demobilisation

Reinstatement after completion of works will be carried out using the follow methodology:

- Demobilise both compounds and layby areas and make good.
- Upon completion of the proposed works the temporary construction compounds and laybys will be decommissioned by backfilling the area with the material arising during excavation, landscaping with topsoil as required.

NOTE:

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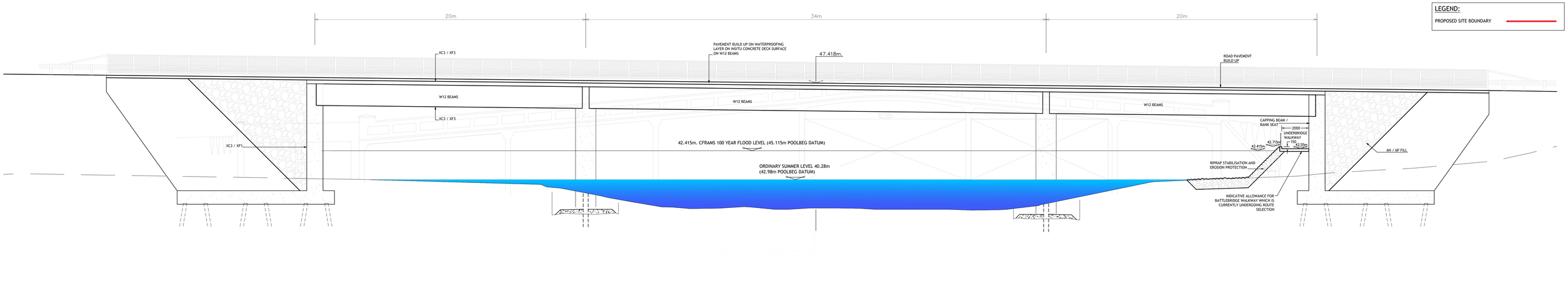
ALL WATER LEVELS TO BE CONFIRMED WITH WATERWAYS IRELAND

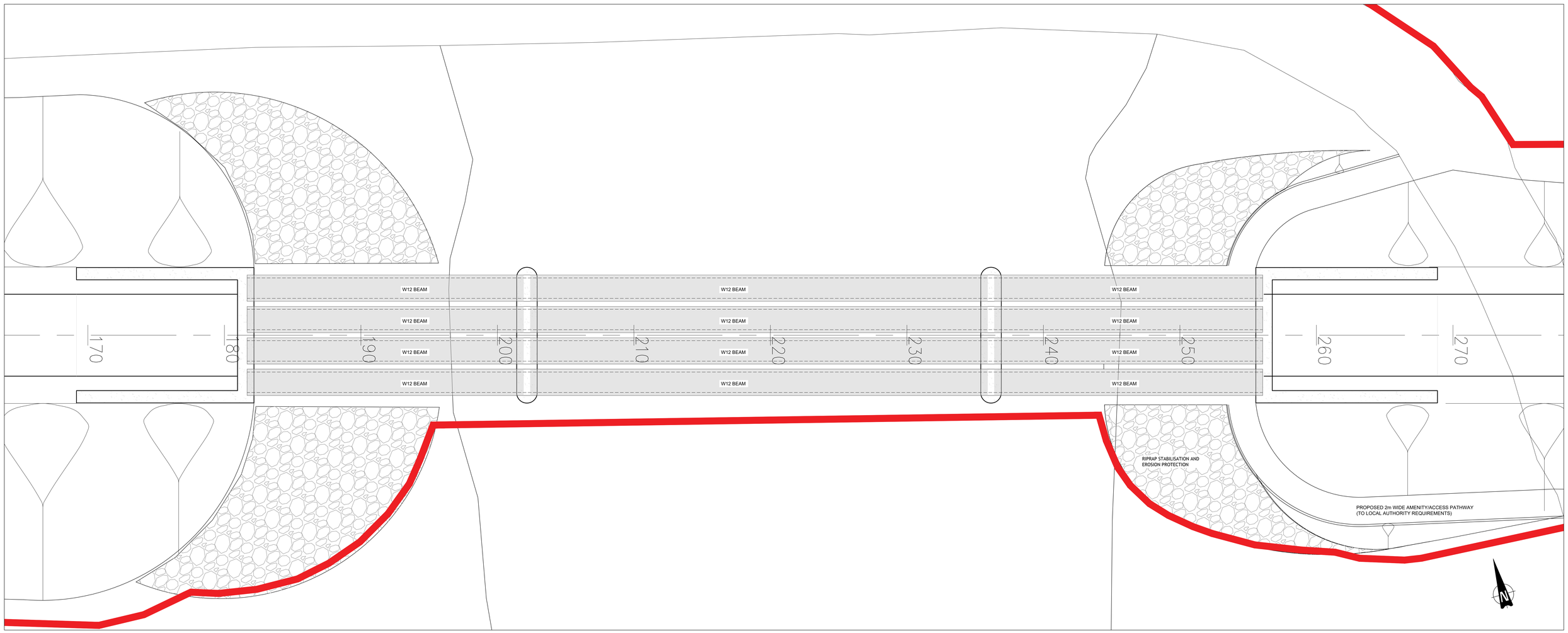
LEGEND:

PROPOSED SITE BOUNDARY



PROPOSED BRIDGE - SECTIONAL ELEVATION

1:100



PROPOSED BRIDGE - SECTIONAL PLAN

1:100

Figure 2-4

COLOUR DRAWING ☒

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Drawn By: S Buckley
Date Issued:
Issued By:

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Job: HARTLEY BRIDGE REPLACEMENT
Title: SECTION PLAN AND ELEVATIONS

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Stage: PLANNING
Scale @ A0: 1:100
Technician Check: S Buckley
Engineer Check: J Roche
Approved:
Drawing No: 182-164-104 Rev: PL0

2.4.3 Overview of Demolition Works Methodology

The proposed demolition of the existing Hartley Bridge will be completed in eight stages summarised under the following main headings:

1. Demolition of Span 4 of Main 6-Span Bridge with Barge-Based Crash Deck.
2. Demolition of Span 5 of Main 6-Span Bridge with Barge-Based Crash Deck.
3. Demolition of Span 3 of Main 6-Span Bridge with Barge-Based Crash Deck.
4. Demolition of Span 2 of Main 6-Span Bridge with Barge-Based Crash Deck.
5. Demolition of Span 6 of Main 6-Span Bridge with Land-Based Crash Deck.
6. Demolition of Span 1 of Main 6-Span Bridge with Land-Based Crash Deck.
7. Demolition of Span W2 of 2-Span Run-On Bridge with Land-Based Crash Deck.
8. Demolition of Span W1 of 2-Span Run-On Bridge with Land-Based Crash Deck.

The proposed stages of demolition are detailed in Figure 2-5.

2.4.3.1 Stage 1 - Demolition of Span 4 of Main 6-Span Bridge with Barge-Based Crash Deck

- A line of circular hollow section (CHS) piles will be driven from barge upstream of Span 4 of the main bridge.
- A barge platform with crash deck (to catch falling debris) and float under Span 4 of the main bridge.
- A line of CHS piles will be driven from a barge downstream of Span 4 of the main bridge.
- A barge platform will be fixed around piles allowing it to float in times of flood.
- A temporary steelwork bracing will be provided to adjacent Spans 3 and 5 supporting lightweight machinery.
- Edge protection and debris tarpaulins will be fixed around edges of crash deck.
- The platform will be jacked up from the piles above water level in the river.
- Parapet upstands will be saw-cut in 1m lengths.
- Working from both sides of Span 4, lightweight machinery will be used to:
    - knock parapet upstands inwards; recover debris directly as far as possible.
    - break out road build-up and slab spanning between cross-beams; recover debris directly as far as possible.
    - break out cross-beams; recover debris directly as far as possible.
    - break out longitudinal beams; recover debris directly as far as possible.
- The crash deck will be cleared to the awaiting barge and demolition waste brought ashore.

2.4.3.2 Stage 2 – Demolition of Span 5 of Main 6-Span Bridge with Barge-Based Crash Deck

- Repeat for Span 5, working from Span 6.
- Temporary steelwork bracing will be provided adjacent to Span 6.

2.4.3.3 Stage 3 – Demolition of Span 3 of Main 6-Span Bridge with Barge-Based Crash Deck

- Repeat for Span 3, working from Span 2.
- Temporary steelwork bracing will be provided adjacent to Span 2.

2.4.3.4 Stage 4 – Demolition of Span 2 of Main 6-Span Bridge with Barge-Based Crash Deck

- Repeat for Span 2, working from Span 1.
- Temporary steelwork bracing will be provided adjacent to Span 1.

2.4.3.5 Stage 5 – Demolition of Span 6 of Main 6-Span Bridge with Land-Based Crash Deck

- For Span 6, a crash deck will be constructed off two lines of temporary piles driven from the riverbank.
- Demolition works will be conducted from behind the East Abutment.

2.4.3.6 Stage 6 – Demolition of Span 1 of Main 6-Span Bridge with Land-Based Crash Deck

- For Span 1, a crash deck will be constructed off two lines of temporary piles driven from the riverbank.
- Demolition works will be conducted from Span W2 of West Abutment run-on bridge.
- Temporary steelwork bracing will be provided at Span W2 of West Abutment run-on bridge.

2.4.3.7 Stage 7 – Demolition of Span W2 of 2-Span Run-On Bridge with Land-Based Crash Deck

- For Span W2, a crash deck will be constructed off two lines of temporary piles driven from the riverbank.
- Demolition works will be conducted from Span W1 of West Abutment run-on bridge.
- Temporary steelwork bracing will be provided at Span W1 of West Abutment run-on bridge.

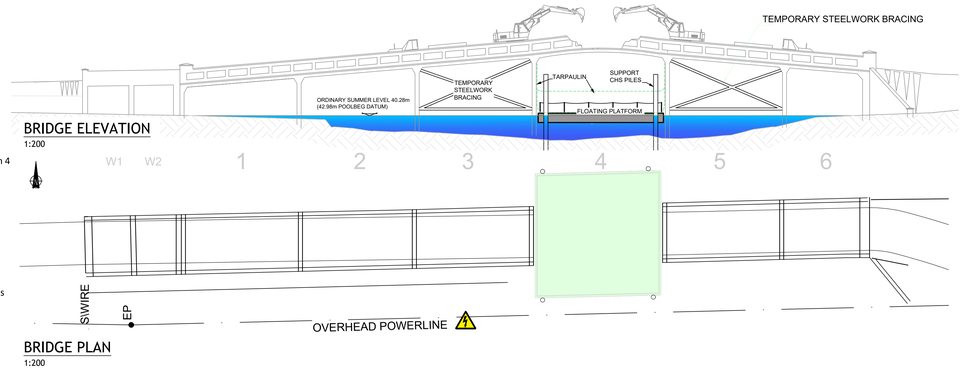
2.4.3.8 Stage 8 – Demolition of Span W1 of 2-Span Run-On Bridge with Land-Based Crash Deck

- For Span W1, a crash deck will be constructed off two lines of temporary piles driven from the riverbank.
- Demolition works will be conducted from behind the West Abutment.

STAGE 1

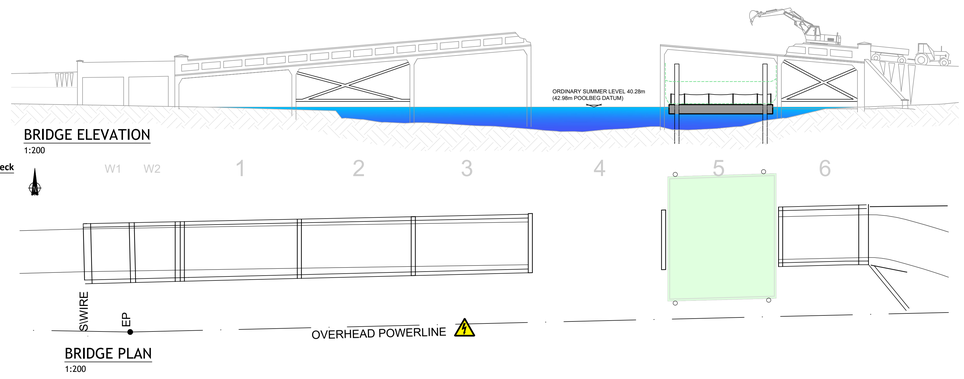
Stage 1 - Commence with Demolition of Span 4 of Main 6-Span Bridge with Barge-Based Crash Deck
Drive line of CHS piles from barge upstream of Span 4 of main bridge.
Build barge platform with crash deck (to catch falling debris) and float under Span 4 of main bridge.
Drive line of CHS piles from barge downstream of Span 4 of main bridge.
Fix barge platform around piles allowing it to float in times of flood.
Provide temporary steelwork bracing to adjacent Spans 3 and 5 supporting lightweight machinery.
Fix edge protection and debris tarpaulins around edges of crash deck.
Saw-cut parapet upstands in 1m lengths.
Working from both sides of Span 4, use lightweight machinery to:
- knock parapet upstands inwards; recover debris directly as far as possible.
- break out road build-up and slab spanning between cross-beams; recover debris directly as far as possible.
- break out cross-beams; recover debris directly as far as possible.
- break out longitudinal beams; recover debris directly as far as possible.

Clear crash deck to awaiting barge and bring demolition waste ashore.



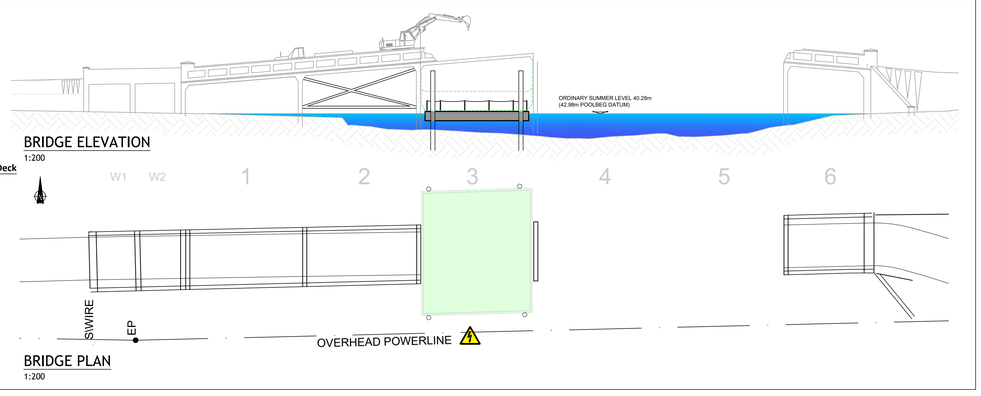
STAGE 2

Stage 2 - Demolition of Span 5 of Main 6-Span Bridge with Barge-Based Crash Deck
Repeat for Span 5, working from Span 6.
Provide temporary steelwork bracing to adjacent Span 6.



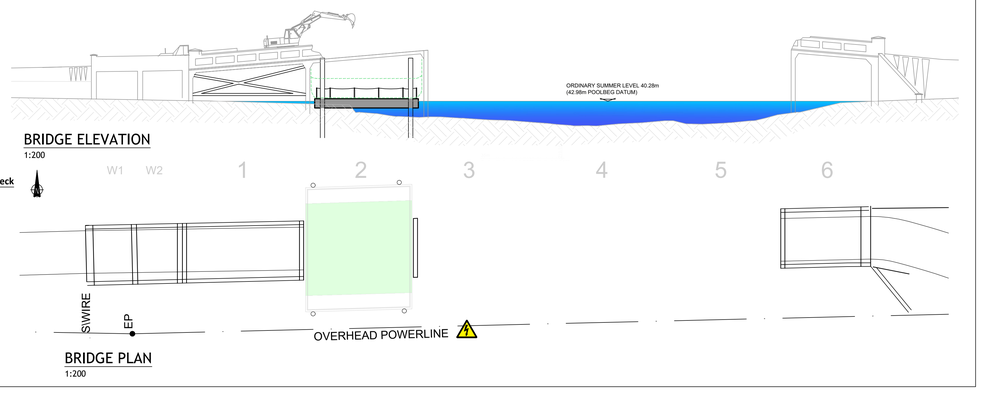
STAGE 3

Stage 3 - Demolition of Span 3 of Main 6-Span Bridge with Barge-Based Crash Deck
Repeat for Span 3, working from Span 2.
Provide temporary steelwork bracing to adjacent Span 2.



STAGE 4

Stage 4 - Demolition of Span 2 of Main 6-Span Bridge with Barge-Based Crash Deck
Repeat for Span 2, working from Span 1.
Provide temporary steelwork bracing to adjacent Span 1.



NOTE:

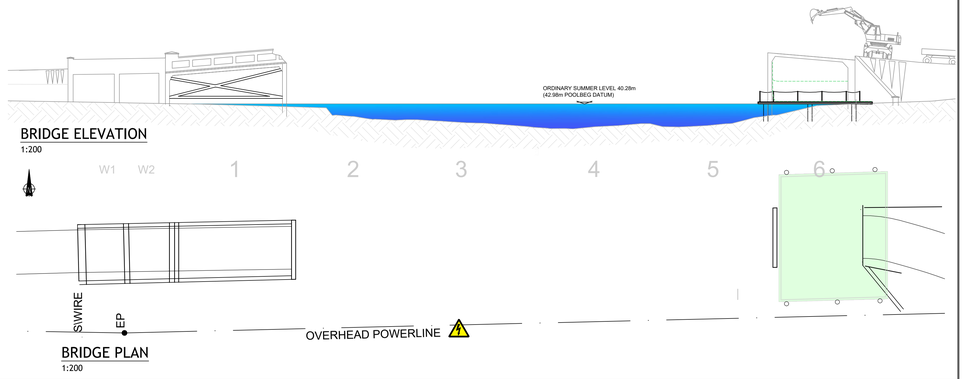
ALL LEVELS ARE RELATED TO THE ORDNANCE DATUM (O.D.) MALIN HEAD UNLESS NOTED OTHERWISE

MALIN HEAD DATUM IS APPROXIMATELY 2.7m ABOVE THE POOLBEG LIGHTHOUSE DATUM
TO GET POOLBEG FROM MALIN HEAD ADD 2.7m
TO GET MALIN HEAD FROM POOLBEG SUBTRACT 2.7m
(SOURCE OSi)

ALL WATER LEVELS TO BE CONFIRMED WITH WATERWAYS IRELAND

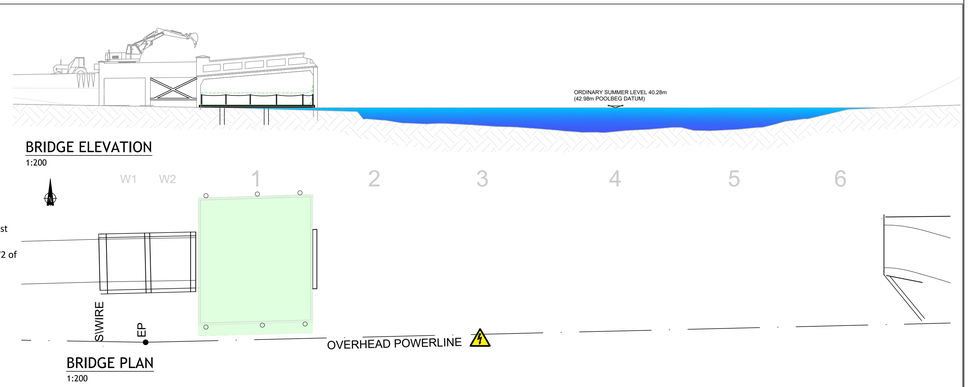
STAGE 5

Stage 5 - Demolition of Span 6 of Main 6-Span Bridge with Land-Based Crash Deck
For Span 6, construct crash deck off 2 lines of temporary piles driven from riverbank.
Conduct demolition works from behind East Abutment.



