Comhairle Cathrach & Contae Luimnigh

Limerick City & County Council

Limerick City Greenway

(UL to NTP)

Construction Environmental Management Plan

JULY 2025

RYAN HANLEY now Stantec

1 Galway Business Park, Upper Newcastle Rd, Dangan, Galway, H91 A3EF.
Floor 5 Jervis House, Jervis Street, Dublin 1, D01 E3W9.
Unit 1203, Building 1000, Gateway Business Park, New Mallow Road, Cork.
Innovation House, Moneen Road, Castlebar, Co Mayo, F23 E400.

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TABLE OF CONTENTS

ABBREVIATIONS ..... **IV**

EXECUTIVE SUMMARY **1**

1. INTRODUCTION **3**

1.1 General 3

1.2 Site Location 3

1.3 Purpose of this Document 5

1.4 Description of Ecological Site Surveys Undertaken 5

2. TARGETS AND OBJECTIVES **8**

2.1 Key Site Targets 8

2.2 Key Site Objectives 8

2.3 Construction Phase Live Document 8

2.4 Conditions on planning as specified by An Bord Pleanála 9

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT **10**

3.1 Existing gravel path, green field, and roads 10

3.2 Proposed Greenway and Bridges 46

3.3 Proposed Amenity/Rest areas, Landscaping and Tree Planting 77

3.4 Description of Proposed Construction Works 81

4. ENVIRONMENTAL MANAGEMENT **96**

4.1 Introduction 96

4.2 Construction Management Plans 96

4.3 Invasive Species Management and Biosecurity Measures 106

4.4 Waste Management 107

5. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION **112**

5.1 Responsibilities 112

5.2 Environmental Awareness and Training 113

5.3 Environmental Legislative and Regulatory Requirements 114

5.4 Stakeholders Liaison 114

6. EMERGENCY INCIDENT RESPONSE PLAN **116**

6.1 Overview 116

6.2 Incident Reporting 116

6.3 Emergency Contact Details 117
6.4 Resources and Training 117
6.5 Emergency Access and Equipment 117
6.6 Site Evacuation/Fire Drill 117
6.7 Spill Control Measures 118
6.8 Corrective Action 119
6.9 Emergency Incident Response Plan – Key Points 119

7. MITIGATION AND MONITORING PROPOSALS 120

8. PROGRAMME OF WORKS 134

8.1 Construction Schedule 134
8.2 Working Hours 135

9. COMPLIANCE AND REVIEW 136

9.1 Site Inspections and Environmental Audits 136
9.2 Auditing 136
9.3 Environmental Compliance 136
9.4 Corrective Action Procedure 137

APPENDIX A PRELIMINARY DESIGN DRAWINGS

APPENDIX B LANDSCAPE ARCHITECTURE DRAWINGS

APPENDIX C STRUCTURAL DESIGN DRAWINGS

Abbreviations

AASR	Appropriate Assessment Screening Report
BPM	Best Means Practicable
CEMP	Construction Environmental Management Plan
CMS	Construction Management System
ECoW	Ecological Clerk of Works
EMS	Environmental Management System
EPA	Environmental Protection Agency
EWC	European Waste Code
IAPS	Invasive Alien Plant Species
ISMP	Invasive Species Management Plan
IRP	Incident Response Plan
KPI	Key Performance Indicator
LCCC	Limerick City and County Council
LoW	List of Waste
MRF	Materials Recovery Facility
NPWS	National Parks and Wildlife Services
NIS	Natura Impact Statement
NTP	Notice to Proceed
NTU	Nephelometric Turbidity Unit
RA	Risk Assessment
SAC	Special Areas of Conservation
SDS	Safety Data Sheet
SPA	Special Protection Areas
TTMP	Temporary Traffic Management Plan
UL	University of Limerick
WEEE	Waste Electrical and Electronic Equipment
WFD	Water Framework Directive
WMP	Waste Management Plan
WSA	Waste Storage Area

Executive Summary

This report has been prepared to support a planning application to An Bord Pleanála made under Section 51(A) of the Roads Act (1993) (As amended). This report has been prepared by Ryan Hanley on behalf of Limerick City & County Council (LCCC).

The proposed Limerick City Greenway (University of Limerick (UL) to National Technology Park (NTP)) will be 4.25km long and will consist of a 3.3km long and 3.0-4.0m wide shared path on existing paths or in green fields, and 0.9km of separated 1.8m wide footpaths and 1.8-2.0m wide cycle lanes alongside the eastern and western sides of University Road and McLaughlan Road. The proposed Greenway will extend between the River Goody bridge and Plassey Park Road.

All elements of this project will be constructed for permanent local and visitor recreational use.

There will be no buildings constructed along the route.

Two concrete bridge decks will be replaced with wider steel decks, but the existing bridge supports will remain. One new steel and concrete bridge will replace a narrow reinforced concrete bridge. One new steel and concrete bridge will provide access to all and replace the function of a narrow reinforced concrete bridge with steps, but the exiting bridge will remain in place. One new steel and concrete bridge will be constructed alongside a narrow stone bridge. A new concrete ramp to Plassey Beach will replace stone steps, and a new concrete retaining wall will enable the existing gravel path at Plassey Beach to be widened to 3.5m.

The proposed Greenway will be constructed in Castletroy, Co. Limerick. It will extend eastwards from the existing Limerick Smarter Travel Cycle Route 2 to run along the southern bank of the River Shannon and provide a new connection between the existing Shannon Fields Greenway to UL path at Groody Bridge, and existing cycle lanes and footpaths on Plassey Park Road. It will also provide new connections to the IDA's National Technology Park (NTP) at Plassey, and the University of Limerick. This proposed Greenway east of Limerick city will extend existing cycle routes from the city further east and provide future links to Castleconnell and to Co. Clare.

The proposed Limerick City Greenway (UL to NTP) is included in Section 9.1.7 Greenway Cycle Network in the Limerick Shannon Metropolitan Area Transport Study (LSMATS) and is described as an '*Extension of the Shannon Fields Greenway to UL along the banks of River Shannon to the NTP and Annacotty*'. The Limerick Development Plan 2022-2028 (LDP) includes policies to deliver modal split (Objective TR 06), to promote '*walking, cycling or other non-motorised wheel-based transport modes for purposeful travel*' (Section 7.5.2), to encourage behavioural change (Objective TR 07), to provide walking and cycling infrastructure (Objective TR O8), and to promote sustainable patterns of transport use (Objective TR P4). This project will provide an accessible cycling and walking route for users of all abilities in accordance with the objectives in the LDP and LSMATS.

The project is not a class of development for which mandatory Environmental Impact Assessment (EIA) is required as specified in either Part 1 of Schedule 5 of the Planning and Development Regulations, 2001 (as amended) or in Part 2 of Schedule 5 of the Planning and Development Regulations, 2001 (as amended). The Formal EIA screening process was completed having regard to the Roads Act as amended by the EIA Directive 2014/52/EU. An EIA report has been prepared for this project. An AA Screening Report was prepared for this project. It concluded that a Natura Impact Statement (NIS) was required so an NIS has been prepared for this project.

The proposed Greenway will provide strategic, sustainable, and safe connectivity between Limerick city the University of Limerick, the National Technology Park, and connect community facilities, tourist

attractions, and transport nodes (i.e., bus stations). This connectivity will benefit communities, businesses, and visitors.

The proposed works for the construction of the Limerick City Greenway (UL to NTP) will be on land for which specific planning objectives are in place. All applicable planning objectives have been examined and any risks to the meeting of same have been mitigated. As a result, the development of the proposed Greenway will not significantly impede development potential or zoning objectives of the land. The proposed development is consistent with planning policy at National, Regional and Local level and is in accordance with proper planning and sustainable development.

1. Introduction

1.1 General

The Construction Environmental Management Plan (CEMP) has been prepared by Ryan Hanley on behalf of Limerick City and County Council (LCCC) for the proposed Limerick City Greenway (UL to NTP) project in Co. Limerick.

This CEMP defines the project specific environmental mitigation measures, which are detailed in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) as well as other documents that are to be put in place and procedures to be followed for the scope of construction works, both permanent and temporary, for the Limerick City Greenway (UL to NTP).

The CEMP is considered a '*live*' document and prior to commencing construction on site, the appointed Construction Management Team will prepare a detailed CEMP. The detailed CEMP will be based on the contents of this CEMP and will define environmental measures and procedures to manage construction works regarding risk to the environment in more detail.

The CEMP is an integral part of the site health, safety, environmental and quality management system and constitutes a component of the Construction Health and Safety Plan documentation. The CEMP is also subject to the requirements of the project quality management system with respect to documentation control, records control, and other relevant measures.

1.2 Site Location

The proposed Limerick City Greenway (UL to NTP) will be 4.25km long and will consist of a 3.3km long and 3.0-4.0m wide shared path on existing paths or in green fields (refer to the orange and green lines on Figure 1 1), and 0.9km of separated 1.8m wide footpaths and 1.8-2.0m wide cycle lanes alongside the eastern and western sides of University Road and McLaughlan Road (refer to the blue lines on Figure 1-1). The proposed Greenway will extend between the River Goody bridge and Plassey Park Road.