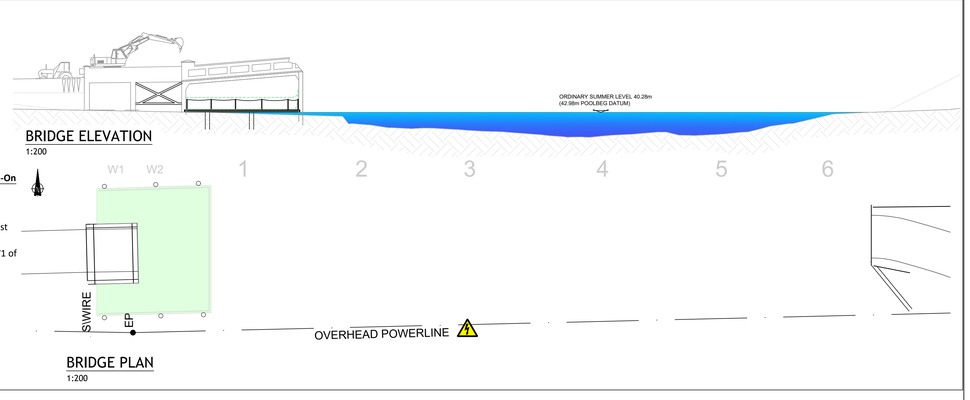
STAGE 6

Stage 6 - Demolition of Span 1 of Main 6-Span Bridge with Land-Based Crash Deck
For Span 1, construct crash deck off 2 lines of temporary piles driven from riverbank.
Conduct demolition works from Span W2 of West Abutment run-on bridge.
Provide temporary steelwork bracing to Span W2 of West Abutment run-on bridge.



STAGE 7

Stage 7 - Demolition of Span W2 of 2-Span Run-On Bridge with Land-Based Crash Deck
For Span W2, construct crash deck off 2 lines of temporary piles driven from riverbank.
Conduct demolition works from Span W1 of West Abutment run-on bridge.
Provide temporary steelwork bracing to Span W1 of West Abutment run-on bridge.



STAGE 8

Stage 8 - Demolition of Span W1 of 2-Span Run-On Bridge with Land-Based Crash Deck
For Span W1, construct crash deck off 2 lines of temporary piles driven from riverbank.
Conduct demolition works from behind West Abutment.

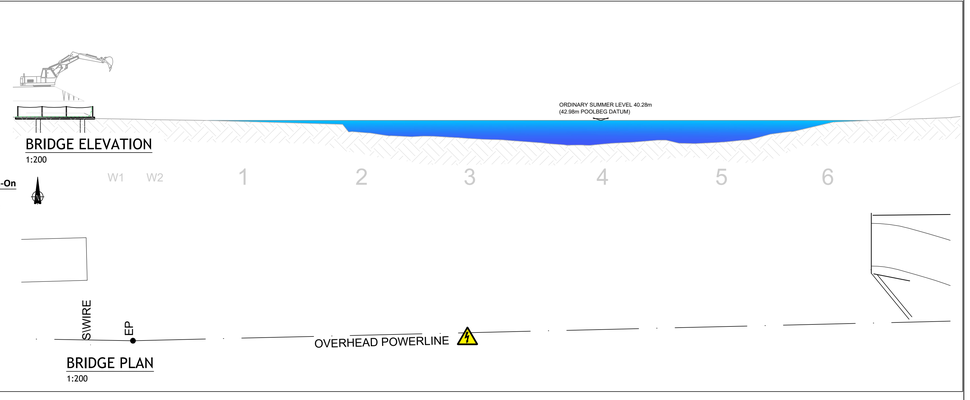


Figure 2-5

COLOUR DRAWING ☒

Date Drawn:	September 2020
Drawn By:	S Buckley
Date Issued:	
Issued By:	

Rev	Amendment	By	Date	Rev	Amendment	By	Date
PL0	ISSUED FOR PLANNING	IBS	2021/09/10				

Client: Comhairle Chontae Liatroma Leitrim County Council

Job: HARTLEY BRIDGE REPLACEMENT
Title: EXISTING BRIDGE DEMOLITION STAGES

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Stage:	PLANNING
Scale @ A0:	1:200
Technician Check:	S Buckley
Engineer Check:	J Roche
Approved:	
Drawing No:	182-164-107
Rev:	PL0

2.4.4 Road Construction

The road realignment works on approach to the bridge comprise approximately 135m on the western bank and 110m on the eastern bank. It should be noted that the western bank is located within the Roscommon County border and the eastern bank within the Leitrim County border. These will be referred to as the western and eastern banks.

Road construction will be as per the following sequence:

- Temporary swales will be constructed outside the extents of the proposed embankments to direct surface water run-off during the construction period to temporary soak-pits.
- Topsoil will be stripped to satisfactory formation level and a suitable geotextile membrane will be placed on the base.
- Selected fill material will be imported with placement to new embankments and compaction in layers not in excess of 300mm. The sequence will be repeated until required design levels are achieved.
- The construction of a new surface water drainage system will be carried out.
- A new Tarmac road surfacing will be laid.
- After works have been completed, the temporary drainage will be removed followed by landscaping of embankments and area within the site boundary.

2.4.5 In-stream Works

As outlined in the methodologies above, in-stream works will be required to complete the new bridge construction and existing bridge demolition phases of the project.

The in-stream works methodology are summarised as follows:

- Clean stone will be imported to provide a solid working area on the bank
- All topsoil will be stripped from the worksite and either stockpiled for re-use or removed from the site entirely by a licensed waste contractor.
- Water quality shall be visually monitored on a regular basis by the Site Manager for the duration of the works.

The in-stream works at Hartley Bridge will be undertaken in line with the Inland Fisheries Ireland (IFI) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters* (2016). This document sets out issues of concern in terms of construction impacts and their prevention. It also provides guidance on timing of works which will be agreed with IFI prior to commencement. IFI will be notified prior to these works commencing and relevant method statements submitted for review.

All works (including in-stream activities) will also be undertaken in line with Transport Infrastructure Ireland (TII) (formerly the National Roads Authority (NRA)) guidance, specifically; *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes* (NRA, 2008).

Works will involve the driving of piles into the riverbed which will be undertaken from both the riverbank and from a barge. Subsequent placement of the cantilevered section will be via bankside and pontoon mounted machinery. Demolition of the existing bridge will be carried out by working from a barge.

Works are proposed to take place in the riverbed with disturbance of sediments expected. Limited sediment excavation may be required around the pier foundations. There has been no history of

industrial activity within the vicinity and sediments are not expected to be contaminated. Prior to removal of any sediments from the river they will however be subject to environmental sampling and analysis to confirm the absence of contaminants and the most suitable recovery/disposal route.

Excavated sediments will be removed from the site by a qualified contractor for dewatering and recovery/disposal. No earthworks/disturbance to the banks of the river shall occur other than the minimum works necessary to be undertaken to facilitate construction of the cantilever structure.

- Prior to in-stream piling works a cofferdam will be placed to contain sediment and other material generated during piling. Coffer dams will be installed using sheet piles where piers are to be constructed to create a dry working area. The sheet piles will be installed by a drill rig working from a barge.
- Where silt or sediment is evident within the waters being pumped from the cofferdam, the water will be pumped through a silt bag with the filtered water discharged back to the watercourse.
- The silt bag will allow the water to flow through the geotextile fabric, trapping fine silt and sediment, preventing it from entering the watercourse. Formwork will be constructed with an adequate capacity and additional freeboard to prevent any spillage.
- During demolition the bridge deck will be removed by working from a barge. The waste material from the demolished bridge will be collected on the barge and removed to the site compound prior to disposal to a licenced waste facility.
- Potential impacts caused by fuel spillages etc. during the construction phase will be reduced by keeping spill kits and other appropriate equipment (e.g. floating absorbent oil boom, floating absorbent mats and silt curtains) on the workboat.
- Fuels, oils, greases and hydraulic fluids will be stored in a bunded compound at least 50m from watercourses.

2.4.6 Works at Span 4-5

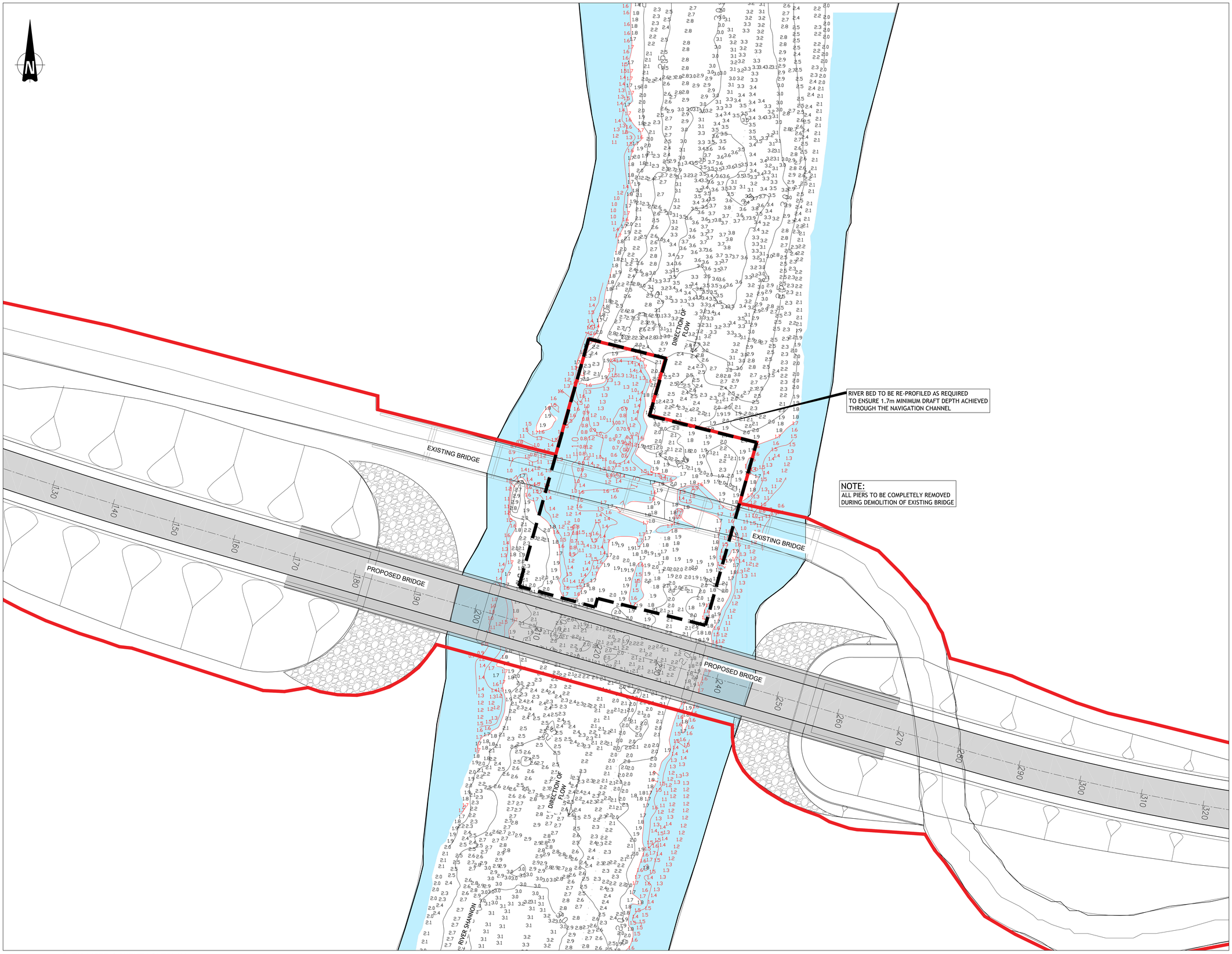
A bathymetric survey was carried out by Hydrographic Surveys Ltd. in September and October 2020. This survey identified a raised area of riverbed between Spans 2 and 5 of the existing bridge to be demolished. Minimal levelling works are required at this location to allow for safe navigation at this point on the river.

These works will be carried out by a mini-excavator working from a barge. The riverbed will be levelled by minor digging works with no requirement for dredging. Material removed will be disposed of to the barge and subsequently to a designated waste facility or re-used on-site as appropriate. All existing bridge piers will require complete removal in this section to facilitate navigation of the channel to the requirements of Waterways Ireland. The removal of piers and localised dredging of the riverbed will facilitate a wider navigation channel to operate between piers of the new proposed bridge.

The bathymetric survey showing the area to be reprofiled is provided in Figure 2-6.

2.4.7 Overhead Line

There is an overhead line which will be moved as part of the proposed works. This line will be moved underground and incorporated as part of the new bridge deck design as detailed in Figure 2-7.



BATHYMETRIC SURVEY OVERLAY
1:200

SURVEY NOTES:

1. SURVEYED IN IRISH TRANSVERSE MERCATOR.
2. HORIZONTAL CONTROL BY RTK GPS.
3. SOUNDINGS IN METRES AND DECIMETRES REDUCED TO LOCAL ORDINARY SUMMER LEVEL (OSL). OSL TAKEN AS 42.98 OD POOLBEG / 40.28 OD MALIN (OSGM15).
4. DEPTHS GIVEN AS POSITIVE BELOW DATUM.
5. GRID SPACING 50m.

BATHYMETRIC SURVEY CARRIED OUT BY HYDROGRAPHIC SURVEYS LTD.
(From Dwg: PH20022_001 - Rev.01 - Survey date: 23/09/2020)

IMPORTANT NOTE:

ADDITIONAL POST-WORKS BATHYMETRIC SURVEY TO BE CARRIED OUT AND THE AS-BUILT RESULTS SUPPLIED TO WATERWAYS IRELAND.

LEGEND:

1.2 DENOTES RIVER BED LEVELS LESS THAN 1.7m DEPTH RELATIVE TO ORDINARY SUMMER LEVEL (OSL)

OSL TAKEN AS 42.98 OD POOLBEG / 40.28 OD MALIN (OSGM15).

PROPOSED SITE BOUNDARY

RIVER BED RE-PROFILING MATERIAL QUANTITIES:

AFFECTED AREA OF RIVER BED: 487.20 m^2

VOLUME OF RIVER BED MATERIAL REMOVED: 149.20 m^3

Figure 2-6

COLOUR DRAWING ☒

Date Drawn:	October 2020
Drawn By:	S Buckley
Date Issued:	
Issued By:	

Rev	Amendment	By	Date	Rev	Amendment	By	Date
PL0	ISSUED FOR PLANNING	IBS	2021/09/10				

Client: Comhairle Chontae Liatroma / Leitrim County Council

Job: HARTLEY BRIDGE REPLACEMENT
Title: BATHYMETRIC SURVEY OVERLAY

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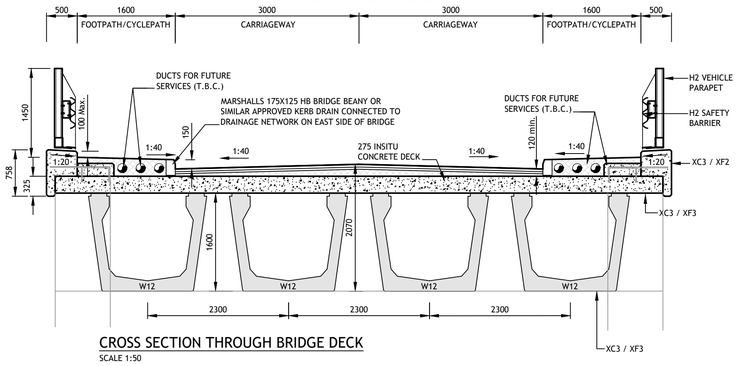
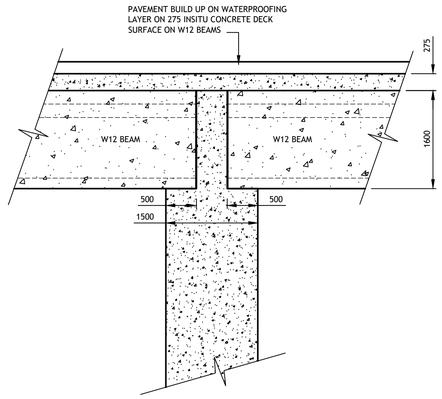
Stage:	PLANNING
Scale @ A0:	1:200
Technician Check:	S Buckley
Engineer Check:	J Roche
Approved:	
Drawing No:	182-164-109
Rev:	PL0

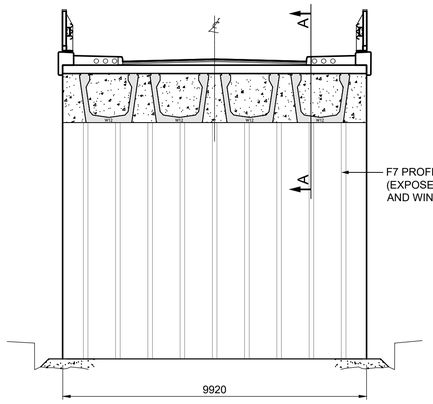
PAVEMENT BUILDUP:
120mm SURFACING:-
45mm HRA WEARING COURSE
55MM DBM BASE COURSE
ON REGULATING COURSE
ON 20mm PROTECTIVE LAYER



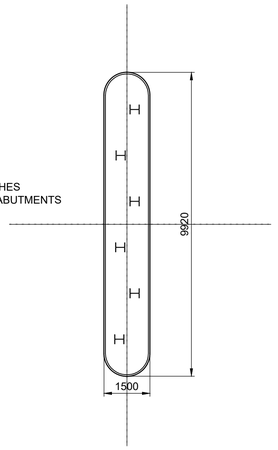
CROSS SECTION THROUGH BRIDGE DECK
SCALE 1:50



SECTION A-A
SCALE 1:50



PIER ELEVATION
SCALE 1:100



PIER - SECTIONAL PLAN
SCALE 1:100

NOTES:
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.

2. ALL LEVELS ARE SHOWN IN METRES ABOVE ORDNANCE DATUM.

3. ALL EXPOSED ARRISES TO HAVE A 25x25 CHAMFER

4. DETAILS

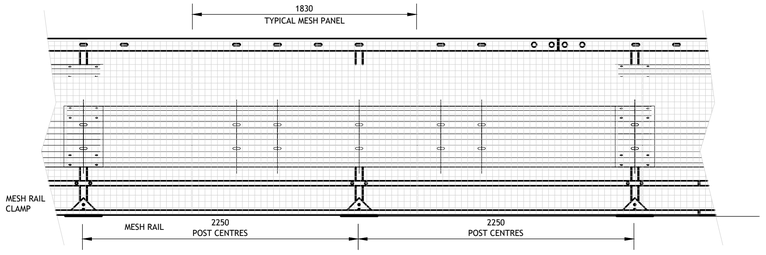
FINISHES:

BURIED UNFORMED SURFACES	- U1
EXPOSED UNFORMED SURFACES (EXCLUDING AREAS TO RECEIVE WATERPROOFING)	- U3
BURIED SURFACES	- F1
END SUPPORTS (ABUTMENTS)	- F4
CHEEK WALLS/WINGWALLS/FLYWALLS	- F4
PARAPET EDGE BEAMS	- F3/U3
PRECAST BEAMS	- F4
AREA OF DECK TO BE WATERPROOFED	- U4
DECK CANTILEVER	- F4

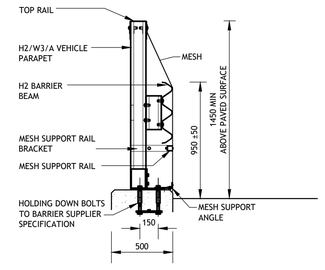
MATERIALS:

INSITU DECK CONCRETE	- GRADE C40/50
CONCRETE FOR BLINDING	- GRADE ST1
PRECAST PRESTRESSED CONCRETE	- GRADE C52/65
PARAPET UPSTAND	- GRADE C40/50
SUBSTRUCTURE CONCRETE ABOVE BASE LEVEL INCLUDING ABUTMENT	- GRADE C40/50
SUBSTRUCTURE CONCRETE BELOW GROUND	- GRADE C32/40
FOOTWAY/VERGE INFILL CONCRETE	- GRADE C25/30
CONCRETE WITHIN SPLASH ZONE	- GRADE C40/50 (INCLUDING 50% GGBFS)

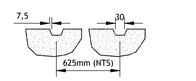
6NI/6PI STRUCTURAL BACKFILL TO BE SELECTED TO HAVE Ø PEAK <45°. SITE TESTING MUST BE CARRIED OUT ON THE BACKFILL MATERIAL TO VERIFY THAT THE SELECTED MATERIAL SATISFIES THIS REQUIREMENT.



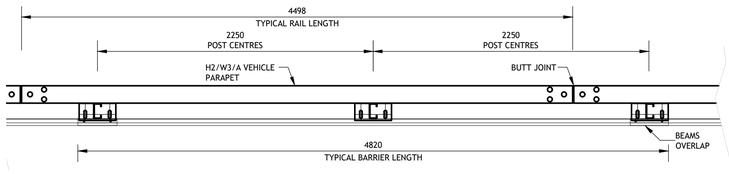
BRIDGE BARRIER PANEL ELEVATION
SCALE 1:25



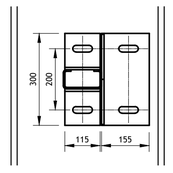
BRIDGE BARRIER CROSS SECTION
SCALE 1:25



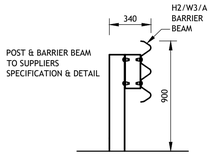
F7 CONCRETE FINISH DETAIL
SCALE 1:10



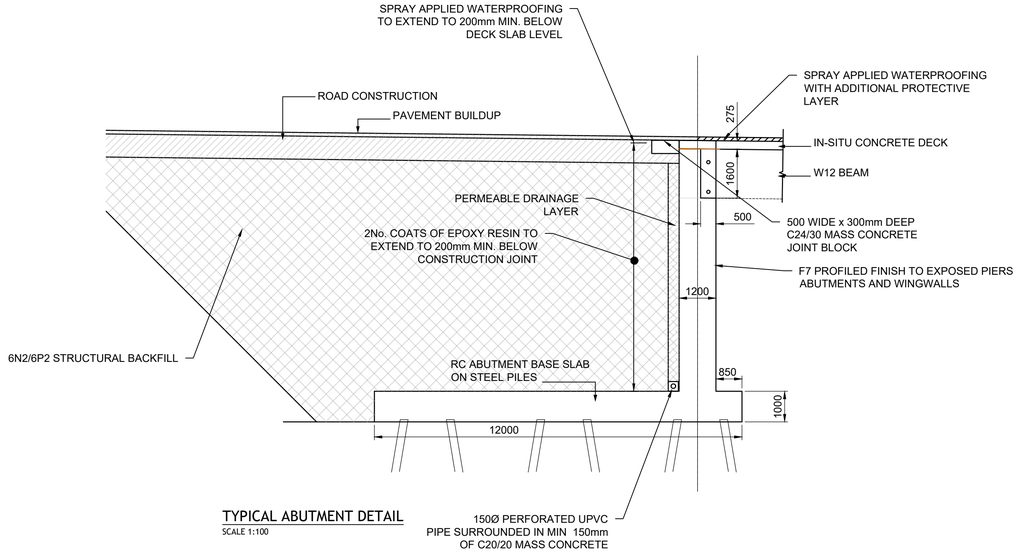
BRIDGE BARRIER PANEL PLAN
SCALE 1:25



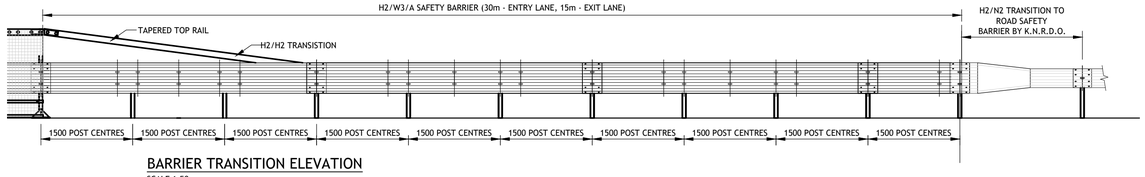
BARRIER POST BASE PLATE
SCALE 1:10



ROAD BARRIER CROSS SECTION
SCALE 1:25



TYPICAL ABUTMENT DETAIL
SCALE 1:100



BARRIER TRANSITION ELEVATION
SCALE 1:50

Figure 2-7

COLOUR DRAWING ☒

Date Drawn:	July 2020
Drawn By:	S Buckley
Date Issued:	
Issued By:	

bsi. BIM Verified Design & Construction Capital/Delivery PAS 1192-2

Rev	Amendment	By	Date
PL0	ISSUED FOR PLANNING	IBS	2021/09/10

Client: Comhairle Chontae Liatroma Leitrim County Council

Job: HARTLEY BRIDGE REPLACEMENT
Title: BRIDGE DETAILS

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Stage:	PLANNING
Scale @ A1:	As Shown
Technician Check:	S Buckley
Engineer Check:	J Roche
Approved:	
Drawing No:	182-164-105
Rev:	PL0

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

It is the responsibility of the appointed main contractor to implement an effective environmental management system and ensure the requirements as set out in the sections that follow are implemented in full.

The following sections provide a summary of the proposed site-specific measures and procedures for the implementation of an effective environmental management system.

3.2 Construction and Demolition Phase Drainage

During the construction and demolition phases of the project a surface water management plan will be developed by the appointed contractor to ensure that contaminated or silt laden surface water does not discharge from the site untreated. All discharges from land-based works areas will be via constructed temporary settlement ponds or 'Silt Away' units, with the outfall directed towards areas of natural vegetation at distance from the River Shannon. Silt bags will be placed on all outflow pipes and replaced at regular intervals where silt laden runoff is likely.

Where surface water is encountered during excavation works and found to contain silt and sediment, it will be managed by temporary treatment which will include a settlement process such as settlement ponds to treat and remove silt and sediment from the water. The treated water will be pumped to any area of the site where natural attenuation of the clean surface water can be achieved or discharge to the surface water system proposed as part of the development. There will be no direct discharge of surface water and any run-off will undergo the necessary settlement process as outlined. No routes of any natural drainage features will be altered as part of the development and associated new roadways. Drainage mitigation measures that may be employed during the construction and demolition phases of the project are further described below.

Particular emphasis will be placed on hazardous materials entering the surface water management system as well as spills or leaks of fuel or oils. The proposed management of cement products and fuel are outlined in Section 3.3 and 3.4 respectively. Section 6 provides an Emergency Response Plan for dealing with spillages which may result in adverse environmental effects. Section 8.2 provides an outline Schedule of Works Operation Record (SOWOR) to be implemented with agreement from the Main Contractor. The SOWOR will include a risk rating for each works element and a number of 'action required' or 'stop work' triggers.

3.2.1 Timing of Works

Timing of works can strongly influence the potential for damaging the freshwater environment. Traditionally, works undertaken during the drier summer months would result in less erosion and siltation. Furthermore, work will cease entirely near drains or watercourses if it is evident that water quality is being impacted. Additional to this:

- Works will be carried out during the period July 1st – September 30th, in line with Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016).
- IFI will be notified in good time prior to commencement of works and any recommendations made by them adhered to during the proposed works.
- An Otter pre-commencement survey will be conducted as per NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This will involve a search for all otter signs e.g. spraints, scat,

prints, slides, trails, couches and holts. A 10m riparian buffer (both banks) is considered to comprise part of the otter habitat (NPWS 2009).

3.2.2 Drainage Design Principles

Drainage water from any works areas of the site will not be directed directly to any natural watercourses within the site where possible. Two distinct methods will be employed to manage drainage water within the site. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt or sediment, to allow attenuation and settlement prior to controlled diffuse release.

Drainage mitigation measures are intended to maximise erosion control, which is more effective than having to control sediment during high rainfall. Such a system also requires less maintenance. The area of exposed ground will be minimised. The drainage measures will prevent runoff from entering the works areas of the site from adjacent ground, to minimise the volume of sediment-laden water that has to be managed. Discoloured run-off from any construction area will be isolated from natural, clean run-off.

Drainage design drawings for the proposed development are included in the bridge services detailed drawings in Figure 3-1.

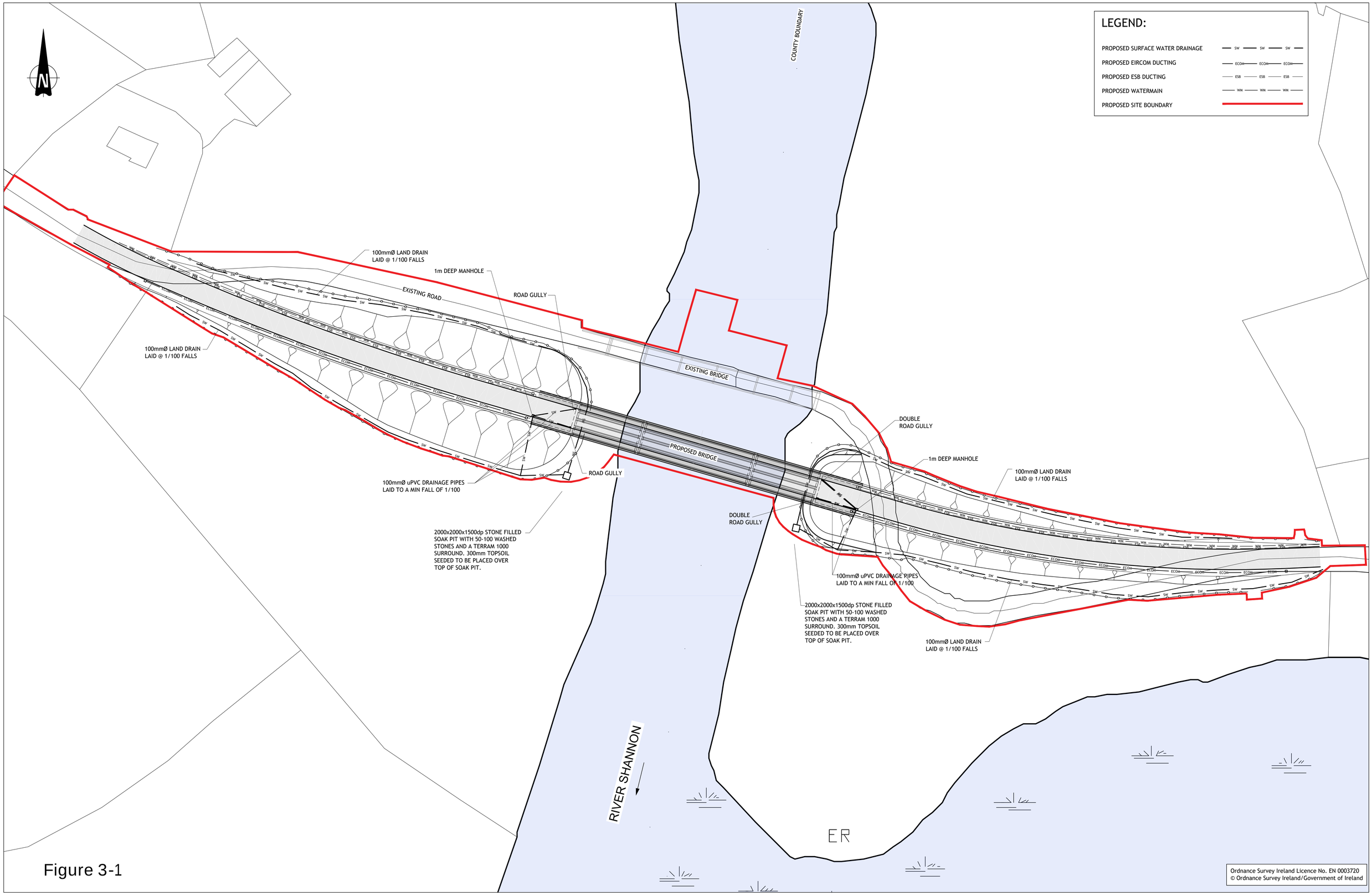

Figure 3-1

COLOUR DRAWING ☒

Date Drawn:	September 2020
Drawn By:	S Buckley
Date Issued:	
Issued By:	

Rev	Amendment	By	Date
PL0	ISSUED FOR PLANNING	IBS	2021/09/10

Client: Comhairle Chontae Liatroma Leitrim County Council

Job: HARTLEY BRIDGE REPLACEMENT

Title: PROPOSED BRIDGE SERVICES PLAN

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Stage:	PLANNING
Scale @ A1:	1:500
Technician Check:	S Buckley
Engineer Check:	J Roche
Approved:	
Drawing No:	182-164-208
Rev:	PL0

3.2.3 Surface Water Mitigation Measures

General pollution prevention measures will be adopted to prevent run-off occurring as a result of the proposed works, including:

- A site compound shall be established within the agricultural fields, a minimum of 50m from the water's edge. The compound shall be secured, and all construction materials shall be stored in this defined area.
- Prior to the outset of works a silt fence will be erected along both sides of the river channel to prevent run-off entering the river. This will comprise wooden posts and geotextile membrane buried in an 'L' shape to a minimum depth of 250mm. The silt fence will filter any potential surface water run-off from the site generated during the proposed works.
- The proposed works area will be fenced off with temporary fencing and no works will be undertaken outside of the fenced area.
- Access routes will be clearly marked / identified. Access during construction to any working areas will be restricted to land within the outlined works area.
- Silt fencing will be installed alongside the works area, as required, as a water quality protective measure.
- Check dams will be installed in the existing drains which are located immediately adjacent to the works.
- No refuelling of machinery or overnight parking of machinery is permitted in areas adjacent to on-site drainage infrastructure.
- Plant will travel slowly across bare ground at a maximum of 5 kilometres per hour (km/hr).
- Depending on the nature of the excavated material, the stockpiles of excavated materials will be sealed with a digger bucket to reduce the potential for sediment runoff. These areas will be surrounded with silt fencing to prevent pathways to sensitive receptors.
- Discharge of pumped water to ground will be via a silt bag which will filter remaining sediment from the pumped water. The entire discharge area from silt bags will be enclosed by a perimeter of silt fencing.
- The site will be continuously monitored by the Site Manager for signs of run-off such as silt in surrounding vegetation, and measures will be put in place to prevent this where necessary.
- Excavations will be carried out using a suitably sized excavator and, in all circumstances, excavation depths and volumes will be minimised.
- Whilst no significant excavations are proposed, should any ingress of water (ground or rain) require pumping out this will be done so as described above, or alternatively it will be pumped to a sealed clean tanker and removed from the site for appropriate treatment and discharge.
- Stockpiling of excavated material will be temporary and located in a clearly defined and demarcated area, a minimum of 50m from any watercourse. Stockpiles will be removed on a regular basis to avoid potential sediment-laden run-off escaping the site.
- Earthworks will take place during periods of low rainfall to reduce run-off and potential siltation of watercourses.
- As construction advances there may be a requirement to collect and treat surface water within the site. This will be completed using perimeter swales at low points around the construction areas, and if required water will be pumped from the swales into silt bags prior to overland discharge, allowing water to percolate naturally to ground or disperse by sheet flow into local drainage ditches.
- Good construction practices such as dust suppression on site roads, and regular plant maintenance will ensure minimal risk.
- The Construction Industry Research and Information Association (CIRIA) guidance document, Guidance on the Control and Management of Water Pollution from

Construction Sites (CIRIA, 2001) provides additional surface water protection measures to be considered throughout the construction and demolition phases.

3.2.3.1 Flood Risk

The proposed works are located within and adjacent to the River Shannon and thus subject to water level changes associated with the natural character of the river. The proposed works will be carried out between July to September inclusive in line with IFI (2016) Guidelines, therefore the works will be carried out during periods coinciding with (typically) the driest period of weather.

As a precaution the site compound will be located a minimum distance of 50m from the water's edge. outside of areas mapped as potentially having an Annual Exceedance Probability (AEP) of 0.1%, 1% or 10% as mapped on the OPW CFRAM maps (https://www.floodinfo.ie/map/floodmaps/). The compound shall be secured and all construction materials shall be stored in this defined area. Weather conditions will be monitored and if at any stage the works site is in danger of being inundated due to rising water levels, machinery will be removed outside of the floodable area.

3.2.3.2 Interceptor Drains

Interceptor drains will be installed up-gradient of works areas to collect surface water runoff and prevent it reaching excavations and construction areas of the site, where it might otherwise have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to divert upslope runoff around the works area to a location where it can be redistributed over the ground surface as sheet flow. This will minimise the volume of potentially silty runoff to be managed within the construction area.

The interceptor drains will be installed in advance of main construction works commencing. The material excavated to make the drain will be compacted on the downslope edge of the drain to form a diversion dike. On completion of the proposed works, it is envisaged that the majority of the interceptor drains could be removed. At that stage, there will be no open excavations or large areas of exposed ground that are likely to give rise to large volumes of potentially silt-laden run off.

Areas in which works were carried out to construct roads will have been built up with large grade hardcore, which even when compacted in place, will retain sufficient void space to allow water infiltrate the subsurface of these constructed areas. It is not anticipated that roadways or other installed site infrastructure will intercept ground-conveyed surface water runoff to any significant extent that would result in scouring or over-topping or spill over. Where the drains are to be removed, they will be backfilled with the material from the diversion dike. Interceptor drains may have to be retained in certain locations, for example where roadways are to be installed on slopes, to prevent the roadways acting as conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains would be maintained in localised areas along the roadway with culverts under the roadway, which would allow the intercepted water to be discharged to vegetation filters downgradient of the roadway. Similarly, in localised hollows where water is likely to be funnelled at greater concentrations than on broader slopes, interceptor drains and culverts may be left in situ following construction.

The velocity of flow in the interceptor will be controlled by check dams (see Section 4.2.4.3 below), which will be installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane will be added to the channel.

Interceptor drains will be installed horizontally across slopes to run in parallel with the natural contour line of the slope. Intercepted water will travel along the interceptor drains to areas downgradient of works areas, where the drain will terminate at a level spreader. Across the entire length of the

interceptor drains, the design elevation of the water surface along the route of the drains will not be lower than the design elevation of the water surface in the outlet at the level spreader. Figure 3-2 provides an illustrative drawing of an interceptor drain.