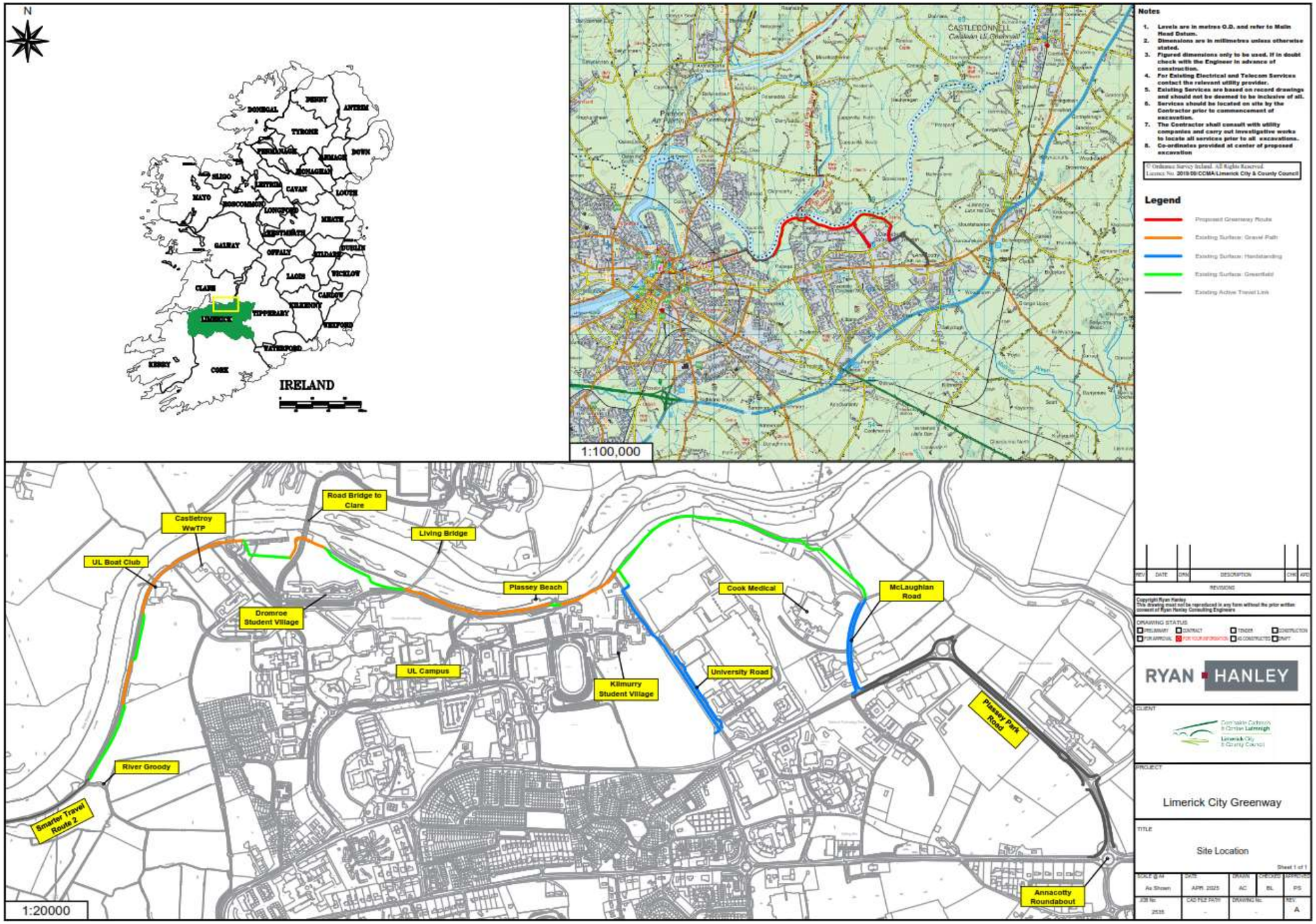

Figure 1-1: Location Map

1.3 Purpose of this Document

The purpose of this document is to communicate applicable environmental guidance and instruction to all contractors, sub-contractors, and employees in order to address and prevent potential environmental effects that may arise while carrying out any construction activity for the proposed works.

This CEMP is to be read in conjunction with the EIAR and NIS. This CEMP will assist the appointed contractor in the development of the detailed CEMP as well as a suite of Construction Phase Management Plans including waste, surface water and traffic. The objectives of the detailed CEMP developed by the contractor appointed by LCCC to construct the works, prior to commencement of construction activities and will also include any planning conditions imposed by LCCC.

The detailed CEMP will be overseen by personnel such as the Site Manager and Environmental Manager, as outlined in Section 5.1 of this report.

1.4 Description of Ecological Site Surveys Undertaken

Site survey visits were made by the Ryan Hanley team and contracted Ecologists between 2020 and 2024 with a focus on the variety of habitats, mammals, bats, birds, and freshwater aquatic ecology occurring within the environs of the proposed scheme. The ecology of the area surrounding the proposed development was first assessed in terms of habitats, flora, fauna and invasive species.

The area over which the proposed development has the potential to result in effects to the Zone of Influence was determined by on-site observation and scientific analysis. The surveys undertaken for the Limerick City Greenway (UL to NTP) Project included:

Survey Type	Dates
Preliminary Multi-Disciplinary walkover survey	Nov 2020 and April 2022
Ecology habitat survey	May 2021 and April 2022
Aquatic Ecology Appraisal	Oct 2023
Water Framework Directive (WFD) Assessment – RHAT survey	July 2024
Badger Surveys	May 2021 and July 2024
Bat Surveys	July 21, Sept 2021, June & July 2024
Breeding Bird Survey	June 2021, April and June 2022, and May and June 2023
Winter bird Surveys	Nov 2021 to March 2022 and October 2023 to March 2024
Invasive Alien Plant Species Surveys	Nov 2020 and May 2021 – June and July 2024
Otter Surveys	May 2021 and July 2024
Tree Surveys and arboriculture impact assessment	May and June 2021 and Feb 2024

All surveys were undertaken by professional ecologists with the professional experience and necessary qualifications required to carry them out. Habitats recorded within the study area of the greenway are illustrated in Figure 1-3.