3.2.3.3 Collector Drains

Collector drains are shallow drains that will be used to intercept and collect run off from construction areas of the site during the proposed works. Collector drains will remain in place to collect runoff from roads after the development is completed. A collector drain is an excavated drainage channel located along the downgradient perimeter of construction areas, used to collect and carry any sediment-laden runoff to a sediment-trapping facility and stabilised outlet. Collector drains are proven to be most effective when a dike is installed on the downhill side. They are similar in design to interceptor drains and collector drains described above.

Collector drains will be installed downgradient of any works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Collector drains will intercept the potentially silt-laden water from the excavations and construction areas of the site and prevent it reaching natural watercourses.

Collector drains will be installed in advance of any main construction works commencing. The material excavated to make the collector drain will be compacted on the downslope edge of the drain to form a diversion dike. Figure 3-2 shows an illustrative drawing of a collector drain.

3.2.3.4 Check Dams

The velocity of flow in the interceptor drains and collector drains, particularly on sloped sections of the channel, will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the collector drain is non-erosive. Check dams will also be installed in some existing artificial drainage channels that will receive waters from works areas of the site.

Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. Check dams may also be installed in some of the existing artificial drainage channels on the site, downstream of where collector drains connect in.

The check dams will be made up of 4/40mm non-friable crushed stone. The check dams will be installed at regular intervals along the interceptor drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150mm lower than the edges to allow excess water to overtop the dam in flood conditions rather than cause upstream flooding or scouring around the dams.

The check dams will be installed at regular intervals along the interceptor drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150 mm lower than the edges to allow excess water to overtop the dam in flood conditions rather than cause upstream flooding or scouring around the dams.

Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be left in place where required at the end of the construction phase to limit erosive linear flow in the collector drain during extreme rainfall events.

Check dams are designed to reduce velocity and control erosion and are not specifically designed or intended to trap sediment, although sediment is likely to build up. If necessary, any excess sediment build up behind the dams will be removed. For this reason, check dams will be inspected and

maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam. Figure 3-2 shows illustrative examples of a check dam.

3.2.3.5 Level Spreaders

A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any works areas in locations where they are not likely to contribute further to water ingress to construction areas of the site, or areas where they are not likely to give rise to peat stability issues.

The water carried in interceptor drains will not come in contact with active works areas, and therefore should be free of silt and sediment. The level spreaders will distribute clean drainage water onto vegetated areas where the water will not be re-concentrated into a flow channel immediately below the point of discharge. The discharge point will be on level or only very gently sloping ground rather than on a steep slope to prevent erosion. Figure 3-2 provides an illustrative example of a level spreader.

The slope in the channel leading into the spreader will be less than or equal to 1%. The slope downgradient of the spreader onto which the water will dissipate will have a grade of less than 6%. The availability of slopes with a grade of 6% or less will determine the locations of level spreaders. If a slope grade of less than 6% is not available in the immediate area downgradient of a works area at the end of a diversion drain, a piped slope drain will be used to transfer the water to a suitable location.

The spreader lip over which the water will spill will be made of a concrete kerb, wooden board, pipe, or other similar piece of material that can create a level edge similar in effect to a weir. The spreader will be level across the top and bottom to prevent channelised flow leaving the spreader or ponding occurring behind the spreader. The top of the spreader lip will be 150mm above the ground behind it. The length of the spreader will be a minimum of four metres and a maximum length of 25 metres, with the actual length of each spreader to be determined by the size of the contributing catchment, slope and ground conditions.

Clean four-inch stone can be placed on the outside of the spreader lip and pressed into the ground mechanically to further dissipate the flow leaving the level spreader over a larger area. Figure 3-2 provides illustrative examples of a level spreader.

3.2.3.6 Vegetation Filters

Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.

Vegetation filters will carry outflow from the level spreaders as overland sheet flow, removing any suspended solids and discharging to the groundwater system by diffuse infiltration.

Vegetation filters will not be used in isolation for waters that are likely to have higher silt loadings. In such cases, silt-bearing water will already have passed through stilling (settlement) ponds prior to diffuse discharge to the vegetation filters via a level spreader.

3.2.3.7 Stilling Ponds/Settlement Ponds

Stilling ponds will be used to attenuate runoff from works areas of the site during the construction phase. The purpose of the stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity. Reducing runoff

velocity will allow larger particles to settle out in the stilling ponds, before the run-off water is redistributed as diffuse sheet flow in filter strips downgradient of any works areas.

Stilling ponds will be excavated/constructed at each required location as two separate ponds in sequence, a primary pond and a secondary pond. The points at which water enters and exits the stilling ponds will be stabilised with rock aprons, which will trap sediment, dissipate the energy of the water flowing through the stilling pond system, and prevent erosion. The primary stilling pond will reduce the velocity of flows to less than 0.5 metres per second (m/s) to allow settlement of silt to occur. Water will then pass from the primary pond to the secondary pond via another rock apron. The secondary stilling pond will reduce the velocity of flows to less than 0.3m/s. Water will flow out of the secondary stilling pond through a stone dam, partially wrapped in geo-textile membrane, which will control flow velocities and trap any sediment that has not settled out.

Water will flow by gravity through the stilling pond system. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. The stilling ponds will be dimensioned so that the length to width ratio will be greater than 2:1, where the length is the distance between the inlet and the outlet. Where ground conditions allow, stilling ponds will be constructed in a wedge shape, with the inlet located at the narrow end of the wedge. Each stilling pond will be a minimum of 1.0-1.5m in depth. Deeper ponds will be used to minimise the excavation area needed for the required volume.

The embankment that forms the sloped sides of the stilling ponds will be stabilised with vegetated turves, which will have been removed during the excavation of the stilling ponds area. All material excavated during pond construction will be used locally for landscaping and berm construction around these ponds.

Stilling ponds will be located towards the end of collector drains, close to where the water will be reconverted to diffuse sheet flow. Upon exiting the stilling pond system, water will be immediately reconverted to diffuse flow via a fan-shaped rock apron if there is adequate space and ground conditions allow. Otherwise, a collector drain will be used to carry water exiting the stilling pond system to a level spreader to reconvert the flow to diffuse sheet flow.

Stilling ponds will be inspected weekly and following rainfall events with sediment cleaned out as required. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows. Figure 3-2 provides an illustrative example of a stilling pond.

3.2.3.8 Silt Bags

Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the site.

Dewatering silt bags are an additional drainage measure that can be used downgradient of the stilling ponds at the end of the collector drain and will be located, wherever it is deemed appropriate, throughout the site. The water will flow, via a pipe, from the stilling ponds into the silt bag. The silt bag will allow the water to flow through the geotextile fabric and will trap any of the finer silt and sediment remaining in the water after it has gone through the previous drainage measures. The dewatering silt bags will ensure that there will be no loss of peaty silt into any stream.

The dewatering silt bag that will be used will be approximately 3m in width by 4.5m (see Plates 3.1 and 3.2) in length and will be capable of trapping approximately four tonnes of silt. The dewatering silt bag, when full, will be removed from site by a waste contractor with the necessary waste collection permit, who will then transport the silt bag to an appropriate, fully licensed waste facility.

Plate 3-1 Silt bag typical use no. 1

Plate 3-2 Silt bag typical use no. 2

3.2.3.9 Silt Fences

Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations as required, particularly where works are proposed within the 50m buffer zone from natural watercourses, particularly where existing roads in proximity to watercourses are to be upgraded as part of the development. These areas include around existing culverts, surrounding temporary stockpiled material and at locations where it is deemed necessary by the Site Manager in consultation with the Environmental Clerk of Works (ECoW).

Silt fences can be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document, Control of Water Pollution from Linear Construction Projects, published by CIRIA (CIRIA, No. C648, 1996). Up to three silt fences may be deployed in series.

Silt fences will be emplaced along drains and parallel to access roads edges as required, down-gradient of all new roads. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral subsoils of glacial and glacio-fluvial origin, and entrained in surface water runoff.

Inspection and maintenance of these structures during the proposed works is critical to their functioning to stated purpose. Silt fencing material will be Terra Stop Premium or similar (certified CE mark for erosion control of EN13253 or similar), as per the agreed final specifications.

The most suitable type, number or combination of silt fences will be determined on a location specific basis for the various parts of the site. Silt fences may be installed in series on the ground.

Silt fences will be inspected regularly to ensure water is continuing to flow through and the fence is not coming under strain from water backing up behind it.

3.2.4 Site Drainage Management

3.2.4.1 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures outlined above, will be brought on-site in advance of any works commencing. An adequate amount of clean stone, silt fencing, wooden stakes, etc. will be stored on site at all times, to implement the drainage design measures as necessary. The drainage measures outlined in the above will be installed prior to, or at the same time as the works they are intended to drain.

3.2.4.2 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts and predicted rainfall in particular. Large excavations, large movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

3.2.4.3 Reactive Site Drainage Management

Reactive management by the ECoW or Site Manager will be required to ensure the continued effectiveness of mitigation measures employed on site. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW or Site Manager. The ECoW or Site Manager will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor or collector drains as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground at the particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW or Site Manager will stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined above will be installed in advance of works recommencing.

3.2.4.4 Drainage Maintenance

An inspection and maintenance plan for the drainage system on-site will be prepared in advance of commencement of any works. Regular inspections of all installed drainage features will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the ECoW or the Site Manager.

If necessary, any excess sediment build up behind check dams will be removed. For this reason, check dams will be inspected and maintained weekly during the construction phase of the project to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

Check dams will also be inspected weekly during the proposed works and following rainfall events to ensure the structure of the dam is still effective in controlling flow. Any scouring around the edges of the check dams or overtopping of the dam in normal flow conditions will be rectified by reinforcement of the check dam.

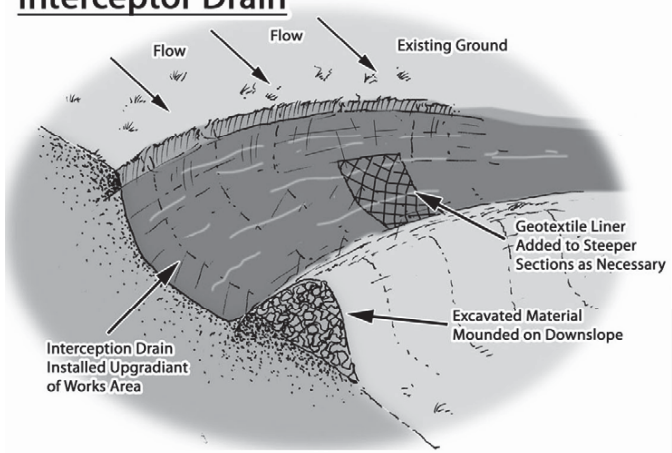
Collector drains will be regularly inspected for evidence of erosion along the length of the drain. If any evidence of erosion is detected, additional check dams will be installed to limit the velocity of flow in the channel and reduce the likelihood of erosion occurring in the future.

An adequate amount of clean stone, Terra Stop (or similar silt fencing material), wooden stakes, straw bales (rectangular bales, to be used in emergency only), etc. will be kept on site at all times. This is to ensure the drainage system can be fully maintained throughout the construction phase of the development. It also will ensure that personnel are fully equipped to provide an emergency facility to control the discharge from settlement ponds and react appropriately to any accidental silt discharges.

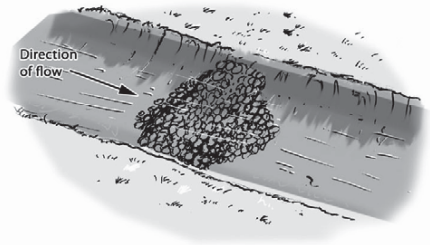
Silt traps will be inspected weekly during the construction phase of the project and following rainfall events with sediment build-up removed as required. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

Drainage Design Measures

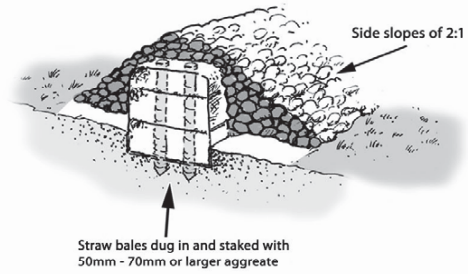
Interceptor Drain



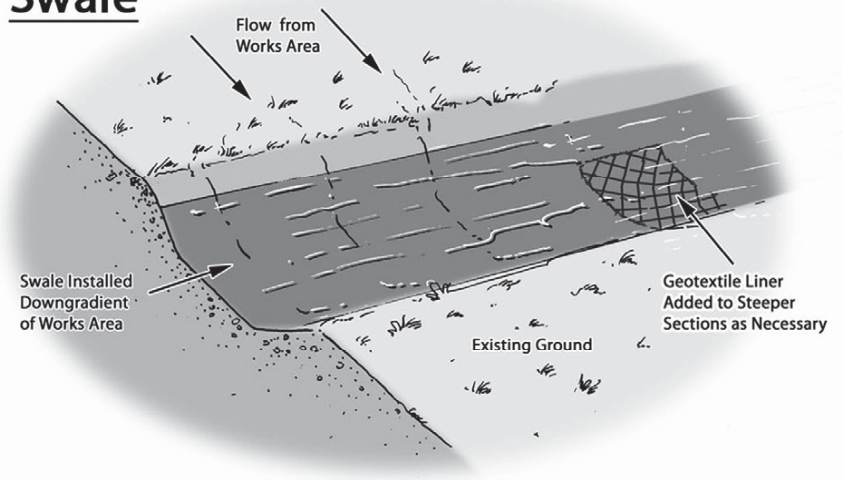
Check Dam (Stone Dam in Drain)



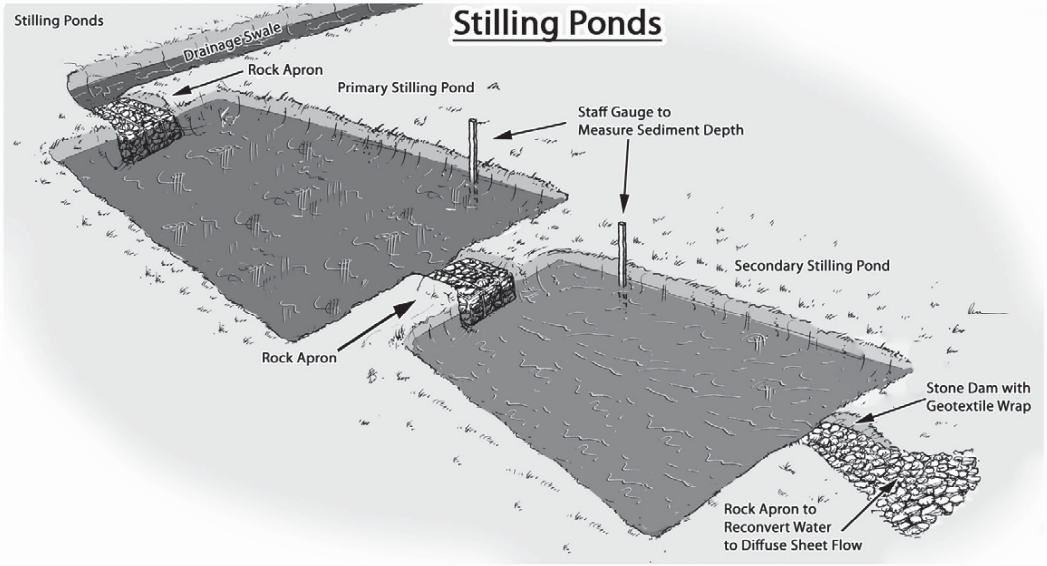
Check Dam
(Straw Bale & Stone Dam - Cross Section)



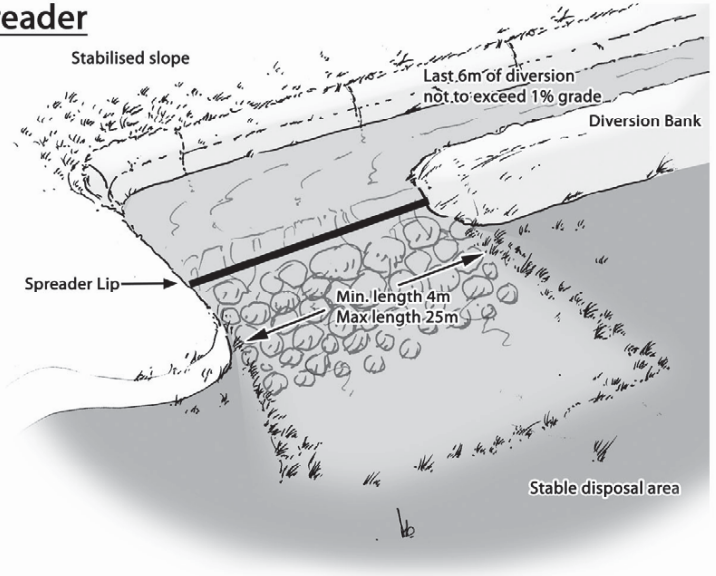
Swale



Stilling Ponds



Level Spreader



MAP TITLE: **Drainage Mitigation Measures**				**Figure 3-2**
PROJECT TITLE: **Hartley Bridge**				PROJECT No.: **181209**
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Owen Cahill**	SCALE: **NTS**		DATE: **02-10-2020**

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3.3 Operational Phase Drainage

There will be no significant change to the usage of the new bridge compared to the existing bridge. The proposed works relates to the construction of a new bridge and the demolition of the existing bridge. The new road realignment will include drainage designed in accordance with TII guidelines. This includes the installation of road gullies, drainage pipes, and soak pits, as shown in Figure 3-1. No impacts are anticipated.

3.4 Cement Based Products Control Measures

The complete washing out of concrete trucks will not be permitted at the site. Suppliers will be directed back to their own facility to complete the washout process. However, a washout area for chute cleaning will be provided at various locations in close proximity to the concrete pour locations.

The following mitigation measures are proposed to avoid release of cement leachate from the site:

- No batching of wet-cement products will occur on site.
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used.
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site.
- Where concrete is delivered on site, only chute cleaning will be permitted, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- The weather forecast will be checked prior to the pouring of concrete and no such works will be undertaken when bad weather is forecast. Works will be stopped if inundation or flooding of the works area is likely. Concrete will not be poured at times when rain is predicted as this may lead to run off and over spillage of the formwork.
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.
- Concrete (including waste and wash down) will be contained and managed appropriately to prevent pollution of watercourses. Pouring will occur in the dry, with appropriate curing times (48 hours) before re-flooding.

3.5 Refuelling, Fuel and Hazardous Materials Storage

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- All plant will be inspected prior to use. Defective plant shall not be used until the defect is satisfactorily fixed. All major repair and maintenance operations will take place off site.
- Minimal refuelling or maintenance of vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station.

- Vehicles will never be left unattended during refuelling. Only dedicated, trained, and competent personnel will carry out refuelling operations. Plant refuelling procedures shall be detailed in the contractor's method statements.
- Fuels, lubricants and hydraulic fluids for equipment used will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment.
- Refuelling will be completed in a controlled manner using drip trays at all times and at least 50m away from watercourses.
- On-site refuelling will take place using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer or similar, will be re-filled off site, and will be towed around the site by a 4x4 vehicle to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the excavators, etc. that will be used during works. The 4x4 vehicle will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the when not in use. Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Fuels volumes stored on site will be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the works and fitted with a storm drainage system and an appropriate oil interceptor.
- Mobile storage tanks such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked.
- All pipework from containers to pump nozzles will have anti siphon valves fitted.
- The plant refuelling procedures shall be detailed in the contractor's method statements.
- The plant used will be regularly inspected for leaks and fitness for purpose.
- An emergency plan to deal with accidental spillages will be developed (refer to Section 5). Spill kits will be available to deal with and accidental spillage in and outside the refuelling area.

3.6 Dust Control

Dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e. soil, sand, peat, etc. and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Traffic movements also have the potential to generate dust as they travel along the haul route.

Proposed measures to control dust include:

- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- Public roads outside the site and along the main access routes to the site will be regularly inspected by the Site Manager for cleanliness, most notably before and after plant and machinery deliveries to site.
- Material handling systems and material storage areas 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.
- Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions.

- If transport of soils or other material off site is required, which has significant potential to generate dust, this will be undertaken in tarpaulin-covered vehicles where necessary.
- All works related traffic will have speed restrictions on un-surfaced roads to 20 kilometres per hour (kph).
- Daily inspection of site to examine dust measures and their effectiveness.

3.7 Noise Control

The operation of plant and machinery, including construction vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures to control noise include:

- Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts.
- Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations.
- Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers.
- Operating machinery will be restricted to the proposed development site boundary.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works.
- Compressors will be of the 'sound reduced' models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machines, which are used intermittently, will be shut down during those periods when they are not in use.
- Training will be provided by the Site Manager to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation.
- Local areas of the haul route will be condition monitored and maintained, if necessary.

3.8 Invasive Species Management

Aquatic invasive species Asian Clam and Zebra Mussel were recorded in the River Shannon as part of the Aquatic Impact Assessment undertaken by Ecofact in 2019. The introduction and/or spread of invasive species such as terrestrial species Japanese Knotweed, or aquatic species Zebra Mussel, for example, could have negative impacts on the surrounding environment or potentially lead to dispersal of the species outside the site.

3.8.1 General Best Practice Control Methods

The following general best practice guidelines in the treatment and control of invasive species during construction works are outlined below having regard to the following relevant guidance documents:

- NRA (2010) Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads.
- Invasive Species Ireland (2008) Best Management Practice Guidelines.
- IFI (2010) Biosecurity Protocol for Field Survey Work

3.8.2 Site Management

Careful preparation of the site and planning of the works is crucial to successful treatment of invasive species. The following list of guidelines, which is not exhaustive, shall be followed by all on-site personnel. Only those who have been inducted into biosecurity measures on-site may enter the contaminated zones within the works areas. Should any risk of contaminated material escaping be observed by the site supervisor, management for the site must be amended by an appropriately qualified person to mitigate against the risk.

3.8.3 Establishing Good Site Hygiene

- A risk assessment and method statement must be provided by the Contractor prior to commencing works.
- Fences will be erected around areas of infestation, as confirmed by test pits, and warning signs shall be erected. Good construction site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (e.g. Japanese Knotweed, Himalayan Balsam etc.) by thoroughly washing vehicles prior to entering the site. Any soil and topsoil required on the site will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present.A designated wash-down area will be created, where power-washed material from machinery can be contained, collected, and disposed of with other contaminated material. This area will contain a washable membrane or hard surface.All machinery and equipment to be used in-stream will be cleaned with a 1% Virkon aquatic disinfectant solution (or equivalent), or steam cleaned at a high temperature (> 40°C)in line with IFI recommendations, prior to arrival on site. This is to prevent the transfer of aquatic invasive species to the site from elsewhere. This method of clean down will also be carried out on completion of the works prior to machinery and equipment moving off-site, to prevent the potential spread of invasive species including Asian Clam and Zebra Mussel.Stockpile areas will be chosen to minimise movement of contaminated soil.Stockpiles will be marked and isolated.Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore. The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material.

Plant and equipment which is operated within an area for the management of materials in contaminated areas should be decontaminated prior to relocating to a different works area. The decontamination procedures should take account of the following:

- Personnel may only clean down if they are familiar with the plant and rhizome material and can readily identify it.
- Decontamination will only occur within designated wash-down areas.
- Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g. wheel treads and arches.
- All run-off will be isolated and treated as contaminated material. This will be disposed of in already contaminated areas.

3.9 Waste Management

This section of the CEMP provides an outline Waste Management Plan (WMP) which describes the best practice procedures during the proposed works. The WMP will outline the methods of waste prevention and minimisation by recycling, recovery and reuse. Disposal of waste will be seen as a last resort.

A draft Outline Construction and Demolition (C&D) Waste Management Plan (September 2020) has also been prepared by PUNCH Consulting Engineers for the proposed development and has been included as Appendix 1 to this CEMP.

Section 2.9 of the PUNCH WMP details approximate quantities of C&D waste materials estimated to arise during the project. Table SF1 (from this WMP Section 2.9) is provided below for reference.

Table 3-1 Estimated C&D Waste Arisings (Punch WMP)

Construction Waste Material	Quantity	Actions
Metal	0 t	Not envisaged at this stage of the project*
Concrete	800 t	50% of any waste concrete to be recycled and 50% to be properly disposed of
Paper & Cardboard	2 t	100% of any waste packaging to be recycled
Plastic	2 t	100% of any waste packaging to be recycled
Wood	5 t	100% of any waste timber to be recycled
Mixed Waste	5 t	Waste materials will be recycled where possible or disposed of appropriately
Mineral (bricks, gypsum)	40 t	100% of any waste masonry to be recycled
Soil/Stones	100 t	100% of any soil or stones to be recycled and reuse on site subject to suitability of material
Residues	5 t	Any other waste materials will be recycled where possible or disposed of appropriately
TOTAL Arisings	959 t	

Table SF1 Estimated C&D Waste Arisings on Site from Appendix 3 of Best Practice Guidelines of Waste Management Plans for C&D Projects (figures to be confirmed as design progresses)

3.9.1 Legislation

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and European Union (EU) legislation.

The Act requires that any waste related activity must have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

The Department of the Environment, Climate and Communications (DECC) provides detailed information on the information to be contained in a WMP via the guidance document, Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (2006). This document was referred to throughout the process of completing this WMP.

3.9.2 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing in the following order:

Prevention and Minimisation:

The primary aim of the WMP will be to prevent, and thereby reduce the amount of waste generated during the project.

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill.

Recycling of Waste:

There are a number of established markets available for the beneficial use of C&D waste such as using waste concrete as fill for new roads.

At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

3.9.3 Construction Phase Waste Management

3.9.3.1 Description of the Works

The proposed development will include the construction of one new 75m reinforced concrete road bridge spanning the River Shannon, road realignment works and associated infrastructure.

The main bridge supports will be pre-cast reinforced concrete (RC) W-beams, to be manufactured off-site and delivered to the site to be fixed in place. Other bridge construction materials will consist of reinforcing steel (rebar), concrete, stone, brick and tarmac.

Abutment foundations and piers will consist of H-piles, beams, concrete and stone.

The waste types arising from the construction phase of the development are outlined in Table 3-1 below.

Table 3-2 Expected waste types arising during the construction phase.

Material Type	Example	European Waste Catalogue (EWC) Code
Cardboard	Boxes, cartons	15 01 01
Composite packaging	Containers	15 01 05
Metals	Copper, aluminium, lead, iron and steel	17 04 07

Material Type	Example	European Waste Catalogue (EWC) Code
Inert materials	Sand, stones, plaster, rock, blocks, tarmac	17 01 07
Mixed municipal waste	Daily canteen waste from construction workers, miscellaneous	20 03 01
Plastic	Polyvinyl chloride (PVC) frames, electrical fittings	17 02 03
Plastic packaging	Packaging with new materials	15 01 02
Wooden packaging	Boxes, pallets	15 01 03
Bitumen	Road surfacing	05 01 17

Hazardous wastes that may occur on site during the construction phase of the development may include oil, diesel fuel, chemicals, paints, preservatives etc. All hazardous wastes will be stored in appropriate bunded containers/areas, before being collected by an authorised waste contractor and brought to an Environmental Protection Agency (EPA) licensed waste facility. Hazardous wastes will be kept separate from non-hazardous wastes to prevent cross-contamination.

3.9.3.2 Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Construction Waste

Construction waste will arise on the project mainly from excavation and unavoidable construction waste including material surpluses, damaged materials and packaging waste.

Appropriate measures will be taken to ensure excess waste is not generated during construction, including:

- Ordering of materials will be on an 'as needed' basis to prevent over supply to the site. Co-ordination is required with suppliers enabling them to take/buy back surplus stock.
- Purchase of materials pre-cut to length to avoid excess scrap waste generated on site.
- Request that suppliers use least amount of packaging possible on materials delivered to the site.
- Ensuring correct storage and handling of goods to avoid unnecessary damage that would result in their disposal.
- Ensuring correct sequencing of operations.
- Use reclaimed materials in the construction works.
- Excavated material will be reused on-site where possible and otherwise will be removed from the site and disposed of in a licenced waste facility.

Hazardous waste will be kept separate from all other construction waste to prevent contamination and removed appropriately.

3.9.3.3 Waste Arising from Construction Activities

All waste generated on site will be contained in waste skips at a waste storage area on site. This waste storage area will be kept tidy with skips clearly labelled to indicate the allowable material to be disposed of therein.

This waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal.

It is not envisaged that waste will be generated from the materials used to construct the bridge and road realignment as only the quantity of stone necessary will be sourced from local quarries and brought on site on an 'as needed' basis.

Site personnel will be instructed at induction that no under no circumstances can waste be brought to site for disposal in the on-site waste skip. It will also be made clear that the burning of waste material on site is forbidden.

3.9.3.4 Reuse

Many construction materials can be reused a number of times before they have to be disposed of, including:

- Concrete can be reused as aggregate for roads cable trench backfilling material.
- Plastic packaging can be used to cover materials on site or reused for the delivery of other materials.
- Excavated soil can be reused for reinstatement or landscaping.

3.9.3.5 Recycling

If a certain type of construction material cannot be reused on-site, then recycling is the most suitable option.

All waste that is produced during the construction phase including dry recyclables will be segregated by waste stream (e.g. wood, brick, metal) into clearly identified on-site skips initially and sent for subsequent segregation at a remote facility. The anticipated volume of all waste material to be generated at the development from bridge construction works is low.

3.9.4 Demolition Phase Waste Management

3.9.4.1 Description of the Works

The existing Hartley Bridge is proposed to be taken off-line and dismantled. The existing bridge was constructed in 1915 and is one of the earliest reinforced concrete bridges in the country, comprising of two sections; a six-span reinforced concrete integral structure and an adjoining two-span cast in/situ reinforced concrete structure, butting the six-span structure to the west. All components of the structure are composed of reinforced concrete.

Any structural elements that are not suitable for recycling will be disposed of in an appropriate manner. Any materials which cannot be re-used or recycled will be disposed of by an appropriately licenced contractor.

The waste types arising from the decommissioning of the development are outlined in Table 3-2 below.

Table 3-3 Expected waste types arising during the Demolition Phase

Material Type	Example	EWC Code
Metals	Copper, aluminium, lead, iron and steel (rebar)	17 04 07
Inert materials	Crushed stone, concrete, brick	17 01 07
Mixed municipal waste	Daily canteen waste from construction workers, miscellaneous	20 03 01
Wooden packaging	Boxes, pallets, parapets	15 01 03
Bitumen	Road surfacing	05 01 17

Hazardous wastes that may occur on site during demolition may include oil, diesel fuel, chemicals, paints, preservatives etc. All hazardous wastes will be stored in bunded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility. Hazardous wastes will be kept separate from non-hazardous wastes to avoid cross contamination.

3.9.4.2 Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Demolition Waste

Demolition waste will arise on the project mainly from bridge break out.

Appropriate measures will be taken to ensure excess waste is not generated during these works, including:

- Ensuring correct sequencing of operations.
- Use reclaimed materials if possible.

Hazardous waste will be kept separate from all other construction waste to prevent contamination and removed appropriately.

3.9.4.3 Waste Arising from Demolition Activities

There will be five waste categories generated on site as outlined in Table 3-3 above. Waste will be segregated for export off-site to a materials recovery facility and subsequent recycling. This will be segregated and contained in waste skips kept in the construction compounds. The skips will be clearly labelled to indicate the allowable material to be disposed of therein. Any canteen waste generated will be sent to an appropriate waste management facility.

All inert material recovered from bridge demolition works will be removed to a licenced facility.

Site personnel will be instructed at induction that no under no circumstances can waste be brought to site for disposal in the on-site waste containers or skips. It will also be made clear that the burning of waste material on site is forbidden.

3.9.4.4 Implementation

3.9.4.4.1 *Roles and Responsibilities for Waste Management*

The Site Manager will be responsible for the implementation of the objectives of the waste management protocol for the site, ensuring that all hired waste contractors have the necessary authorisations and that

the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

3.9.4.4.2 *Training*

It is important for the Site Manager to communicate effectively with colleagues in relation to the aims and objectives of the waste management plan. All employees working on-site during the project will be trained in materials management and thereby, will be able to:

- Distinguish reusable materials from those suitable for recycling.
- Ensure maximum segregation at source.
- Coordinate with the Site Manager on the best locations for stockpiling reusable materials.
- Separate materials for recovery.
- Identify and liaise with waste contractors and waste facility operators.

3.9.4.4.3 *Record Keeping*

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the site. Each record will contain the following:

- Consignment reference number
- Material type(s) and EWC code(s)
- Company name and address of site of origin
- Trade name and collection permit ref. of waste carrier
- Trade name and licence ref. of destination facility
- Date and time of waste dispatch
- Registration no. of waste carrier vehicle
- Weight of material
- Signature of confirmation of dispatch detail
- Date and time of waste arrival at destination
- Site address of destination facility

3.9.4.5 Waste Management Plan Conclusion

The WMP will be properly adhered to by all staff involved in the project which will be outlined within the induction process for all site personnel. The waste hierarchy should always be employed when determining the appropriate option for dealing with a waste material to ensure that the least possible amount of waste is produced. Reuse of certain types of construction wastes will cut down on the cost and requirement of raw materials therefore further minimising waste levels.

4. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

4.1 Roles and Responsibilities

The Site Manager is the project focal point relating to construction-related environmental issues. Due to the scale of the works and the short-term duration that they will be undertaken, the Site Manager will fulfil the role of Environmental Manager for the site. The responsibilities of their role are summarised below.

4.1.1 Site Manager

The Site Manager will have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The duties and responsibilities of the Site Manager will include:

- Ensure that all works are completed safely and with minimal environmental risk.
- Approve and implement the mitigation measures outlined in the CEMP and supporting environmental documentation e.g. NIS, and ensure that all environmental standards are achieved during proposed works.
- Ensure good environmental working practice.
- Ensure compliance through audits and management site visits.
- Ensure timely notification of environmental incidents.
- Ensure that all activities are planned and performed such that minimal risk to the environment is introduced.

4.1.2 Environmental Clerk of Works

The main contractor will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, with experience in construction and demolition works to fulfil the role of Environmental Clerk of Works (ECoW), to ensure that methodologies and mitigation are followed throughout construction and demolition to avoid negatively impacting on the receiving environment.

The ECoW will visit the site at the start of the project to assess site set-up before works commence to ensure all mitigation is in place and to give a Toolbox Talk to all staff. ECoW site inspections will be carried out throughout the construction phase as follows:

- Prior to terrestrial works commencing
- Prior to in-stream works commencing
- Whilst works are being carried out
- Prior to completion of works and decommissioning of site
- Post completion of the project

The ECoW will report to the Site Manager. The responsibilities and duties of the ECoW will include the following:

- Preparation and update of the CEMP as required and supporting environmental documentation and review/approval of contractor method statements.
- Undertake inspections and reviews to ensure the works are carried out in compliance with the CEMP.
- Monitor the implementation of the CEMP, particularly all proposed/required environmental monitoring.

- Generate environmental reports as required to show environmental data trends and incidents and ensure environmental records are maintained throughout the construction period.
- Advise site management/contractor/sub-contractors on:
    - Prevention of environmental pollution and improvement to existing working methods.
    - Changes in legislation and legal requirements affecting the environment.
    - Suitability and use of plant, equipment and materials to prevent pollution.
    - Environmentally sound methods of working and systems to identify environmental hazards.
- Ensure the specified mitigation measures are initiated and adhered to during the construction and demolition phases.
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents.
- Support the investigation of incidents of significant, potential or actual environmental damage, and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties.
- Identify environmental training requirements and arrange relevant training for all levels of site-based staff/workers.

The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, developer's project manager, Local Authorities or other relevant Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project.

4.2 Water Quality and Monitoring

4.2.1 Pre-Construction Baseline Monitoring

Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of construction and demolition works at the site. The baseline monitoring programme will be subject to agreement with LCC.

Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and sampling will be undertaken at locations downstream of the works area.

Baseline sampling will be completed on at least two occasions and these should coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a dry spell. Flow conditions will be determined based on the rainfall intensity over a 24hr period as reported by Met Eireann for the nearest weather station. In this case, Mount Dillon weather station will be used, located in Lanesborough, Co. Roscommon, approximately 25km south of the proposed development.

4.2.2 Construction and Demolition Phase Monitoring

4.2.2.1 Daily Visual Inspections

Daily visual inspections of drains, outfalls and the River Shannon will be performed by the Site Manager during the works period to confirm the effectiveness of the drainage measures that are in place, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime.

Inspection and monitoring records along with photographic records will be maintained by the ECoW and made available to the Site Manager, or others upon request. Inspection points will be determined by the areas in which works are ongoing. Visual inspections will also be completed after major rainfall events, i.e. after events of greater than 25mm rainfall in a 24-hour period, and surface water quality data including turbidity, dissolved oxygen and pH in addition to photographic evidence, may be collected during inspections.

4.2.2.2 Monthly Laboratory Analysis

Baseline laboratory analysis for a range of parameters with relevant regulatory limits and environmental quality standards (EQSs) will be undertaken as per the surface water monitoring programme for the overall development and each primary watercourse along the route. This will not be restricted to just these locations around the immediate site with further sampling points added as deemed necessary by the ECoW, in consultation with the Site Manager.

4.2.2.3 Monitoring Parameters

The analytical determinants of the monitoring programme (including limits of detection and frequency of analysis) will be as per Statutory Instrument (S.I.) No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations and European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The likely suite of parameters may include:

- pH (field measured)
- Electrical Conductivity (field measured)
- Temperature (field measured)
- Dissolved Oxygen (field measured)
- Total Phosphorus
- Chloride
- Nitrate
- Nitrite
- Total Nitrogen
- Ortho-Phosphate
- Ammoniacal Nitrogen
- Biochemical Oxygen Demand (BOD)
- Total Suspended Solids
- Turbidity

4.2.3 Drainage Inspections and Maintenance

Drainage performance will form part of the civil works contract requirements. During the construction and demolition phases the effectiveness of drainage measures designed to minimise runoff entering works areas, and capture and treatment of potentially silt-laden water from the works areas, will be monitored periodically.

Prior to the commencement of construction an inspection and maintenance plan for the on-site drainage system will be prepared by the ECoW in consultation with the Site Manager. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Any excess build-up of silt levels at check dams, settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.

The following periodic inspection regime is likely to be proposed:

- Daily general visual inspections by Site Manager

- Weekly (existing and new drains) inspections by the site Construction Manager.
- Inspection to include all elements of drainage systems and all monitoring. Inspections required to ensure that drainage systems are operating correctly and to identify any maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter should be noted and corrective action should be implemented. High risk locations such as settlement ponds will be inspected daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as silt fencing or oil absorbent materials need replacement.
- Event based inspections by the Site Manager as follows:
    - Rainfall >10 mm/hr (i.e. high intensity localised rainfall event)
    - Rainfall >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
    - Rainfall total greater than monthly average recorded in 7 consecutive days (prolonged heavy rainfall over a week).
- A written record will be maintained and readily available of all construction phase monitoring undertaken.