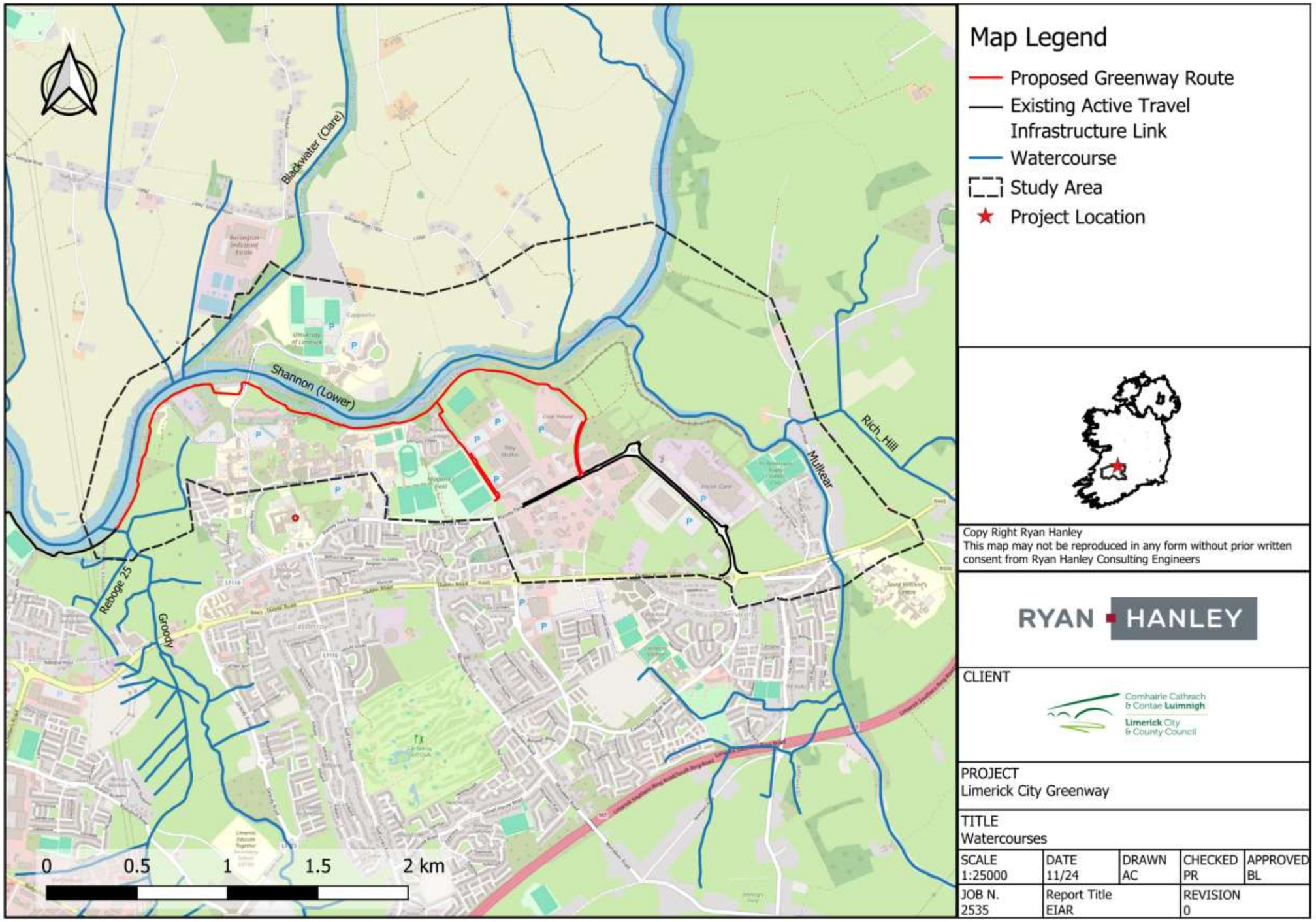

Figure 1-2: Study Area

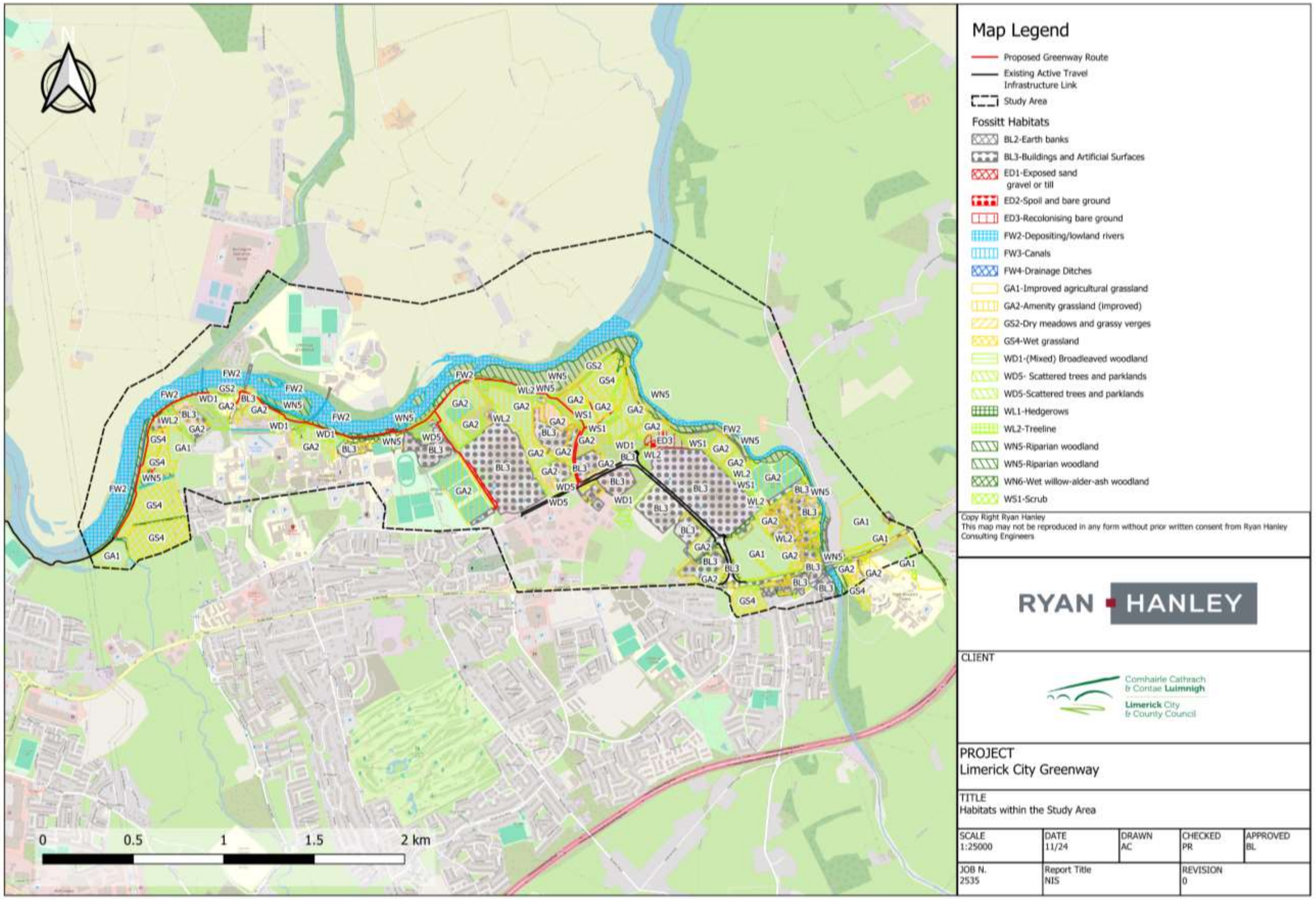

Figure 1-3: Fossitt Habitats Recorded within the Study Area

2. Targets and Objectives

Proposed construction phase works will be designed and carried out to approved standards, which will include specified materials, standards, specifications, and environmental codes of practice.

2.1 Key Site Targets

The key site targets are as follows:

- Ensure construction works and activities are completed in accordance with mitigation and approaches presented in this CEMP, EIAR, NIS and associated documentation;
- Ensure construction works and activities are completed in accordance with all documents prepared as part of the assessment of the proposed development;
- Ensure construction works and activities have minimal impact/disturbance to the local landowners, academic facilities, accommodation and the local community;
- Ensure construction works and activities have minimal impact on the natural environment;
- Adopt a sustainable approach to construction; and
- Provide adequate environmental training and awareness for all project personnel.

2.2 Key Site Objectives

The key site objectives from an environmental perspective are as follows:

- Using recycled materials, if possible, e.g., timber, excavated stone and overburden material;
- Ensure sustainable sources for materials supply where possible;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Keeping all watercourses free from obstruction and debris;
- Keep impact of construction to a minimum on the local environments, watercourses, and wildlife;
- Correct fuel storage and refuelling procedures to be followed;
- Good waste management and housekeeping to be implemented;
- Air, dust, and noise pollution prevention to be implemented;
- Implementation of monitoring of the works and any adverse effects that it may have on the environment. Construction methods and designs will be altered where it is found there is an adverse effect on the environment;
- Follow the principles of Waste Hierarchy to minimise waste and disposal to landfill;
- Comply with all relevant water quality legislation listed throughout this document; and
- Ensure a properly designed, constructed, and maintained drainage system appropriate to the requirements of the site is always kept in place.

2.3 Construction Phase Live Document

As outlined in the Introduction above, the CEMP is to be considered a '*live*' document and as such will be reviewed on a regular basis. Updates to the CEMP may be necessary due to any changes in environmental management practices, design, and/or contractors. As detailed in more detail in the later sections, the procedures agreed in this CEMP and developed further in the detailed CEMP will be audited by the environmental manager regularly throughout the construction phase to ensure compliance.

Triggers for amendments to the CEMP will include:

- When there is a perceived need to improve performance in an area of environmental impact;
- As a result of changes in environmental legislation applicable and relevant to the project;

- Where landowner accommodation works are agreed which necessitate a change;
- As a result of changes to the project design;
- Where the outcomes from auditing establish a need for change;
- Outcomes of third-party consultations;
- Where work method statements identify changes to a construction methodology to address high environmental risk; and
- As a result of an incident or complaint occurring that necessitates an amendment.

The contractor will ensure that the CEMP remains up to date for the duration of the construction period.

2.4 Conditions on planning as specified by An Bord Pleanála

This section will be populated with any and all additional requirements under conditions imposed by An Board Pleanála (ABP) should the Board decide to grant development consent for the Limerick City Greenway (UL to NTP) project.

3. Description of the Proposed Development

3.1 Existing gravel path, green field, and roads

The proposed Limerick City Greenway (UL to NTP) will be constructed alongside the southern bank of the River Shannon between the River Groody bridge and east of Cook Medical in the IDA park. There will be links perpendicular to the river between Kilmurray Student Village and University Road, and between Cook Medical/McLaughlan Road and Plassey Park Road.

Refer to the Preliminary Design drawings in Appendix A for Chainages.

CH000 – CH300

The proposed route commences west from the existing River Groody bridge (Figure 3-1) at the confluence of the River Groody with the River Shannon.

Figure 3-1: Existing Bridge at River Groody

The proposed Greenway route will divert from and run adjacent to an existing narrow walking track along the southern bank of the River Shannon. The existing narrow path has a wooden fence along its sides and there have been complaints to LCCC from the public regarding the width of the path, especially in relation to the speed of cyclists and scooter users. For this reason a new 3.5m wide path is proposed to be constructed between CH0-300.

Figure 3-2: Start of proposed greenway in green field with existing path alongside

CH300-CH430

The proposed greenway will cross the land drain and rejoin the existing path which will be resurfaced but the existing path will remain the same. The path will avoid a small forest of trees that were planted to compensate for habitat loss when the Living Bridge that connects the UL Campus that is located in Co. Limerick and in Co. Clare was constructed. The path will cross the existing bridge at CH400.

Figure 3-3: Existing bridge at CH400

CH430-CH615

The proposed greenway will divert away from the existing path and run through a green field. It will cross a land drain.

CH615-CH795

The proposed greenway will rejoin the existing path and run in front of the UL Boat Club building, and the UL slipway. The existing ESB covered will be raised to match the level of the proposed greenway (approx. 150mm higher than existing).

Figure 3-4: Existing path to be resurfaced

The proposed greenway will continue along the existing paved path until the surface changes from paved to gravel surface. It will connect to an existing shared surface leading to the UL campus.

Figure 3-5: Paved path connects to shared path leading to UL

Figure 3-6: Existing Project information sign for Limerick Smarter Travel Cycle Route 2

Figure 3-7: Existing direction sign outside the UL Boat Club and slipway in background

There is existing public lighting along the existing path between the River Groody bridge and the UL Boat House. Refer to the black column and lantern in Figure 3-8.

Figure 3-8: Examples of existing Public Lighting Column and Lantern along Limerick Smarter Travel Cycle Route 2

East of the paved path towards the UL campus, the existing path surface changes from tarmac to gravel.

Figure 3-9: Path surface changes from paved to gravel and narrows to approximately 1.5m width

CH795

The path will cross a bridge over a land drain (Named as Bridge 1 for the purposes of this project). There is a stone parapet on the River Shannon side of the bridge and a metal railing on the opposite side. There are wooden fences leading to the bridge on the eastern and western approaches.

Figure 3-10: Existing Bridge No 1

Figure 3-11: Existing bridge over land drain (Bridge 1)

Figure 3-12: Existing abutment wall (proposed to be decommissioned)

CH795-CH950

The proposed greenway will continue eastwards and pass along the existing gravel path north of the Castletroy wastewater treatment plant. There is a northern access into the plant with an existing route over a culverted land drain that will be included in the proposed greenway path.

Figure 3-13: View south to the northern access gate of Castletroy Wastewater Treatment Plant

Figure 3-14: View facing east outside the Castletroy wastewater treatment plant

There are existing concrete railings alongside the narrow gravel path. The proposed path will avoid two trees with a potential for a bat roost at CH850. No bat roosts have been identified in these trees, but the trees will remain.

CH950-CH980

The existing path continues to an existing narrow stone bridge (named as Bridge 2 in this project). The surface changes from gravel to paved.

There are existing stone abutments and a high stone wall at Bridge 2.

Figure 3-15: Existing path and stone bridge along Shannon River leading to Bridge 2

Figure 3-16: View of Bridge 2 from the exiting paved path

The existing stone parapet that is missing in Figure 3-17 has been reset into position by LCCC since the photo was taken.

Figure 3-17: View of Bridge 2 from bank of drain

Figure 3-18: View under Bridge 2 facing north to the River Shannon

Figure 3-19: : Existing railing between Bridge 2 and Bridge 3

CH1000

The existing path continues to a temporary steel truss bridge that has replaced a concrete deck over an existing stone bridge (named as Bridge 3 in this project). This bridge crosses the Plassey Mill Race where it flows into the River Shannon.

Figure 3-20: Existing temporary bridge across the Plassey mill race where it rejoins the River Shannon

Figure 3-21: Shallow water level in Plassey Mill Race and existing abutments of Bridge 3

CH1000-1040

The existing path continues past a rest area north of Plassey Mills (Figure 3-22).

Figure 3-22: Existing bench in front of Plassey Mill

The existing bridge between Co. Limerick and Co. Clare is to the north of this area (Figure 3-23). This bridge is known locally as the 'Black bridge'.

Figure 3-23: Black bridge

Figure 3-24: Blocked access to the Black bridge that links County Limerick and County Clare

There is an existing kissing gate on the path east of the rest area in front of Plassey Mills.