4.2.4 Surface Water Monitoring Reporting

Visual inspection and laboratory analysis results of water quality monitoring shall assist in determining requirements for any necessary improvements in drainage controls and pollution prevention measures implemented on site.

It will be the responsibility of the ECoW to present the ongoing results of water quality and weather monitoring at, or in advance of, regular site meetings.

Reports on water quality will consider all visual inspections, and results of laboratory analysis completed for that period. Reports will describe how the results compare with baseline data as well as previous reports on water quality. The reports will also describe whether any deterioration or improvement in water quality has been observed, whether any effects are attributable to construction activities and what remedial measures or corrective actions have been implemented. Any proposed alteration to sampling frequency will be agreed with LCC in advance.

4.3 Environmental Awareness Training

4.3.1 Environmental Induction

The Environmental Induction will be integrated into the general site induction on a case-by-case basis for each member of staff employed on-site depending on their assigned roles and responsibilities on site. Where necessary, the Environmental Induction will as a minimum include:

- A discussion of the key environmental risks and constraints.
- An outline of the CEMP structure.
- A discussion of the applicable works Method Statement.
- The roles and responsibilities of staff, including contractors, in relation to environmental management.
- An outline of the Environmental Incident Management Procedure.

4.3.2 Toolbox Talks

Toolbox talks shall be held by the Site Supervisor/Construction Manager at the commencement of each day, or at the commencement of new activities. The aims of the toolbox talks are to identify the specific work activities that are scheduled for that day or phase of work. In addition, the necessary work method

statements and sub plans will be identified and discussed prior to the commencement of the day's activities.

Site meetings will be held on a regular basis involving all site personnel. The objectives of site meetings are to discuss the coming weeks activities and identify the relevant work method statements and sub-plans that will be relevant to that week's activities. Additionally, any non-compliance identified during the previous week would also be discussed with the aim to reduce the potential of the same non-compliance reoccurring.

5. EMERGENCY RESPONSE PLAN

5.1 Overview

An outline Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/Project Supervisor Construction Stage (PSCS) and suppliers as the project progresses. Where sub-contractors that are contracted on-site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this within this document.

This should be considered a live document that requires regular updating throughout the various stages of the project life cycle.

5.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Manager will lead the emergency response which makes him/her responsible for activating and coordinating the emergency response procedure. In a situation where the Site Manager is unavailable or incapable of coordinating the emergency response this role will be filled by the Project Environmental Health and Safety (EHS) Manager.

5.1.2 Hazard Identification

In order to establish the type and scale of potential emergencies that may occur, the following hazards outlined in Table 5-1 have been identified as being potential situations that may require an emergency response.

Table 5-1 Hazards associated with potential emergency situations

Hazard	Emergency Situation
Construction vehicles: dump trucks, tractors, excavators etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/portable tools	Entanglement, amputation or electrical shock associated with portable tools
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services
Fire	Injury to operative through exposure to fire
Falls from heights including falls from scaffold towers, scissor lifts, ladders and roofs.	Injury to operative after a fall from a height
Sickness	Illness unrelated to site activities of an operative e.g. heart attack, loss of consciousness, seizure
Deep water	Injury to operator as a result of entering deep water and encountering difficulties

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 5-1 the Site Manager shall carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, who have been injured, or are at risk of injury.
- Where necessary, sound the emergency siren/foghorn that activates an emergency evacuation on the site. The Site Manager must proceed to the assembly point if the emergency poses any significant threat to their welfare and if there are no injured personnel at the scene that require assistance. The Site Manager will be required to use their own discretion at that point. In the case of fire, the emergency evacuation of the site should proceed, without exception. The site evacuation procedure is outlined in Section 5.1.3.
- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone. If delegating the task, ensure that the procedures for contacting the emergency services as set out in Section 5.3 is followed.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks, the numbers for which are provided in Section 5.4.
- Contact the next of kin of any injured personnel where appropriate.

5.1.3 Site Evacuation / Fire Drill

A site evacuation / fire drill procedure will provide the basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or foghorn to notify all personnel of an emergency situation.
- An assembly point will be pre-designated and will be marked with a sign. All site personnel will assemble at this point.
- A roll call will be carried out by the Site Security Officer to account for all personnel on site.
- The Site Security Officer will inform the Site Manager when all personnel have been accounted for. The Site Manager will decide the next course of action, which be determined by the situation that exists at that time and will advise all personnel accordingly.

All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping of records of such drills.

5.2 Environmental Emergency Response Procedure

5.2.1 Spill Control Measures

Every effort will be made to prevent an environmental incident during the proposed works. However, in the event of an oil / fuel spill occurring the following steps will be followed:

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.

- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident.
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses, or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the Site Manager immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- The Site Manager will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The Site Manager will notify the appropriate regulatory body such as LCC and the Environmental Protection Agency (EPA), if deemed necessary.

The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps:

- The Site Manager must be immediately notified.
- If necessary, the Site Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded in an Environmental Incident Report, which will provide information such as the cause, extent, actions and remedial measures used, following the incident. The report will also include any recommendations made to avoid reoccurrence of the incident.
- A record of all environmental incidents will be kept on file by the Site Manager. These records will be made available to the relevant authorities such as LCC or the EPA if required.

The Site Manager will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling.

5.3 Contact the Emergency Services

5.3.1 Emergency Communications Procedure

In the event of requiring the assistance of the emergency services the following steps will be taken:

Stay calm. It's important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but don't get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for some reason you are disconnected, at least emergency crews will know where to go and how to call you back.

Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.

If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.

Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There's a good chance, however, that emergency services are already being sent while you are still on the line.

Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you don't understand.

Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.

Do not hang up the call until directed to do so by the call taker.

In the case of remote sites it may be necessary to liaise with the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This will form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.

5.4 Contact Details

A list of emergency contacts is presented in Table 5-2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities.

Table 5-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor – Doctors Surgery	TBC
Hospital – University Hospital Sligo	071 917 1111
ESB Emergency Services	1850 372 999
Bord Gais Emergency	1850 20 50 50
Gardaí –Local Garda Station TBC	TBC
Health and Safety Co-ordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): TBC	TBC
Client – Roads Department, Leitrim County Council	TBC

5.4.1 Procedure for Personnel Tracking

All operatives on site without any exception will have to undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.

In the event of a site operative being in an emergency situation where serious injury has occurred, and hospitalisation has taken place, it will be the responsibility of the Site Manager or next in command if unavailable to contact the next of kin to inform them of the situation.

5.5 Induction Checklist

Table 5-3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

Table 5-3 Emergency Response Plan Items Applicable to the Site Induction Process

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction	
In the case of remote sites, it may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	
All operatives on site without any exception will have to undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.	

6. MITIGATION PROPOSALS

This section of the CEMP groups together all environmental mitigation measures relating to the proposed works.

By presenting the mitigation proposals in the below table format, it is intended to provide an easy to audit list that can be reviewed and reported on during the proposed works.

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
Construction Phase					
Ecology					
MM1	Timing of Works	CEMP Section 3	› Works will be carried out during the period July 1st – September 30th, in line with Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016). › IFI will be notified before works commence and any recommendations made by them adhered to during the proposed works. › An Otter pre-commencement survey will be conducted as per NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This will involve a search for all otter signs e.g. spraints, scat, prints, slides, trails, couches and holts. A 10m riparian buffer (both banks) is considered to comprise part of the otter habitat (NPWS 2009).		
Excavation Works Management					
MM2	Refuelling	CEMP Section 3	On-site refuelling will be carried out using a mobile double skinned, bunded fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 vehicle to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the excavators, etc. that will be used during the proposed works. The 4x4 will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction when not in use. Refuelling operations will be carried out only by designated trained and competent operatives holding a permit to refuel. Mobile anti-pollution measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
MM3	Waste Materials	CEMP Section 3	A fully licensed waste contractor will be employed to remove waste from the site and will be required to provide documented records for all waste dispatches leaving the site of the proposed development.		
		-	To be populated with further mitigation measures prior to commencement.		
		-	To be populated with further mitigation measures prior to commencement.		
Drainage Design and Management					
MM4	Excavation works	CEMP Section 3	Work will cease entirely near drains or watercourses if it is evident that water quality is being significantly negatively impacted.		
MM5	Construction and demolition works	CEMP Section 3	General pollution prevention measures will be adopted to prevent run-off occurring as a result of the proposed works including: › A site compound shall be established within the agricultural fields and a minimum distance of 50m away from the water's edge. The compound shall be secured, and all construction materials shall be stored in this defined area. › Prior to the outset of works a silt fence will be erected along both sides of the river channel to prevent run-off entering the river. This will comprise wooden posts and geotextile membrane buried in an 'L' shape to a minimum depth of 250mm. The silt fence will act in filtering any potential surface water run-off from the site generated during the proposed works. › The proposed works area will be fenced off with temporary fencing and no works will be undertaken outside of the fenced area. › Access routes will be clearly marked / identified. Access during construction to any working areas will be restricted to land within the outlined works area.		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			› Silt fencing will be installed alongside the works area where required as a water quality protective measure. Further details below. › Check dams will be installed in the existing drains which are located immediately adjacent to the works. Further details below. › No refuelling of machinery or overnight parking of machinery is permitted in these areas adjacent to on-site drainage infrastructure. › Plant will travel slowly across bare ground at a maximum of 5 km/hr. › Depending on the nature of the excavated material, the stockpiles of excavated materials will be sealed with a digger bucket to reduce the potential for sediment runoff. These areas will be surrounded with silt fencing to prevent any pathway to any sensitive receptor. › Discharge of pumped water to ground will be via a silt bag which will filter any remaining sediment from the pumped water. The entire discharge area from silt bags will be enclosed by a perimeter of silt fencing. › The site will be continuously monitored by the Site Manager for signs of run-off such as silt in surrounding vegetation and measures will be put in place to prevent this where necessary. › Excavations will be carried out using a suitably sized excavator and, in all circumstances, excavation depths and volumes will be minimised. › Whilst no significant excavations are proposed, should any ingress of water (ground or rain) require pumping out this will be done so as described above or alternatively it will be pumped to a sealed clean tanker and removed from the site		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			and spread to improved agricultural grassland at a distance of over 50m from any watercourse. › Stockpiling of excavated material will be temporary and located in a clearly defined and demarcated area a minimum distance of 50m from any watercourse. Stockpiles will be removed on a regular basis to avoid potential sediment-laden run-off escaping the site. › Earthworks will take place during periods of low rainfall to reduce run-off and potential siltation of watercourses. › As construction advances there may be a small requirement to collect and treat surface water within the site. This will be completed using perimeter swales at low points around the construction areas, and if required water will be pumped from the swales into silt bags prior to overland discharge allowing water to infiltrate naturally to ground or disperse by sheet flow into local drainage ditches. › Good construction practices such as dust suppression on site roads, and regular plant maintenance will reduce risk of incidents. › By adopting current best practice and guidance, runoff from works areas during the course of construction and demolition activities will contain minimum sediment.		
MM6	Potential Release of Hydrocarbons	CEMP Section 3	› Mobile storage tanks such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked.		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			› All plant refuelling will take place using mobile fuel bowsers. Only dedicated trained and competent personnel will carry out refuelling operations. A spill kit and drip tray shall be on site at all times and available for all refuelling operations. Equipment shall not be left unattended during refuelling. All pipework from containers to pump nozzles will have anti siphon valves fitted. The plant refuelling procedures shall be detailed in the contractor's method statements. › Spill kits shall be available in each item of plant required.		
-	-	-	To be populated with further mitigation measures prior to commencement.		
		-	To be populated with further mitigation measures prior to commencement.		
Air Quality/Dust					
MM7	Dust Control	CEMP Section 3	› Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions. › The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the site manager for cleanliness and cleaned as necessary. › Material handling systems and material storage areas 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. › Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions.		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			› The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary. › All construction related traffic will have speed restrictions on un-surfaced roads to 20 kph. › Daily inspection of construction sites to examine dust measures and their effectiveness. › When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper. › All vehicles leaving the construction areas of the site will pass through a wheel washing area prior to entering the local road network.		
			To be populated with further mitigation measures prior to commencement		
Noise Control					
MM8	Noise Control	CEMP Section 3	› Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts. › Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations. › Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers.		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			› All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works. › Compressors will be of the "sound reduced" models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. › Machines, which are used intermittently, will be shut down during those periods when they are not in use. › Training will be provided by the site manager to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation. › Local areas of the haul route will be condition monitored and maintained, if necessary.		
			To be populated with further mitigation measures prior to commencement		

7. MONITORING PROPOSALS

This section of the CEMP groups together all monitoring measures relating to the proposed works.

By presenting the monitoring proposals in the below table format, it is intended to provide an easy to audit list that can be reviewed and reported on during the proposed works.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
Construction Phase			
MX1	Construction Phase Monitoring	CEMP Section 4	› Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the Site Manager. › A written record will be maintained or available on-site within this Construction Environmental Management Plan (CEMP) which will be maintained on-site during the proposed works.
MX2	Proposed Works Drainage Inspections.	CEMP Section 4	› Daily general visual inspections by Site Manager. › Inspection to include all elements of drainage systems and all monitoring. Inspections required to ensure that drainage systems are operating correctly and to identify any maintenance that is required. Daily inspections checks will be completed on plant and equipment, and whether materials such as silt fencing or oil absorbent materials need replacement. › Event based inspections by the Site Manager as follows: ○ Rainfall >10 mm/hr (i.e. high intensity localised rainfall event) ○ Rainfall >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, ○ Rainfall total greater than monthly average recorded in 7 consecutive days (prolonged heavy rainfall over a week). › A written record will be maintained or available on-site of all monitoring undertaken.
			To be populated with further monitoring measures prior to commencement

8. PROGRAMME OF WORKS

8.1 Construction Schedule

The proposed works will occur over a 12-month period including approach roads and bridge construction/demolition works. The commencement date is unknown and subject to An Bord Pleanála and Leitrim County Council approval. It is hoped to commence in the first quarter of 2022.

Works will be undertaken in accordance with Leitrim County Council permitted working hours. This is barring a delay in works due to COVID-19 public health guidelines published in the intervening period.

8.2 Schedule of Works Operation Record (SOWOR)

A Schedule of Works Operation Record (SOWOR) is a document format which can be used to programme individual work tasks, and audit compliance of works with planning conditions and law relating to environmental protection. An example SOWOR template is included in Appendix 2.

It is proposed that the SOWOR will be maintained by the Environmental Clerk of Works (ECoW) who will be a suitably qualified staff member, as outlined in Section 4.1.2. However, the contractor will comply with the requirements of the SOWOR as instructed by the ECoW. Any changes to the SOWOR will be agreed upon by the appointed main contractor, Leitrim County Council and the ECoW during the course of the works.

Digital copies of the SOWOR, method statements, and all other project documentation will be maintained by the contractor at their site offices. Hard copies of the SOWOR and method statements including maps will be held on-site by both the ECoW and the contractor. The draft SOWOR contains a row for each work item.

Once the contractor's programme of works has been confirmed, and during works when the programme changes, it will be the contractor's responsibility to update the numbered work tasks in the draft SOWOR to identify all activities to be executed, and the estimated durations for same; and also to communicate any changes in the programme to MKO before work tasks commence, to allow time to plan for changes to the supervision schedule.

9. COMPLIANCE AND REVIEW

9.1 Site Inspections and Environmental Audits

Routine inspections of works will be carried out on a daily and weekly basis by the Site Manager to ensure all controls to prevent environmental impact, relevant to the activities taking place at the time, are in place.

Environmental inspections will ensure that the works are undertaken in compliance with this CEMP and all other planning application documents, e.g. NIS. Only suitably trained staff will undertake environmental site inspections.

9.2 Auditing

The Main Contractor will be responsible for implementing the mitigation and monitoring measures specified throughout Sections 6 and 7 of this CEMP, and the NIS. The Main Contractor will also be responsible for ensuring that all construction staff understand the importance of implementing the mitigation measures. The implementation of the mitigation measures will be overseen by the Site Manager and inspected at periodic intervals by the ECoW.

Environmental audits will be carried out during the proposed development. In contrast to monitoring and inspection activities, audits are designed to shed light on the underlying causes of non-compliance, and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by contractor staff or alternatively by external personnel acting on their behalf. It is important that an impartial and objective approach is adopted. Environmental audits will be conducted at planned intervals to determine whether the CEMP is being properly implemented and maintained. The results of environmental audits will be provided to project management personnel.

9.3 Environmental Compliance

The following definitions shall apply in relation to the classification of Environmental Occurrences during works:

Environmental Near Miss: An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident: Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.

Environmental Exceedance Event: An environmental exceedance event occurs when monitoring results indicate that limits for a particular environmental parameter (as indicated in the Environmental Monitoring Programme) has been exceeded.

An exceedance will immediately trigger an investigation into the reason for the exceedance occurring and the application of suitable mitigation where necessary.

Exceedance events can be closed out on achieving a monitoring result below the assigned limit for a particular environmental parameter.

Environmental Non-Compliance: Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the EMP.

9.4 Corrective Action Procedure

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the Site Manager. Corrective actions may be required as a result of the following:

- Environmental Audits
- Environmental Inspections and Reviews
- Environmental Monitoring
- Environmental Incidents
- Environmental Complaints

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on-site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on-site that requires immediate attention and direct communications between the Site Manager and the site staff involved, a Corrective Action Notice will be completed at a later date.

APPENDIX 1

OUTLINE CONSTRUCTION & DEMOLITION WASTE MANAGEMENT PLAN, PUNCH CONSULTING ENGINEERS

PUNCH
consulting engineers

Hartley Bridge, Co. Leitrim

Outline Construction & Demolition Waste Management Plan

September 2021

Document Control

Document Number: 182164-OCDWMP-PL0

Revision	Description	Date	Prepared	Checked	Approved
PL0	Planning Issue	10-09-2021	JP Murray	MC. Daly	P. Casey

Table of Contents

1 Introduction

A Main Contractor has not yet been appointed to carry out the proposed works. Once appointed, it will be the responsibility of the Main Contractor to prepare and submit a detailed construction management plan for the Client's submission to the local authority for approval. The Construction and Demolition Waste Management Plan will be a live document that will be updated throughout the project lifecycle by the Main Contractor as required.

The Hartley Bridge Replacement Project consists of the demolition of the multi-span structure over the River Shannon and its replacement with a new bridge structure immediately downstream along with the associated realignment (vertical and horizontal) of the L3400 on approaches to the new bridge structure. Refer to Figure 1 for existing and proposed bridge location over the River Shannon.