Figure 3-25: Existing gate on path at Plassey Mills (1 of 2)

Figure 3-26: Existing gate on path at Plassey Mills (2 of 2

CH1040

The existing path continues eastwards towards an existing bridge (named as Bridge 4 in this project) across the decommissioned overspill for the Plassey Mill Race.

Figure 3-27: Existing bridge (Bridge 4) over the decommissioned and dry Plassey Mill race overspill

Figure 3-28: Dry bed of overspill from Plassey Mill Race

CH1040-CH1330

The existing path continues north of the existing Fisherman cottages, but the proposed path will turn south-east and run behind the Fisherman Cottages as requested by the residents. This area is characterised by uneven poorly drained ground with thick undergrowth. The residents in the cottages have reported regular flooding in their properties so this project will construct a new flood defence system for the residents.

Figure 3-29: Thick vegetation with immature trees with Plassey Mills in the background

Figure 3-30: Heavy undergrowth to rear/south of Fisherman Cottages

Figure 3-31: Trees to south/rear of Fisherman Cottages (cottage partially visible)

Figure 3-32: Existing Bee Hives east of the Fisherman Cottages

Figure 3-33: Existing kissing gate at the Garrisson Wall to be retained on the gravel path that runs in front of the Fisherman cottages

There is an existing gravel path to the east of the Fisherman Cottages that connects to existing shared paths in the UL Campus.

Figure 3-34: Existing gravel path east of Fisherman Cottages

CH1330-CH1340

The proposed path will rejoin the existing path and will pass under an existing bridge between Co. Limerick and Co. Clare.

Figure 3-35:: Existing road bridge between the UL campus in Co. Limerick and Co. Clare

Figure 3-36: View of existing gravel path under road bridge that links UL campus between Co. Limerick and Co. Clare

CH1340-CH1410

East of the road bridge the existing path continues eastwards along the southern bank of the River Shannon and towards the existing Dromroe Student village in the UL Campus. The existing path runs through a designated Annex 1 habitat Alluvial woodland forest. UL Facilities has planted Oak trees between Dromroe Student village and the existing path at this location.

Figure 3-37: Existing gravel path along southern bank of the River Shannon

Figure 3-38: Extent of Annex 1 Alluvial Forest interactions with existing path and proposed Greenway route

CH1410-1730

To avoid the existing avenue of beech trees in the Annex 1 Alluvial Woodland forest alongside the riverside path, the proposed greenway route will divert to the south of the beech trees and north of the Oak trees towards a newly planted stand of birch trees. The existing gravel path will remain unaltered.

Figure 3-39: Existing Beach and newly planted Oak trees between the River Shannon and Dromroe Student village

Figure 3-40: Existing gravel path alongside river through an avenue of mature trees in the Annex 1 Alluvial forest

A 6.5m wide strip of immature Birch trees will be removed to provide space for the proposed greenway.

Figure 3-41: Existing immature trees to be removed

The existing path continues under the Living Bridge.

Figure 3-42: Living Bridge in UL campus

Figure 3-43: Existing gravel path under the Living Bridge

CH1730-CH1965

The existing earthen path enters an existing Annex 1 Alluvial woodland and continues eastwards on a raised earth path north of the Plassey Mill Race and approximately 10-20m to the south of the River Shannon.

Figure 3-44: Existing raised earthen path in the Annex 1 habitat Alluvial residual forest

CH1965-CH2150

An existing footbridge from the UL campus joins the earth path at CH1915.

Figure 3-45: Existing footbridge to University of Limerick and flowering Himalayan Balsam (looking west)

The existing earthen path continues eastward on an elevated earth mound with the Plassey Mill Race to the south and the River Shannon to the north.

Figure 3-46: Existing stone steps from earthen path to Plassey Beach

CH2150-CH2250

The existing earthen path continues alongside Plassey Beach.

Figure 3-47: Unpaved path at Plassey Beach

CH2250

There is an existing reinforced concrete bridge that crosses the start of the existing Plassey Mill race.

Figure 3-48: Existing concrete bridge at mouth of Plassey mill race (to be retained)

Figure 3-49: Existing concrete bridge at mouth of Plassey mill race with Plassey Beach in the background

Figure 3-50: Existing concrete bridge at mouth of Plassey mill race looking northeast

CH2250-CH2500

The existing route passes north of Kilmurray Student Village and reaches a junction.

Figure 3-51: Existing gravel path north of Kilmurray Student Village

The route south provides access to University Road and to Plassey Park Road. The route east provides access to Cook Medical in the IDA's National Technology Park and McLaughlan Road.

Figure 3-52: Existing earthbound path south of the River Shannon

Figure 3-53: Existing path east of Kilmurray Student village approaching the land boundary between UL and the IDA

Figure 3-54: Existing gate and culvert at the land boundary between UL and the IDA

CH2500-CH3180

The path changes from an earthen path to a desire line and continues eastwards running generally 20-50m south of the southern bank of the River Shannon. It crosses under overhead electric wires.

Figure 3-55: Desire line through green field

Figure 3-56: Desire line through green field approaching a small stand of trees

Figure 3-57: Desire line through green field weaving between small stands of trees

Figure 3-58: Proximity of desire line to River Shannon

Figure 3-59: Desire line along proposed Greenway route

CH3180-CH3490

The existing desire line continues along the southern bank of the River Shannon at the boundary between UL registered land and IDA registered land (approx. CH3180), but the proposed Greenway route turns south to McLaughlan Road.

Figure 3-60: Warning signs at the IDA boundary (at Cook Medical)

Figure 3-61: Overhead ESB utilities

Figure 3-62: Existing earth berm with Johnson & Johnson factory in background

Figure 3-63: Example of scrubland between the River Shannon and McLaughlan Road

CH3490-CH3805

There are existing concrete footpaths and grass verges alongside McLaughlan Road between the original entrance road into Cook Medical and Plassey Park Road. There is street lighting and other utilities including drainage, telecommunications, and underground electricity cables in this private road.

Figure 3-64: McLaughlan Road in the IDA park

Figure 3-65: McLaughlan Road in the IDA park with street lighting and junctions to other roads/entrances

Figure 3-66: McLaughlan Road where it joins Plassey Park Road (in background)

There is an existing zebra crossing on Plassey Park Road to the north-east of the junction between Plassey Park Road and McLaughlan Road.

Figure 3-67: Existing Zebra crossing on Plassey Park Road

CH000_C-CH300_C

There is a junction in the existing path east of Kilmurray Student Village and the southern route follows a desire line to an existing bridge east of the UL Agricultural Laboratory. The bridge crosses an existing drainage channel at the north of University Road.

Figure 3-68: Existing desire line connecting the riverside path to an existing bridge to the UL Agricultural Laboratory

There is a secure car parking area immediately south of the laboratory.

Figure 3-69: Secure car parking area immediately south of the laboratory

The entrance road to the UL Agricultural Laboratory runs west of the large drainage channel (bounded by an anti-climb fence) and there are rubbish bins and a car parking area between Kilmurray Student Village and the anti-climb fence. There is an entrance road and gate into Kilmurray Student Village that is generally locked. The gate opens onto University Road.

Figure 3-70: Existing gate access from Kilmurray Student Village to University Road

CH300_C-CH677_C

There are no footpaths along University Road but there are large parking bays and public lighting along the western side of the road. There are commercial/industrial buildings along the eastern side.

Figure 3-71: University Road (looking south)

Figure 3-72: Entrance to industrial buildings off University Road

The proposed Greenway will join into newly constructed Active Travel infrastructure at the southern part of University Road where it joins Plassey Park Road.

Figure 3-73: Junction of University Road and Plassey Park Road

3.2 Proposed Greenway and Bridges

CH000 to CH795: Groody Bridge to Proposed Bridge 1

The proposed Greenway will divert to the southeast of the existing tarmac path because the existing path narrows to 2.2m width (between the existing wooden fences) and LCCC has received complaints from members of the public about near passes from cyclists and scooters. It is intended that walkers would continue to use the existing path and cyclists and other users travelling at speeds in excess of walking pace would utilise the proposed Greenway.

Figure 3-74: Proposed Greenway and existing path, and proposed rest area at CH 000

A new rest area with new benches will be provided (refer to Figure 3-95 for an example of the proposed bench). Proposed wooden bollards will redirect cyclists off the existing path and towards the proposed Greenway.

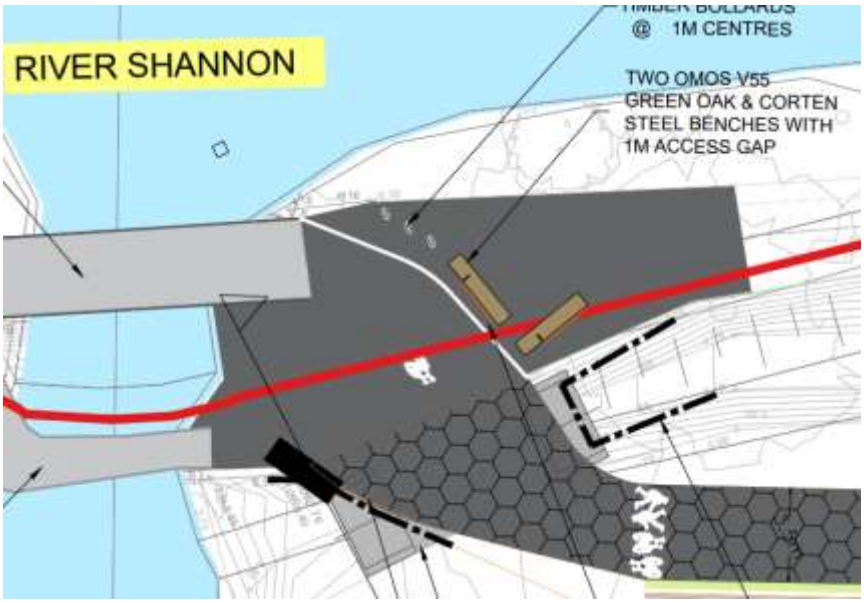

Figure 3-75: Proposed rest area at Groody Bridge

Figure 3-76: Example of wooden bollard that would be installed along the proposed Greenway

In the green field the proposed Greenway will run parallel to a land drain which runs parallel to the River Shannon. A proposed shallow land drain will run along the south side of the Greenway and drainage culverts will enable surface water to drain to the River Shannon. New public lighting will be provided.

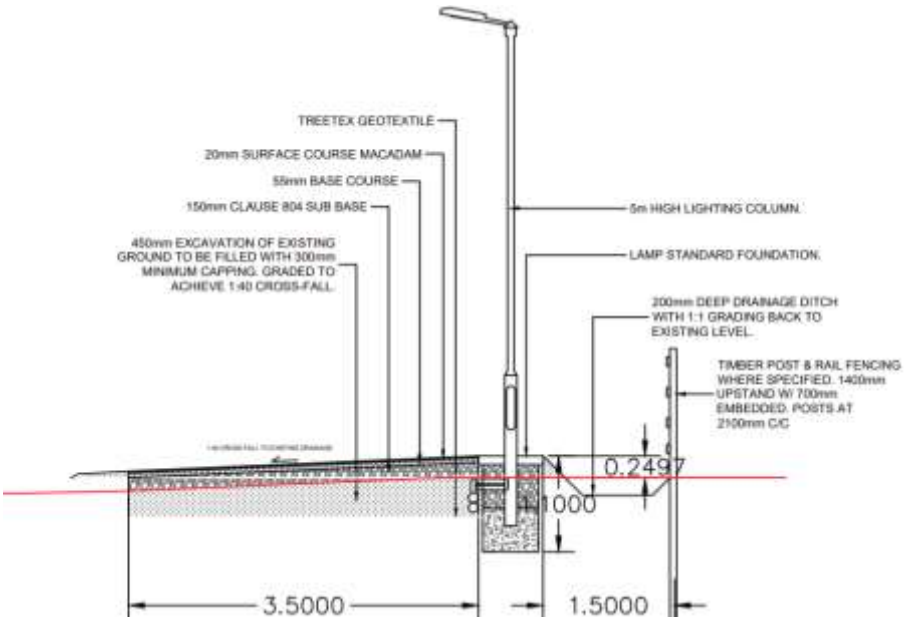

Figure 3-77: Proposed cross section of 3.5m greenway, public lighting column, and land drain

The proposed Greenway will divert north to join the existing 3.5m wide Smarter Travel path and avoid passing through a compensatory habitat area that was planted by the developers of the Living Bridge that connects the UL campus between Co. Limerick and Co. Clare. The proposed Greenway will cross an existing bridge (CH 400). A new steel parapet will be installed above the low stone parapet on this existing bridge to replace the existing parapet which currently narrows the bridge.

Figure 3-78: Existing bridge at CH400

The existing path will be resurfaced.

In accordance with LCCC's tree replacement guide, there will be five trees planted for every tree that will be removed to facilitate construction of the proposed Greenway.

The proposed Greenway will divert south (@ CH430) east of the compensatory habitat area and continue in a green field until it will rejoin the existing 3.5m wide path immediately west of the UL Boat Club. The existing tarmac path will be resurfaced where it passes the existing slipway for the Boat club until CH725 where the existing 2.0m (approx.) wide gravel path will be replaced with a 3.5m wide tarmac path. The surface of the existing path will not be excavated except to install twin ducts for the public lighting and a cellular membrane will be paid onto the gravel path and appropriate building layers will form the base for the tarmacadam surface finish. This will ensure tree roots will not be disturbed.

Figure 3-79: Tree root protection system under new tarmac path in Fairview Park, Dublin 3

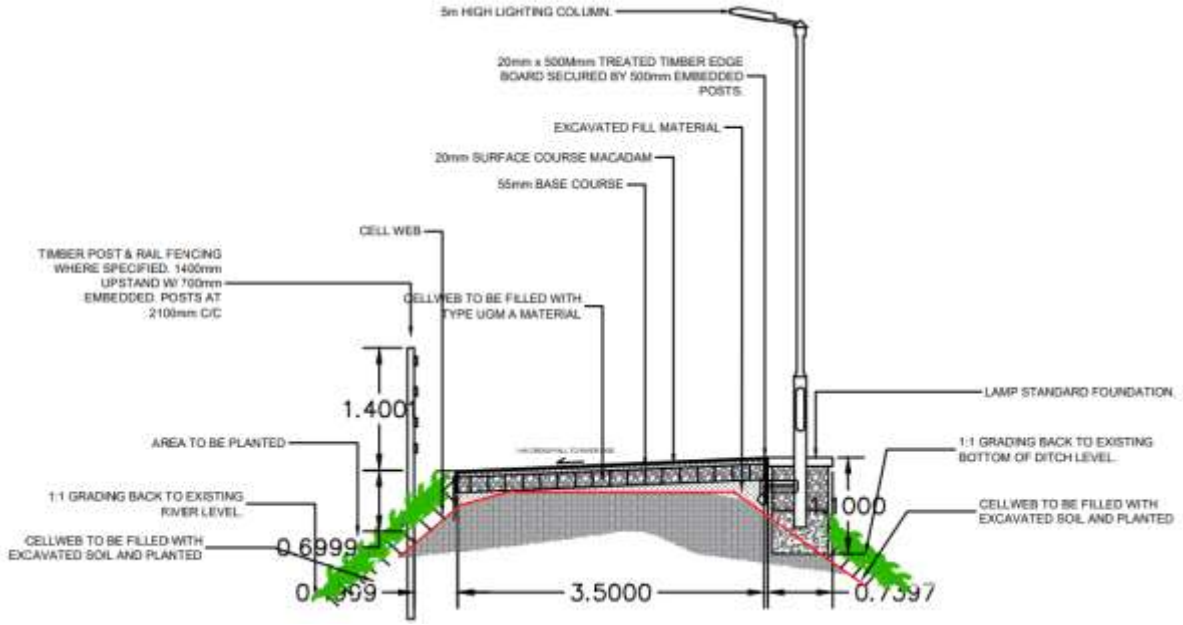

Figure 3-80: Replacement of gravel path with proposed 3.5m wide Greenway

At CH775 there is a proposed tarmac path to join to the existing UL campus shared surface. There are proposed replacement planting trees alongside this proposed path and a proposed bug hotel will be constructed from leftover construction wood and small bore tree branches that may be removed.

Figure 3-81: Example of a bug hotel that will recycle construction materials and reuse tree branches

CH795: Proposed Bridge 1

The proposed Greenway route will extend eastwards to an existing concrete bridge which will be replaced by a proposed 4.8m long and 4.5m wide steel bridge on new concrete abutment walls (Bridge No. 1 @ CH 795). Refer to drawing RHA-XX-DR-C-PD0007.

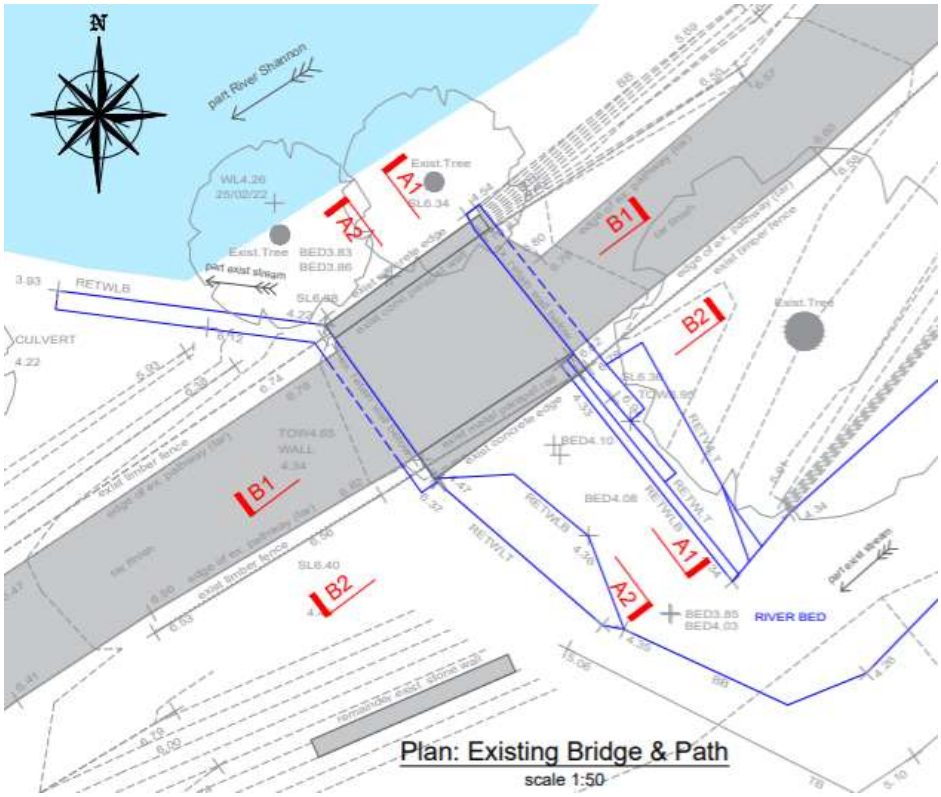

Figure 3-82: Plan of existing Bridge 1 (refer to drawing RHA-XX-DR-S-SP0010)

The existing bridge parapets, one is reinforced concrete, and the other is metal railing (refer to Figure 3-10, Figure 3-11, and Figure 3-12), will be taken down. The existing reinforced concrete bridge deck will be deconstructed by lifting it off the abutments and transporting it to the construction compound where it will be crushed. The crushed material will be recycled by using it to construct haul roads/temporary compounds/ and as a base for the proposed greenway path. Metal arisings, the parapet and the railing will be transported offsite to a licenced waste facility. The existing abutments will be deconstructed by breaking out the walls which will be removed to the construction compound for crushing and recycling, and the foundations will be exposed. Any concrete in the foundations will be broken out and mixed with stone rubble to form the base of the foundations for the proposed bridge abutments.

Dust will be suppressed during the wall and foundation breaking works. To avoid water runoff carrying fines, a shade cloth will be erected immediately adjacent to the concrete that will be broken out to trap dust arisings.

To carry out this deconstruction work and minimise the impact on the environment and local ecology there will be a water filled flood barrier to protect the work site from the River Shannon. To protect the River Shannon from contaminated liquids associated with construction activities including silt, a temporary sheet piled wall will be inserted into the riverbank between the water filled barrier and the worksite, and a silt curtain will be suspended in the River Shannon.