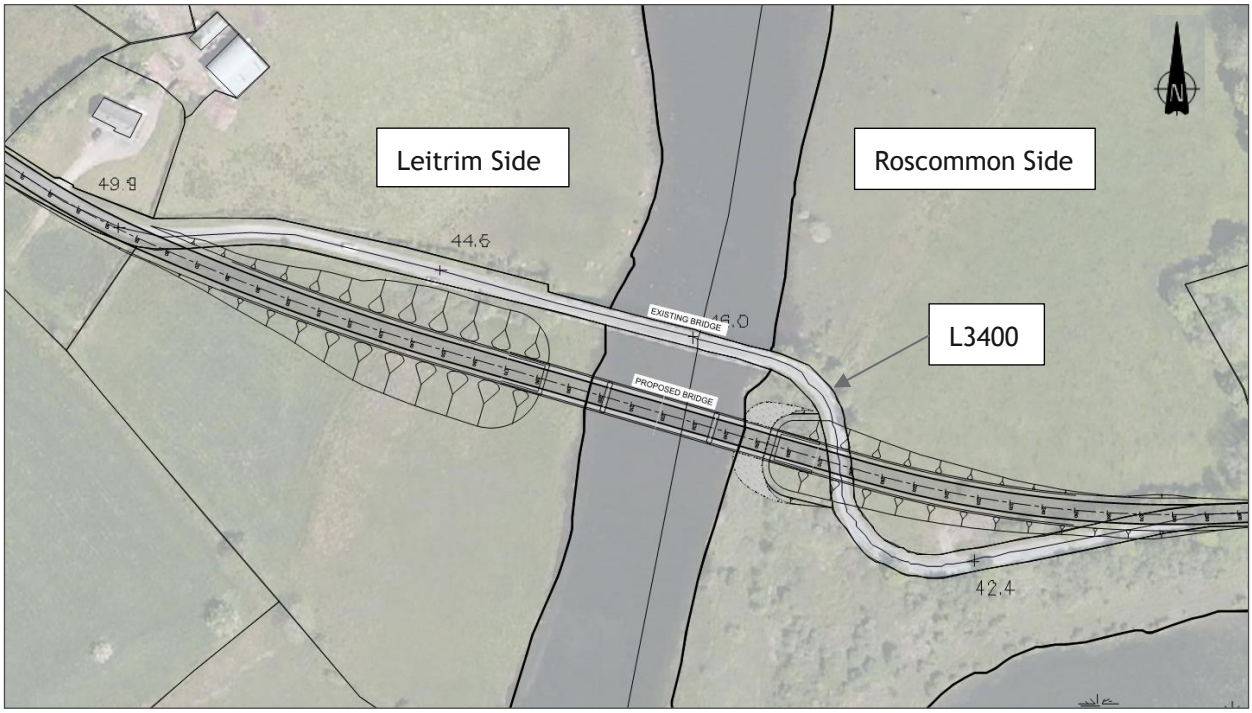

Figure 1 –Existing and Proposed Bridge Locations

The proposed works are outlined in a series of drawings prepared by PUNCH, supplied as part of this planning submission.

This report was prepared for An Bord Pleanála in relation to the proposed project and deals specifically with the Outline Construction and Demolition Waste Management Plan.

2 Construction & Demolition Waste Management

2.1 Background

The purpose of the Construction and Demolition Waste Management Plan (C&D WMP) is to provide the information necessary to ensure that the management of C&D waste at the site is undertaken in accordance with current legal and industry standards including the *Waste Management Act 1996* and associated Regulations, *Litter Act 1997* and the *Eastern-Midlands Region (EMR) Waste Management Plan 2015-2021*.

This section was prepared in accordance with the 'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects' for the planning application of the proposed development and outlines a Preliminary Construction & Demolition Waste Management Plan for the proposed construction works at the site.

2.2 Best Practice

The management of construction and demolition waste should reflect the waste management hierarchy, with waste prevention and minimisation being the first priority succeeded by reuse and recycling.

During site clearance and construction works, there are numerous opportunities for the beneficial reuse and recycling of the demolition materials. The subsequent use of recycled materials in construction works also reduces the quantities of waste which ultimately needs to be consigned to landfill sites.

2.3 Prevention of Waste

The primary effort therefore should be to engage in waste prevention and reduce the amount of waste generated in the first place i.e. minimise the resources needed to do the job.

Prevention is financially advantageous as it reduces the purchase of construction materials and obviates the need to remove wastes from site. It is important to emphasise the potential for certain purchasing procedures to contribute to a reduction in excessive material wastage on site.

Examples include:

- ensuring materials are ordered on an “as needed” basis to prevent over supply to site;
- purchasing construction materials in shape, dimensions and form that minimises the creation of excessive scrap waste on site;
- ensuring correct storage and handling of construction materials to minimise generation of damaged materials/waste, e.g. keeping deliveries packaged until they are ready to be used;
- ensuring correct sequencing of operations; and
- assigning individual responsibility (through appropriate contractual arrangements) to sub-contractors for the purchase of raw materials and for the management of wastes arising from their activities, thereby ensuring that available resources are not expended in an extravagant manner at the expense of the main contractor.

2.4 Reuse of Waste

Waste material that is generated should be reused on site or salvaged for subsequent reuse to the greatest extent possible and disposal should only be considered as a last resort. Initiatives should be put in place to maximise the efficient use/reuse of materials.

2.5 Recycling of Waste

There are a number of established markets available for the beneficial use of C&D waste:

- waste timber can be:
  - recycled as shuttering or hoarding, or
  - sent for reprocessing as medium density fibreboard;
- waste concrete can be utilised as fill material for roads or in the manufacture of new concrete when arising at source; and
- in addition, the technology for the segregation and recovery of stone, for example, is well established, readily accessible and there is a large reuse market for aggregates as fill for roads and other construction projects.

2.6 Overall Management of Construction and Demolition Waste

Waste minimisation, reuse and recycling can best be managed operationally by nominating a "Construction and Demolition Waste Manager" to take responsibility for all aspects of waste management at the different stages of the Project.

This C&D Waste Manager may well be a number of different individuals over the life-cycle of the Project, but in general is intended to be a reliable person chosen from within the Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project Waste Management Plan are delivered and who is assigned the requisite authority to secure achievement of this purpose.

Specifically, the function of the C&D Waste Manager will be to communicate effectively with colleagues in relation to the aims and objectives for waste management on the Project. The primary responsibility for delivery of the objectives of the Waste Management Plan will fall upon the C&D Waste Manager designated at the demolition/ construction stage. A key objective for the C&D Waste Manager should be to maintain accurate records on the quantities of waste/ surpluses arising and the real cost (including purchase) associated with waste generation and management.

The preparation, application and documentation of a Project Waste Management Plan should enable all parties - including contractors, designers and competent authorities - to learn from the systematic implementation and assessment of best practice, particularly through the recording of summary information on performance outcomes.

2.7 Construction Management Plan

2.7.1 Disposal of Water, Wastewater and Sewage

All site facilities during construction will be located entirely within the site. The facilities will include canteen, toilet block and drying room for all staff/workers. These facilities will be connected to the Local Authority sewage system with local authority approval.

2.7.2 Water Disposal

Throughout the works, all surface water (water from excavations etc.) will be pumped to a holding tank on site. From here the water will be pumped to a series of settlement tanks. These tanks will act as primary and secondary settlement. The settlement tanks will be of sufficient number and size to allow the necessary retention time for solids to settle. The discharge water from the final tank will be routed to the existing surface water system with approval from the local authority. Visual checks of the pumping and settlement system will be carried out on a routine basis.

2.7.3 Working Hours

The proposed hours of work on site will be 07:00 hrs to 19:00 hrs Monday to Friday and 08:00 hrs to 16:30 hrs Saturday unless otherwise specified by planning conditions. Certain tasks may need to be undertaken outside of these hours. All outside of hours work will first be agreed in writing with the Local Authority.

2.7.4 Waste Management Control Policy

In general:

Regular shaped skips, will be used for the duration of the demolition/ construction works. All skips will be situated in the waste segregation area on site.

Labelled skips will be available for each of the following waste types: wood, metal, brick/ rubble, canteen waste, plasterboard, paper and cardboard, other general waste and special bins for any hazardous wastes as required.

Throughout the demolition/ construction zone, covered labelled wheelie bins will be placed at designated waste depots. These bins will be taken and used by the operatives/ sub-contractors and returned to the depots after use.

The waste segregation area banksman will co-ordinate the movement of skips to and from the demolition/ construction zone. The banksman will also co-ordinate the scheduling of the approved waste collector to transport waste to the relevant permitted/ licensed waste facility.

2.7.5 Control of Fuels and Lubricants

In order to provide fuel to the relevant items of plant on site, a certified double skinned metal fuel tank with integrated pump, delivery hose, meter, filter and locking mechanism will be situated in a secure area on the construction site. It will be situated within a bund. This tank will be certified for lifting when full.

Sand piles and emergency clean up spill kits will be readily available in the event of a fuel spill. A hazardous bin will also be available to contain any spent sand or soak pads.

New metal gerry cans with proper pouring nozzles will be used to move fuel around the site for the purposes of refuelling items of small plant on site.

Drip trays will be used under items of small plant at all times. Any waste oils etc. contained in the drip trays or the bunded area will be emptied into a waste oil drum, which will be stored within the bund.

Metal gerry cans and any other items of fuel containers will be stored in certified metal bunded cabinets. Any gas bottles will be stored in a caged area at a secure location on the site. All will be properly secured at point of work.

2.7.6 Site Compound Layout

The site will be enclosed by hoarding. A waterproof membrane will be fixed to the base of the hoarding and the ground. The compound area will be of hardstanding material. Due to the nature of the works,

compounds may be required on each side of the River Shannon to facilitate concurrent construction or demolition related works.

2.7.7 Car Parking Arrangements

Due to the availability of adequate space on the site, parking of construction workers vehicles will be feasible within the site extents. To minimise congestion, a traffic management plan will need to be developed by the Contractor to ensure that construction workers access the site using alternative means of transport (i.e. public transport) to negate/minimise any impacts on the local network.

2.7.8 Traffic Management Procedures / Generation

All deliveries will be booked into site at least one day before delivery. All drivers will contact the site gate man 15 minutes before arrival on site.

Construction traffic will arrive along the L3400, prior to entering the proposed site. Refer to defined construction/demolition traffic route in Section 4.1.1 of this report. All deliveries will be off-loaded without delay by the most appropriate method and escorted off site.

The site gate man will be responsible for ensuring that there is no conflict between pedestrians and vehicles entering/ exiting the site. In addition, temporary markings will be painted on the footpath either side of the site entrance to alert pedestrians if required/applicable.

It is predicted that there will be as many as 20 personnel on site during peak construction activity. Accounting for car sharing, there could be in the order of 10 vehicles arriving and departing the site every day during peak construction activity. It is envisaged that working hours on site will be 07:00 hrs to 19:00 hrs Monday to Friday and 08:00 hrs to 16:30 hrs Saturday, therefore the peak movements in and out of the site should occur outside of the AM/PM rush hour traffic.

The volume of HGV movements per day will vary according to the different stages of bulk excavation/demolition. Peak HGV movements will be associated with removal off-site of the decommissioned Hartley Bridge, and deliveries of the prestressed beams and in-situ concrete deliveries associated with the replacement bridge construction.

Bulk Excavation/Regrading Works:

For a rigid HGV hauling material to the site, it will typically take 15 mins from when the rigid arrives at the site entrance, travels to the unloading area, empties its load and leaves the site.

The worst-case scenario is demolition works with an estimated average of 4 HGV's per hour predicted during peak site grading activity. It is envisaged that HGV movements will be undertaken outside of AM/ PM rush hour traffic.

2.7.9 Air Quality

There is the potential for a number of emissions to the atmosphere during the bulk excavation/demolition stage of the project. In particular, activities may generate quantities of dust. Construction vehicles, generators etc., will also give rise to some exhaust emissions.

Vehicular movements to and from the site will make use of existing roads. It is estimated that peak construction HGV movements will be 4 HGV's per hour. Considering the existing traffic levels in the area, the likely air quality impact associated with construction traffic is not significant.

A dust minimisation plan will be formulated for the bulk excavation/demolition and construction phase of the project, as construction activities are likely to generate dust emissions. The potential for dust to be emitted depends on the type of activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these

locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within several hundred metres of the construction area.

In order to ensure that no dust nuisance occurs, a series of measures will be implemented.

Roads shall be regularly cleaned and maintained as appropriate. Hard surface roads shall be swept to remove mud and aggregate materials from their surface. Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.

Vehicles delivering material with dust potential both on and off the site shall be enclosed or covered with tarpaulin at all times to ensure no potential for dust emissions.

All vehicles exiting the site shall make use of a wheel wash facility, if required, prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site shall be regularly inspected for cleanliness and cleaned as necessary.

Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.

At all times, the procedures put in place will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, satisfactory procedures will be implemented to rectify the problem.

The dust minimisation plan shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practise and procedures.

2.8 Noise and Vibration

2.8.1 Noise

There is no published Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider at their discretion noise limits.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale will be agreed with Leitrim County Council and Roscommon County Council as part of the planning conditions and will indicate the maximum permissible noise levels at adjacent properties during construction and any related time constraints with regard hours of operation. The majority of the construction activity is expected to occur during normal working hours.

2.8.2 Vibration

There are two varieties of criteria for vibration: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, piling is typically tolerated at vibration levels up to 5mm/s. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night.

Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard BS 7385 -2:1993: Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration, and;
- British Standard BS 5228-2:2009: Code of practice for noise and vibration control on construction and open sites

2.8.3 Noise and Vibration Mitigating Measures

Due to the nature of the activities undertaken on a construction site, there is naturally potential for generation of significant levels of noise. A variety of items of plant may be in use, such as pneumatic breakers, excavators, lifting equipment, piling rigs, dumper trucks, compressors and generators. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels.

The potential for vibration at neighbouring sensitive locations during construction is typically limited to demolition works, excavation works, substructure works and lorry movements on road surfaces.

With regard to construction activities, reference will be made to BS 5228-1:2009: Noise control on construction and open sites, which offers detailed guidance on the control of noise and vibration from demolition and construction activities. In particular, it is proposed that various practices be adopted during construction, including:

- limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- establishing channels of communication between the contractor/developer, Local Authority and residents;
- appointing a site representative responsible for matters relating to noise and vibration;
- monitoring typical levels of noise and vibration during critical periods and at sensitive locations;
- all site access roads will be kept even, to mitigate the potential for vibration from lorries;
- Construction of 2.4m high hoarding.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- selection of plant with low inherent potential for generation of noise and/ or vibration;
- erection of barriers as necessary around noisy processes and items such as generators heavy mechanical plant or high duty compressors;
- placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

We would recommend that vibration from construction activities be limited to the values set out in section 2.8.2. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

During the construction phase of the project there will be some small impact on nearby properties due to noise emissions from site traffic and other activities. However, given that the construction phase of the project is temporary in nature, it is expected that the various noise sources will not be excessively

intrusive. Furthermore, the application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum.

It is highly recommended that appropriate dilapidation records for the site and surrounding area are documented prior to the commencement of construction/demolition activities.

2.9 Indicative On-Site Waste Construction & Demolition Waste Management Plan

In the course of the Project, it is estimated that the following quantities of construction and demolition wastes/material surpluses will arise:

Construction Waste Material	Quantity		Actions
Metal	0 t		Not envisaged at this stage of the project*
Concrete	800 t		50% of any waste concrete to be recycled and 50% to be properly disposed of
Paper & Cardboard	2 t		100% of any waste packaging to be recycled
Plastic	2 t		100% of any waste packaging to be recycled
Wood	5 t		100% of any waste timber to be recycled
Mixed Waste	5 t		Waste materials will be recycled where possible or disposed of appropriately
Mineral (bricks, gypsum)	40 t		100% of any waste masonry to be recycled
Soil/Stones	100 t		100% of any soil or stones to be recycled and reuse on site subject to suitability of material
Residues	5 t		Any other waste materials will be recycled where possible or disposed of appropriately
TOTAL Arisings	**959 t**		

Table SF1 Estimated C&D Waste Arisings on Site from Appendix 3 of Best Practice Guidelines of Waste Management Plans for C&D Projects (figures to be confirmed as design progresses)

These quantities are provisional only and subject to further determination during construction works.

2.9.1 Proposals for Minimisation, Reuse and Recycling of C&D Waste

Construction and demolition waste will arise on the Project mainly from the site clearance, service trenches and foundation preparation.

The following are proposals for minimisation, reuse and recycling of C&D waste:

- The Purchasing Manager shall ensure that materials are ordered so that the quantity delivered, the timing of the delivery and the storage is not conducive to the creation of unnecessary waste.
- Concrete waste will be source segregated.
- Masonry and wood will be source segregated.
- Packaging will be source segregated for recycling or return to suppliers.
- Hazardous wastes will be identified, removed and kept separate from other C&D waste materials in order to avoid further contamination.

- Other C&D waste materials will be collected in receptacles with mixed C&D waste materials, for subsequent separation and disposal at a remote facility.

It is anticipated that waste materials will have to be moved off site. It is the intention to engage specialist waste service Contractors, who will possess the requisite authorisations, for the collection and movement of waste off-site, and to bring the material to a facility which currently holds a Waste Licence/ Waste Permit/ Certificate of Registration. Accordingly, it will be necessary to arrange the following waste authorisations specifically for the Project:

Authorisation Type	Specific Need for Project (Yes/No?)
Waste Licence	Yes ■ No ☐
Waste Permit	Yes ■ No ☐
Waste Collection Permit	Yes ■ No ☐
Trans frontier Shipment Notification	Yes ☐ No ■
Movement of Hazardous Waste Form	Yes ☐ No ■

Table SF3 Waste Authorisations Necessary for the Scheme from Appendix 3 of Best Practice Guidelines of Waste Management Plans for C&D Projects

A list of waste collection permit holders to be employed on this project will be submitted to the local authority by the contractor in their Formal Construction and Demolition Waste Management Plan for the Construction Stage.

A list of waste collection permit sites that the waste may be recovered or disposed to on this project will be submitted to the local authority by the contractor in their Formal Construction and Demolition Waste Management Plan for the Construction Stage.

2.9.2 Assignment of Responsibilities

A foreman shall be designated as the Responsible Person and have overall responsibility for the implementation of the on-site Waste Management Plan.

The Responsible Person will be assigned the authority to instruct all site personnel to comply with the specific provisions of the Plan.

At the operational level, a Ganger from the main contractor and appropriate personnel from each sub-contractor on the site shall be assigned the direct responsibility to ensure that the discrete operations stated in the Waste Management Plan are performed on an on-going basis.

2.9.3 Training

Copies of the Waste Management Plan will be made available to all personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the Waste Management Plan and informed of the responsibilities which fall upon them as a consequence of its provisions.

Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the Waste Management Plan.

Posters will be designed to reinforce the key messages within the Waste Management Plan and will be displayed prominently for the benefit of site staff.

2.9.4 Waste Auditing

The C&D Waste Manager shall arrange for full details of all arisings, movements and treatment of construction and demolition waste discards to be recorded during the construction stage of the Project.

Each consignment of C&D waste taken from the site will be subject to documentation, which will conform to Table SF4 and ensure full traceability of the material to its final destination.

Detail	Particulars
Name of Project of Origin	e.g. Hartley Bridge Replacement
Material being Transported	e.g. Soil, Demolition Concrete, Crushed Asphalt etc.
Quantity of Material	e.g. 20.50 tonnes
Date of Material Movement	e.g. 01/07/2021
Name of Carrier	e.g. Authorised Carriers Ltd.
Destination of Material	e.g. Suitable Landfill
Proposed Use	e.g. Use as Hardcore in Dwelling Floors

Table 1 Table SF4 Details to be Included within Transportation Dockets from Appendix 3 of Best Practice Guidelines of Waste Management Plans for C&D Projects

Details of the inputs of materials to the Construction site and the outputs of wastage arising from the Project will be investigated and recorded in a Waste Audit, which will identify the amount, nature and composition of the waste generated on the site.