The breaking up and removal of the bridge abutment walls and foundation will be carried out on a dry day within a 6–8-hour period so those works will have a very short duration. The construction period of the bridge is expected to take 2-3 weeks. The existing drain under Bridge 1 is dry so there won't be a risk of drainage water running through the work site. The proposed sheet pile will prevent any material contaminated with dissolved chemicals (from broken concrete) from running into the river. The proposed shade cloth will prevent airborne dust from floating to the river. The proposed water filled flood barrier will prevent water from entering the worksite.

The proposed construction sequence for Bridge 1 is illustrated in Figure 3-83.

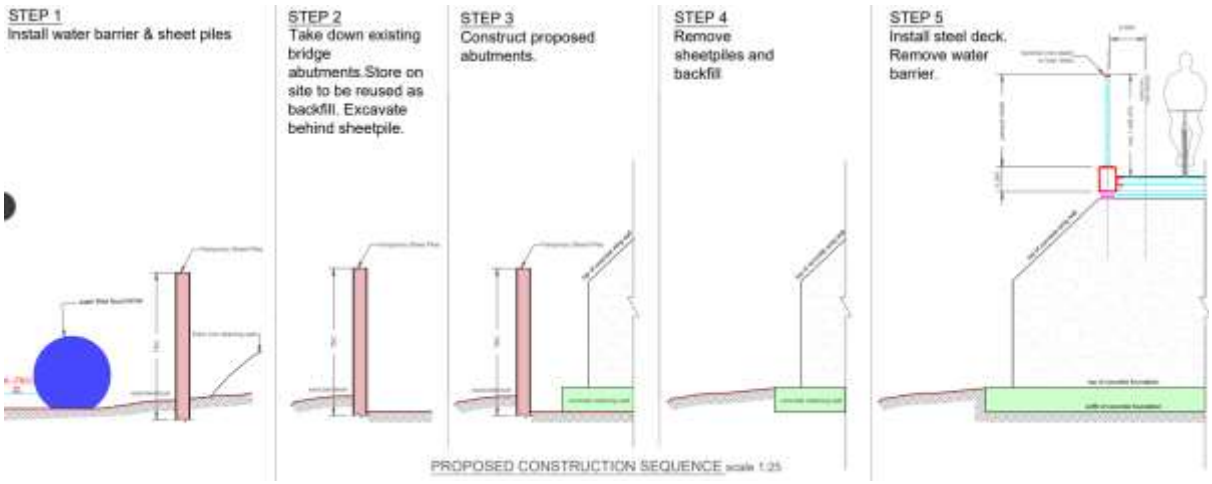

Figure 3-83: Proposed construction sequence for Bridge 1 (refer to drawing RHA-XX-DR-S-SP0012)

New bridge abutments are proposed to be constructed on new concrete foundations and a new steel deck with parapets will be installed by lifting a prefabricated structure into place. Refer to drawing RHA-XX-DR-S-SP0011.

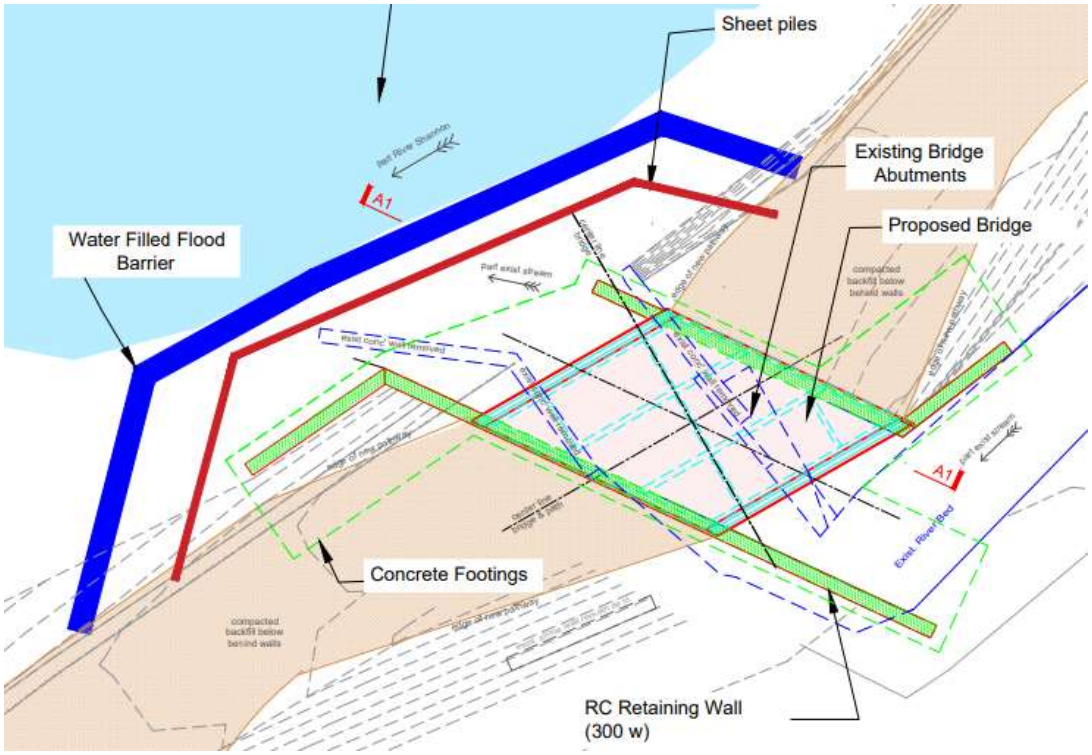

Figure 3-84: Proposed plan of Bridge 1, with ecology protection measures (refer to drawing RHA-XX-DR-S-SP0012)

Due to its proximity to the River Shannon which supports lamprey, the proposed works (including preparatory work) beside the River Shannon which supports salmonids shall be undertaken from May to October (inclusive) and in consultation with Inland Fisheries Ireland (IFI) to avoid accidental damage or siltation of spawning beds, subject to the water level in the river.

Bat surveys have been carried out along the riverbank and in the location of Bridge 1. No trees with a potential for bat roots were identified at Bridge 1 and the closest tree with a potential for a Bar roost is 60m to the east.

The existing bridge and vegetation growing on it were surveyed by an experienced Ecologist to look for species such as dipper, grey wagtail, wren and other bird species that will use bridge structures as nesting sites, and there was no evidence of birds nests or bat roosts at the structure or vegetation. A survey by an experienced Ecologist shall be undertaken at Bridge 1 no more than 24 hours ahead of vegetation clearance or structure removal works to confirm there are no bats roosting or birds nesting in the vegetation or in the structure that will be taken down and removed.

The SAC boundary line runs through the existing and proposed bridge.

The existing area under Bridge 1 is dry so a flume is not proposed.

No refuelling will be permitted outside of construction compounds and all machinery will be periodically serviced and regularly maintained to ensure diesel and oils spills do not occur.

There will be a 40m long silt curtain installed in the River Shannon to catch any discharges from the worksite into the river. Silt curtains will catch materials that float or are suspended in the water. Silt curtains are typically made from PVC and closed-cell foam. They are a flexible, water permeable barrier that extends downwards in the body of water, where it is typically anchored or weighted to prevent the silt from moving. The foam provides buoyancy, while the PVC curtain controls sediment in the water. Example photos of a silt curtain in the River Corrib in Galway are provided in Figure 3-85 and Figure 3-86.

Figure 3-85: Installation of a silt curtain in the River Corrib, Co. Galway

Figure 3-86: Silt curtain retaining contaminated water during advanced works for sheet piling

Figure 3-87: Example of sheet piling along the bank of the River Corrib

CH795 to CH970: Proposed 3-4m wide greenway

The proposed 3.5m wide greenway will be installed on top of the existing 1.5-2.0m wide gravel path and grass verges (refer to the cross section in Figure 3-77). The proposed Greenway will pass two trees with bat roost potential (although no roosts have been identified) at CH850. The public lighting columns have been designed at maximum distances from these trees to minimise light impact on bats if bats were to create roosts there in the future.

CH970: Proposed Bridge 2

The proposed Bridge No. 2 @ CH 970 will be a new 9.6m long and 4.5m wide steel and reinforced concrete bridge, and it will be constructed alongside the existing stone bridge. No demolition works are required for Bridge 2.

A photomontage which illustrates the proposed Bridge 2, the proposed Bridge 3, and the proposed amenity area can be seen in Figure 3-88.

Figure 3-88: Proposed bridges No 2 & 3 and rest area east of Plassey Mills

Due to its proximity to the River Shannon which supports lamprey, the proposed foreshore works (including preparatory work) beside all watercourses supporting salmonids shall be undertaken from May to October (inclusive) and in consultation with Inland Fisheries Ireland (IFI) to avoid accidental damage or siltation of spawning beds, subject to the water level in the river.

The SAC boundary line runs through the proposed bridge.

The existing Bridge 2 plan and section are provided in Figure 3-89.

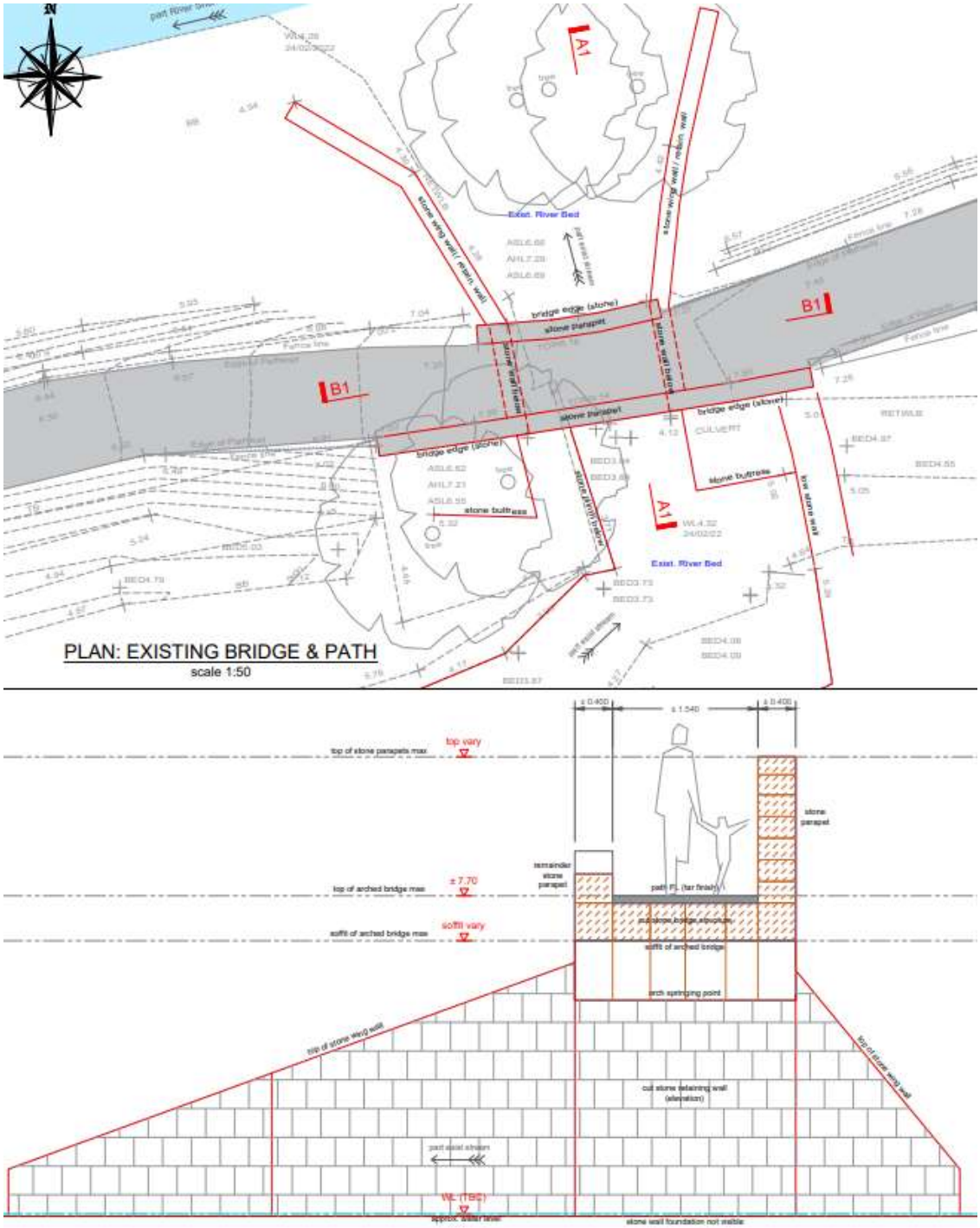

Figure 3-89: Existing plan and section for Bridge 2 (refer to drawing RHA-XX-DR-S-SP0020)

The plan for the proposed new bridge 2 alongside the existing stone bridge is illustrated in Figure 3-90 and the section drawing that illustrates the same is in Figure 3-91. The abutment for the existing stone bridge will remain untouched. The stonework for the existing bridge will be repointed, the low parapet wall will be restored by a stonemason, and a new metal railing will be installed onto it to ensure the existing stone bridge complies with current design standards for bridge parapets, i.e., 1.45m high. The bottom of the new metal parapet railing on the existing low stone parapet will follow the arc of the stone wall to preserve its historical function which was to allow a tow rope to slide over the parapet while a horse was towing a barge down the River Shannon.

Figure 3-90: Plan for the proposed new bridge 2 alongside the existing stone bridge (refer to drawing RHA-XX-DR-S-SP0021)

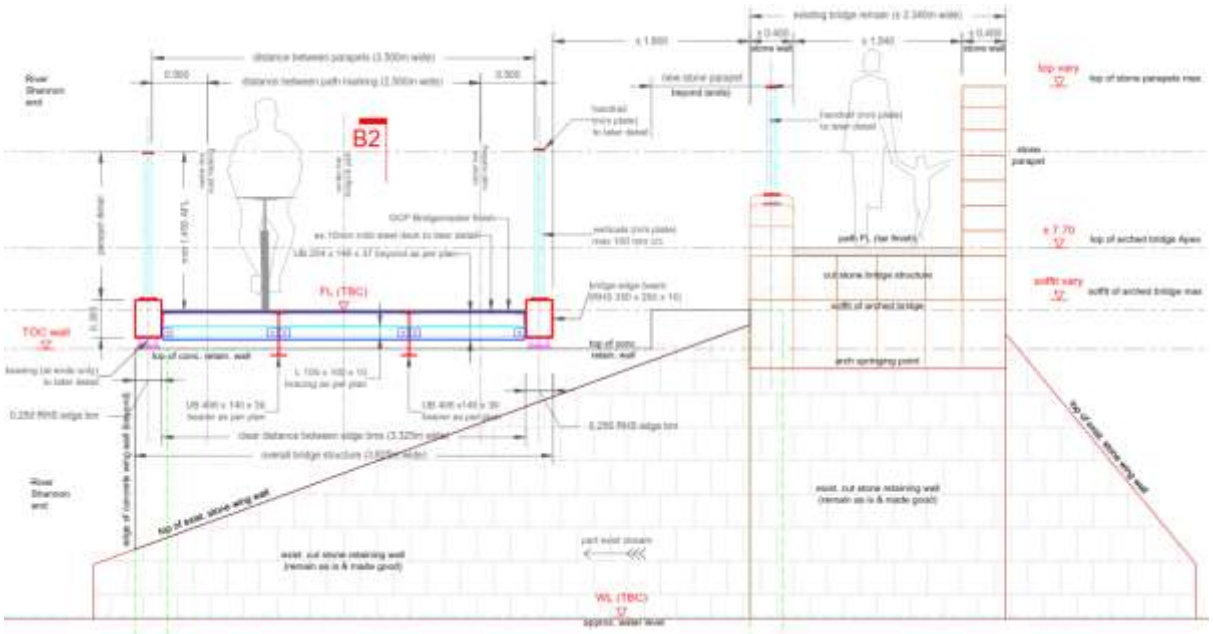

Figure 3-91: Section for the proposed new bridge 2 alongside the existing stone bridge (refer to drawing RHA-XX-DR-S-SP0021)

To carry out this construction work and minimise the impact on the environment and local ecology there will be a water filled flood barrier to protect the work site from the River Shannon. To protect the River Shannon from contaminated liquids associated with construction activities including silt, a temporary sheet piled wall will be inserted into the riverbank between the water filled barrier and the worksite, and a silt curtain will be suspended in the River Shannon. Refer to drawing RHA-XX-DR-S-SP0022.

The construction period of Bridge 2 is expected to take 2-3 weeks. The existing stream under Bridge 2 will be flumed during the works to keep the work site dry. The proposed sheet pile will prevent any material contaminated from running into the river. A proposed shade cloth will prevent airborne dust from floating to the river. The proposed water filled flood barrier will prevent river water from entering the worksite.

There will be a 60m long silt curtain installed in the River Shannon to catch any discharges from the worksite into the river. Silt curtains will catch materials that float or are suspended in the water. Silt curtains are typically made from PVC and closed-cell foam. They are a flexible, water permeable barrier that extends downwards in the body of water, where it is typically anchored or weighted to prevent the silt from moving. The foam provides buoyancy, while the PVC curtain controls sediment in the water. Example photos of a silt curtain in the River Corrib in Galway are provided in Figure 3-85 and Figure 3-86.

Tree felling of immature trees and saplings will be required in the September to February period before the construction work for Bridge 2. All trees to be cut down shall be inspected by an experienced and qualified Ecologist to check for nests and roosts (despite their very limited habitat potential) and shall be laid on the ground for at least 24 hours before they will be recycled or mulched.

There will be aquatic wall plates bolted to the new abutments where they will be in contact with river/surface water drainage water. The purpose of the aquatic plates is to provide a habitat for fish and other aquatic life.

Figure 3-92: Example of aquatic plates to be installed on bridge abutments

CH1000: Proposed Deck replacement for Bridge 3

The existing temporary bridge across the Plassey Mill race @ CH1000 will be replaced with a new 5.4m long and 4.5m wide steel bridge deck. The new steel deck and parapets will be lifted onto new concrete plinths which will be cast directly onto the stone abutment walls. Refer to drawing RHA-XX-DR-S-SP0031.

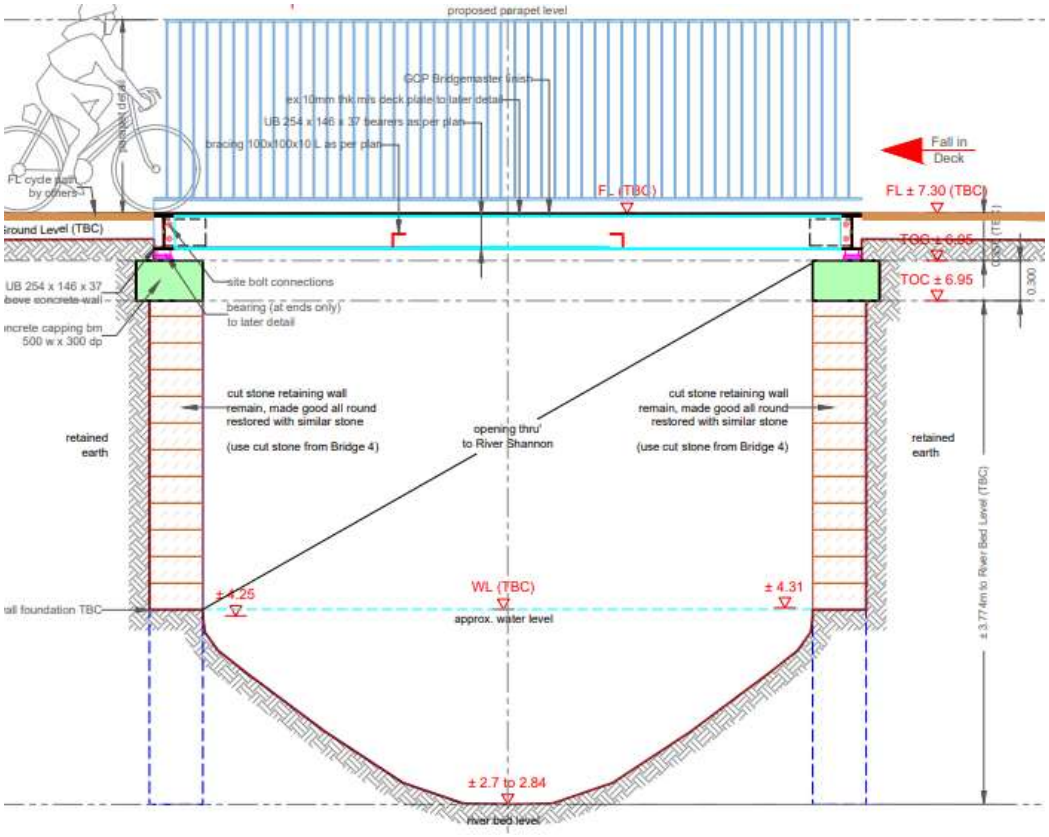

Figure 3-93: Proposed deck replacement for Bridge 3 with new concrete plinths on existing stone abutments

Due to its proximity to the River Shannon which supports lamprey, the proposed foreshore works (including preparatory work) beside all watercourses supporting salmonids shall be undertaken from May to October (inclusive) and in consultation with Inland Fisheries Ireland (IFI) to avoid accidental damage or siltation of spawning beds, subject to the water level in the river.