The Waste Audit will examine the manner in which the waste is produced and will provide a commentary highlighting how management policies and practices may inherently contribute to the production of construction and demolition waste.

The measured waste quantities will be used to quantify the costs of management and disposal in a Waste Audit Report, which will also record lessons learned from these experiences which can be applied to future projects.

The total cost of C&D Waste management will be measured and will take account of the purchase cost of materials (including imported soil), handling costs, storage costs, transportation costs, revenue from sales, disposal costs etc. Costs will be calculated for the management of a range of C&D Waste materials, using the format shown in Table SF5.

The Table SF5 below will be completed and submitted to the Council in full following the appointment of a contractor for the works.

Material	Estimated Quantities & Costs (tonnes & Euro)
SOIL	XXX tonnes for €_____
Quantity of Waste Soil(tonnes)	
Purchase Cost i.e. Import Costs (€)	
Materials Handling Costs (€)	
Material Storage Costs (€)	

Material Transportation Costs (€)	
Revenue from Material Sales (€)	
Material Disposal Costs (€)	
Material Treatment Costs (€)	
Total Waste Soil Management Costs (€)	
Unit Waste Soil Management Costs (€)	

Table SF5 Standard Record Form for Costs of C & D Waste Management from Appendix 3 of Best Practice Guidelines of Waste Management Plans for C&D Projects

Details of the quantities and types of C&D Waste arising from the Project will be forwarded to Environmental Protection Agency, local competent authority, NCDWC etc.

3 Waste Management Legislation and Obligations

3.1 Relevant Waste Management Legislation

This section provides details of waste related legislation relevant to the project. In accordance with cradle to grave responsibilities, the Contractor will be responsible for all waste arisings from the time the waste is generated until it reaches its final destination point. This includes its method of treatment/disposal. The Waste Management Acts 1996-201, give effect to the polluter pays principle effectively stating that the waste producer may be liable for any pollution incidents arising from the management of their waste. There is therefore an onus on the Contractor to ensure that all contractors managing waste on their behalf are legally compliant and technically competent and the waste itself is contained, handled, treated and disposed of in accordance with all relevant regulatory requirements.

A brief description of the main waste related regulatory controls relevant to the project is provided hereunder; however, the list is not exhaustive and should be reviewed and amended at regular intervals in accordance with changing legislation:

3.1.1 Waste Management (Landfill Levy) Regulations 2015, S.I. No. 189/2015

The existing levy of €75 per tonne of waste disposed is unchanged under these new Regulations.

3.1.2 Waste Management (Facility Permit and Registration) (Amendment) Regulations 2015, S.I. No. 198/2015

These regulations describe the process for obtaining a Waster Permit or Certificate of Registration, by a private operator from a local authority, or a Certificate of Registration from the Environmental Protection Agency (EPA) in respect of a local authority run waste activity which requires registration.

3.1.3 Waste Management (Licensing) (Amendment) Regulations 2010, S.I. No. 350/2010

These regulations relate to the process for obtaining a waste licence from the EPA for the operation of certain waste recovery or disposal facilities under Part V of the Waste Management Act.

3.1.4 Waste Management (Collection Permit) (Amendment) Regulations 2016, S.I. No. 24/2016

These regulations relate to the requirement to obtain a waste collection permit from the relevant local authority for the collection of waste on a commercial basis.

3.1.5 Waste Management (Movement of Hazardous Waste) Regulations 1998, S.I. No. 14/1998

These regulations control the movement of hazardous waste within Ireland requiring authorisation in the form of C1 consignment forms. The C1 form is completed by the Consignor, the Carrier and the Consignee. A three part document provides a tracking mechanism for the hazardous waste from its point of origin to its final destination.

3.1.6 Waste Management (Shipments of Waste) Regulations 2007, S.I. No. 419/2007

These regulations control the movement of waste across member states. Shipments are controlled under a TFS (Transfrontier Shipment) form, which designates the waste under the categories of Green, Amber and Red List. Dublin City Council is the designated competent authority under the regulations.

3.1.7 Waste Classification, List of Waste and Determining if Waste is Hazardous or Non-Hazardous, 2015

This document allows the generators of waste to classify the waste as hazardous or non-hazardous and in the process assigning the correct List of Waste entry. The waste classification system applies across the EU and is the basis for all national and international waste reporting obligations. Correct classification is the foundation for ensuring that collection, transportation, storage, treatment of waste is carried out in a manner that provides protection for the environment and human health and in compliance with legal requirements.

3.1.8 Carriage of Dangerous Goods by Road Regulations 2015, S.I. No. 288/2015

These regulations require drivers transporting dangerous goods to be ADR trained. In addition, a Dangerous Goods Safety Advisor (DGSA) must be appointed where activities include the carriage, or related packing, loading, filling or unloading of dangerous goods by road.

4 Construction Traffic Management

This section, relating to the Construction Traffic Management Plan (CTMP), sets out the traffic management requirements that will apply to Contractors who are engaged in the demolition and construction activities associated with the proposed Hartley Bridge replacement project. The Contractor must adopt the requirements of this Outline Construction Traffic Management Plan into his own Construction Traffic Management Plan and must agree same with Leitrim County Council and Roscommon County Council prior to commencement on site.

Please refer to the Outline Traffic Management Plan supplied separately as part of the planning submission for further details.

4.1 Construction Traffic Access to the Site

4.1.1 Location and access to the site

The site will be accessed via the L3400 from the Leitrim or Roscommon county side, depending on whether you are approaching the eastern or western banks respectively. Refer to the figures included below for illustration.

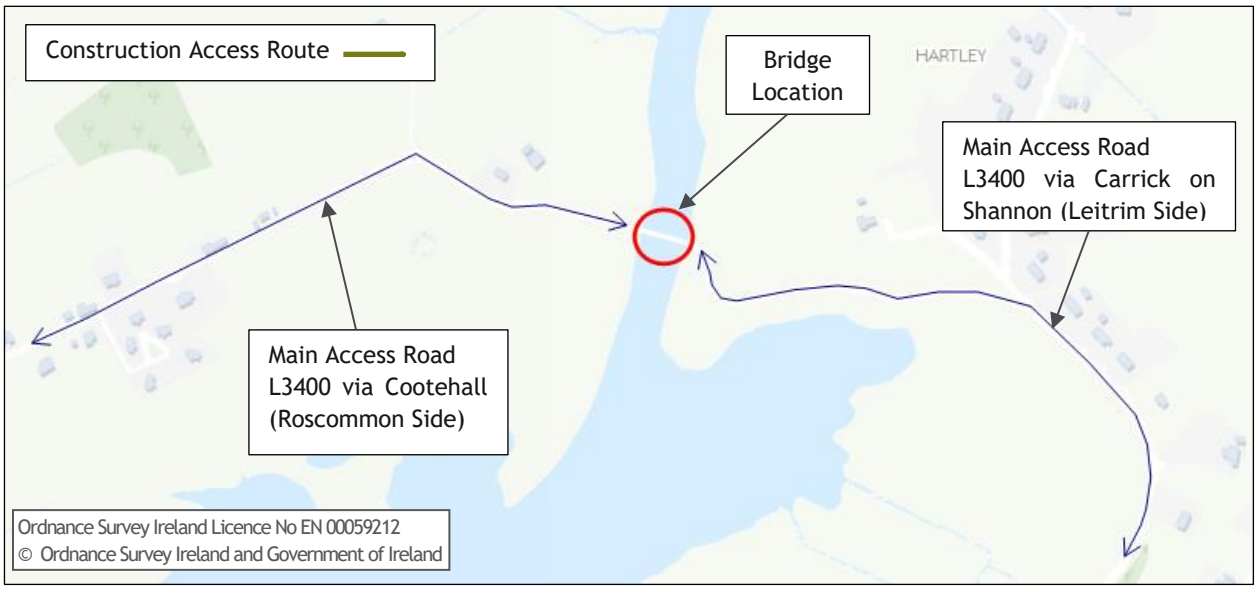

Figure 4-1: L3400 Access Road

Figure 4-2: L3400 (Eastern Approach, i.e. Leitrim Side) © Google Maps

The management of construction traffic on the public road network around the development will be a critical part of the overall project and must be actively managed by the Contractor.

4.1.2 Definition of Construction Traffic

Construction traffic means the following vehicles:

- HGVs & haul trucks – i.e. vehicle with 6 tyres or more as set out in the RSA publication 'Guidelines on Maximum Weights and Dimensions of Mechanically Propelled Vehicles and Trailers, Including Manoeuvrability Criteria'
- Site machinery such as excavators, tippers, bulldozers, etc.
- Concrete trucks.

Smaller vehicles used by construction workers to access the site, such as cars and vans, are not deemed to be construction traffic.

4.2 Management of Construction Traffic around Hartley Bridge

The Contractor is required to control the construction traffic in and around the proposed Hartley Bridge site, with access to the site via the L3400. The Contractor must adhere to the following:

- Communicate clearly to all construction staff and subcontractors that they are bound by these restrictions.
- Schedule site traffic in advance to ensure that these restrictions are adhered to.
- Monitor construction traffic at key points remote from the site to check compliance.
- Details of the Contractor's management plan must be submitted to Leitrim County Council and Roscommon County Council in advance of construction and included as part of the Construction Management Plan.
- Vehicle movements associated with ancillary, maintenance and other non-essential activities will be minimised during the peak traffic hours on the public road in the vicinity of the site. These are the hours of 8:00-9:00 in the morning and 17:00-18:00 in the evening.
- A special permit for moving oversized and hazardous loads will be obtained from the local authorities/ An Garda Síochána prior to any such movements.
- Daily construction programmes will be planned to minimise the number of disruptions to surrounding roads by staggering HGV movements to avoid site queues.
- It is envisaged that there will be provision for on-site parking, sufficient only to serve those directly involved with the works.
- Construction vehicles will follow the road hierarchy as much as practicable - i.e. construction vehicles will be directed away from local or minor streets and roads and will be required to use designated primary national and regional routes for accessing the site.
- The Contractor will appoint a Traffic Management Coordinator who will be responsible for the coordination of all traffic safety and traffic management matters. The Traffic Management Coordinator will ensure that all traffic management requirements set-out in the CTMP are met.
- In the event that multiple contractors will be working on site, overall traffic management coordination will be required. This will include a review of the individual CTMPs prepared by

different Contractors and provision of guidance to ensure consistency between them. An overall CTMP for the entire site should be prepared and agreed with the local authorities in advance of commencement of works.

4.3 Proof of Compliance with Traffic Restrictions

The Contractor will track the transit of construction traffic in the area for the duration of the works.

The Contractor will control traffic movements using the following procedure;

- Develop a restrictions and rule adherence form that all lorry drivers and site operatives will sign.
- All traffic movements to and from site to be managed by the Contractor's transport manager in accordance with these restrictions
- Appointed person located at the site entrance to issue dockets and record all traffic entering and leaving site.
- Records to be reviewed periodically by the site manager.
- Prior to any new contractors starting, all persons must sign up to restrictions and prequalification forms.
- A certified Flagman must be present to coordinate the traffic entering and leaving the site.

4.4 Construction Traffic Access to site via the L3400

4.4.1 Traffic Management Procedures / Generation

All deliveries will be booked into site at least one day before delivery. All drivers will contact the site gate man 15 minutes before arrival on site.

All construction traffic will arrive along the main access road (L3400) with entry to the site via the west or east river bank depending on approach via the Leitrim or Roscommon side. All deliveries will be off-loaded without delay by the most appropriate method and escorted off site.

The site gate man will be responsible for ensuring that there is no conflict between pedestrians and vehicles / entering / exiting the site.

It is predicted that there will be an average of 20 personnel on site during peak construction activity. Accounting for car sharing, there could be in the order of 10 vehicles arriving and departing the site every day during peak construction activity. It is envisaged that working hours on site will be 08:00 hrs to 19:00 hrs Monday to Friday and 08:00 hrs to 16:30 hrs Saturday, therefore the peak movements in and out of the site should occur outside of the AM/PM rush hour traffic.

There is one stage this project that will generate HGV movements; bulk excavation works.

For a rigid HGV hauling material to the site, it will typically take 15 mins from when the rigid arrives at the site entrance, travels to the unloading area, empties its load and leaves the site.

The worst-case scenario is demolition works with an estimated average of 4 HGV's per hour predicted during peak site grading activity. It is envisaged that HGV movements will be undertaken outside of AM/ PM rush hour traffic.

4.4.2 Traffic management – Internal Site Extents

Contractor / subcontractor / supplier parking is not permitted on any local access routes. Vehicles must be parked within approved designated areas within the site extents. To minimise congestion, a traffic management plan will need to be developed by the Contractor to ensure that construction workers access

the site using alternative means of transport (i.e. public transport) to negate impacts on the local network.

No unloading or blockages of access routes, including emergency vehicle access routes. Such vehicles will be immediately requested to move to avoid impeding works.

In accordance with the CTMP, the Contractor must appoint a Traffic Management Coordinator responsible for the management of traffic management related activities on site.

The Contractor must carry out an auto-track analysis to ensure that adequate turning space is available. The auto-track must demonstrate how construction vehicles will go in and out of the site. Contractors must eliminate where possible the necessity for reversing of any construction or supply chain vehicle onsite.

Contractor is to note requirement for traffic management.

4.4.3 Traffic management coordination meetings

Monthly logistics coordination will be undertaken where the traffic management strategy, traffic management coordination (and implementation of any required temporary traffic management schemes) will be discussed and agreed.

4.4.4 Construction Access Road required behaviours

The Contractor must adhere to established traffic management measures specified in the Construction Traffic Management Plan including:

- Queuing procedures outside the site for vehicles seeking to enter the site to prevent back-up onto the local road network;
- Sign-in requirements;
- Visual PPE checks;
- Arrangements for infrequent visitors, e.g. project team, client visitors;
- Compliance to sign-in requirements, use of turnstiles and/or swipe cards; and
- Collaborate with any required security searches of vehicles entering or exiting.

All Contractors will be deemed to have inspected and examined the site and its surroundings at tender stage and to have satisfied itself as to the nature and means of access to the site.

In the event of a Contractor not being satisfied with the permitted access routes to and from the site, the Contractor is obliged to provide for all expenses and charges for temporary way-leaves and temporary truck/vehicle holding areas in connection with different access arrangements to the site. Any amendments must be to the satisfaction of Leitrim County Council and Roscommon County Council.

4.4.5 Loading/Unloading locations

Vehicles must be loaded and unloaded within the site area (i.e. access routes, site compound set-up and loading areas to be developed and agreed with the Contractor). Contractors are not permitted to carry out loading or unloading on the public roadway. This approach reduces the risk to the public, reduces congestion, and minimises disruption and risk to any passing vehicles on the highway. All deliveries and collections should be overseen and managed for the Contractor by a nominated competent person.

Contractors must consider and explain how to manage the impacts on cyclists, pedestrians, other road users, and any affected roadway infrastructure.

4.4.6 Emergency Access

Access for emergency vehicles via the primary haul roads must be maintained at all times.

4.4.7 Asset Protection

The Contractor must take care to avoid damage to roads, footpaths, grass margins, and other surfaces and all walls including protected walls, structures including protected structures and the associated curtilage, trees, lighting fixtures and all other street furniture within or outside of the overall site. They shall be liable for the cost of repairing / replacing all such damage caused by its operations to the satisfaction of Leitrim County Council and Roscommon County Council.

Contractors must take precautions to ensure against spillage of diesel fuel, contaminated water or solvents. Any damage so caused shall be made good by the offending Contractor at its own expense. There may also be repercussions relating to planning conditions for which the Contractor will be liable.

Contractors must prohibit the use of tracked plant on road surfaces outside of the site unless suitably approved protective measures are taken to safeguard the integrity of surfaces.

The Contractors Construction Management Plan must include specifications regarding the quality of temporary reinstatements and the timelines for permanent reinstatements of roads and pavements affected by the works.

4.5 River Navigation Management

The Traffic Co-ordinator will be responsible for ensuring that there is no conflict between public watercraft and construction operations. The interface between watercraft navigating the river and the demolition/construction operations will need to be actively managed throughout the various stages of Works delivery, with an emphasis on minimising adverse impacts on existing navigation norms at Hartley Bridge.

It is unavoidable that some impacts will be incurred due to the ecological/environmental necessity of carrying out the Works during fisheries season also coinciding with peak boating season (June-September). However, the Contractor will endeavour to minimise disruption to navigation by proper sequencing of the Works and reliance on limited short-term partial/full closures of the navigation channels.

The Contractor will control traffic movements using the following non-exhaustive measures;

- Marine Notice to be issued in advance by Waterways Ireland closing the navigation formally.
- Dates for closure of the navigation should be signalled well in advance.
- Safety boats will be required upstream and downstream of the works.
- The barge and temporary installations should be lit to ensure that it can be seen during darkness / reduced visibility.
- Waste arisings from the demolition of the existing bridge structure will be collected ashore locally with HGV hauling material off site via the L3400.
- The proposed sequencing of demolition activities aims to re-establish existing navigation arrangements as early as possible in the process.

Active management of river traffic will be required throughout the demolition of the existing Hartley Bridge structure and the construction of the new replacement bridge. Outline river navigation management proposals are outlined in PUNCH Drawing 182-164-110.

APPENDIX 2

SCHEDULE OF WORKS OPERATION RECORD (SOWOR) TEMPLATE

Works Item No.	**Description**	**Estimated Duration of Works**	**Start / Finish Dates**	**Risk Rating** Schedule 1: Very High Risk Schedule 2: High Risk Schedule 3: Intermediate Risk	**Pre-commencement Triggers** All four triggers should be met				**Works Abandonment Triggers** If any four triggers are met			
					Trigger 1 Drainage treatment infrastructure installed prior to works commencing and in good working order	**Trigger 2** River / watercourse turbidity	**Trigger 3** River level	**Trigger 4** Weather forecast: (a) During the planned works period (b) Observed on site	Trigger 1 Damage to silt fencing/other drainage measure of drainage point close to capacity	**Trigger 2** River / watercourse turbidity	**Trigger 3** River level flood stage forecast	**Trigger 4** Weather forecast: (a) During the planned works period (b) Observed on site
1	Enabling works including clearing of vegetation, site compound establishment, site welfare and fencing.	3 weeks		Schedule 2	Drainage measures to be installed as per drainage management plan	Turbidity at baseline levels	River level within agreed safe working range	Schedule 2 rainfall figures utilising reliable forecasting source, e.g. Met Eireann, agreed prior to commencement of works with Contractor/local authority.	Works cease and emergency response procedure activated including the use and installation of additional pumping equipment, sedimats, siltbags and silt fencing.	Turbidity 20% above baseline conditions or >15 NTU – subject to baseline data analysis and agreement with IFI.	Works cease and all equipment, materials etc. secured against potential flood event.	Schedule 2 rainfall figures

Trigger 4 - Activities should not begin or should cease if the following rainfall amounts are forecasted:	
Schedule 1 – Very high-risk activities	>10 mm/hr (i.e. high intensity local rainfall events)
	>25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
	>half monthly average rainfall in any 7 days.
	No overland flow or pathway for water movement
	Conditions on the ground match the forecast
Schedule 2 – High risk activities	>10 mm/hr (i.e. high intensity local rainfall events)
	>25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
	>half monthly average rainfall in any 7 days.
	Conditions on the ground match the forecast
Schedule 3 – Intermediate risk	>10 mm/hr (i.e. high intensity local rainfall events)
	>25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
	>half monthly average rainfall in any 7 days.
	Conditions on the ground match the forecast