There will be two 6m long silt curtains installed in the Mill Race stream to catch any discharges from the worksite into the stream. Silt curtains will catch materials that float or are suspended in the stream water. They are a flexible, water permeable barrier that extends downwards in the body of water, where it is typically anchored or weighted to prevent the silt from moving. Silt curtains are typically made from PVC and closed-cell foam. The foam provides buoyancy, while the PVC curtain controls sediment in the water.

The SAC boundary line runs through the existing and proposed bridge. Refer to the red line in Figure 3-94.

CH1010 to CH1030: Proposed rest area at Plassey Mills

The plan for the proposed rest area at Plassey Mills is illustrated in Figure 3-94.

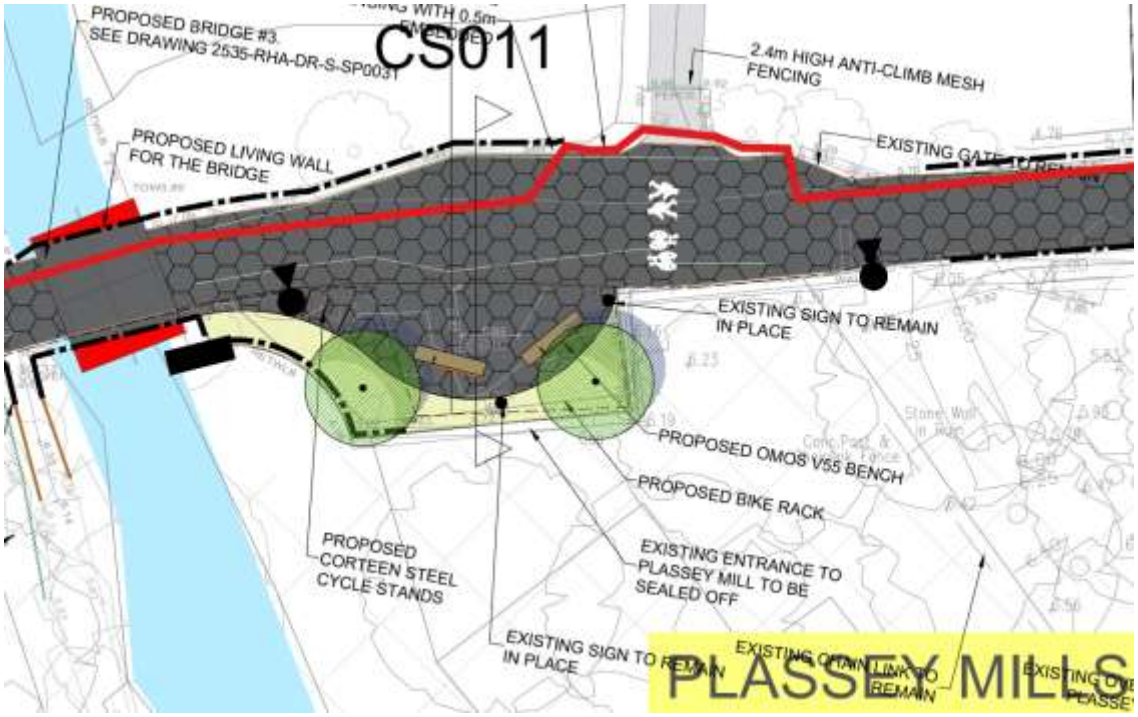

Figure 3-94: Proposed rest area at Plassey Mill

Two new benches similar to an OMOS green oak and Corten steel bench will be provided. A rack of new Corten steel cycle stands will also be provided and two new native Irish trees with understory will soften the interface between the existing stone/block walls and the proposed tarmac path surface.

Figure 3-95: Green Oak and Corten steel seat and cycle stand

A future connection to the Black bridge across the River Shannon to Co. Clare could join the proposed Greenway at this rest area.

CH1045: Proposed deck replacement for Bridge 4

A proposed 5.1m long and 4.5m wide steel bridge deck for Bridge 4 @ CH 1045 will replace the existing 3m wide concrete bridge deck across the overspill for the Plassey Mill race. The existing reinforced concrete bridge deck will be deconstructed by lifting it off the cut stone abutment walls and transporting it to the construction compound where it will be crushed. The crushed material will be recycled by using it to construct haul roads/temporary compounds/ and as a base for the proposed greenway path. Metal arisings and the existing steel parapets will be transported offsite to a licenced waste facility. The existing cut stone abutment walls and foundations will remain in-situ. The proposed

steel deck will sit on top of a concrete plinth that will be set into place on the existing stone abutments. The existing width of the Plassey Mill Race overspill will not be impacted.

New parapets will replace the existing stainless-steel parapets. Refer to drawing RHA-XX-DR-S-SP0042.

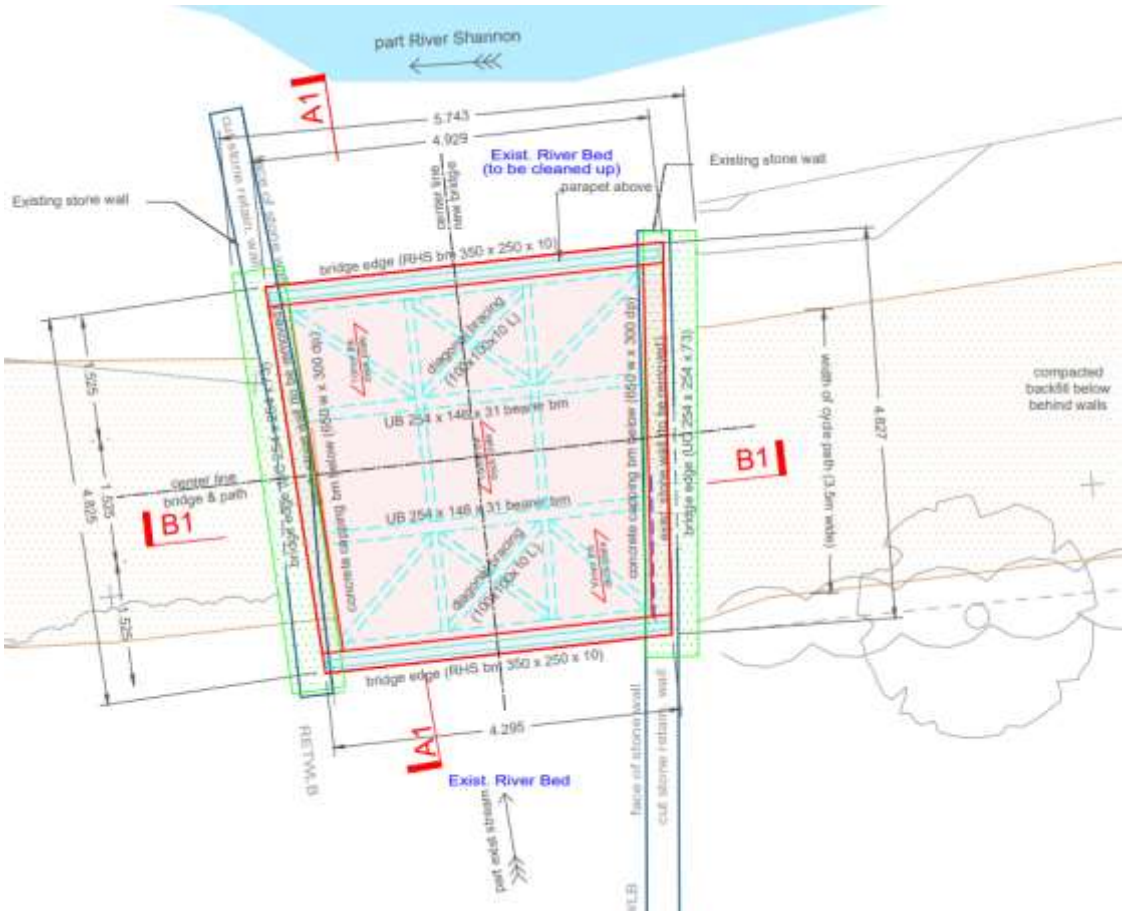

Figure 3-96: Proposed plan of Bridge 4 deck replacement

Due to its proximity to the River Shannon which supports lamprey, the proposed foreshore works (including preparatory work) beside all watercourses supporting salmonids shall be undertaken from May to October (inclusive) and in consultation with Inland Fisheries Ireland (IFI) to avoid accidental damage or siltation of spawning beds, subject to the water level in the river.

The SAC boundary line runs through the existing and proposed bridge.

There are no trees proposed for removal to construct Bridge 4.

CH1050 to CH1320: Proposed route south of Fisherman Cottages

The proposed Greenway will turn southeast and will continue south of a collection of fishing huts and cross a section of mixed broadleaved woodland and amenity grassland (approx. CH 1050 – CH 1250).

The plan for the proposed Greenway route south of the Fisherman cottages is illustrated Figure 3-97.

Figure 3-97: Proposed route south of Fisherman cottages

The trees and hedgerows that will be cut down to clear a path for the proposed Greenway will be replanted to act as a screen between the proposed path and the rear of the Fisherman cottages. All trees and hedgerows shall be cut down between September and February and shall be inspected by an experienced and qualified Ecologist to check for nests and roosts. They shall be laid on the ground for at least 24 hours before they will be recycled or mulched. Refer to the Landscape drawing 2525-RHA-XX-DR-C-LA0003 for proposed planting details for the Trees, Hedgerows, and wildflower meadow in this area.

The residents in the Fisherman cottages requested LCCC to resolve flooding at the rear of their properties. The proposed earth bund along the east (partially), south, and west (partially) of the properties will prevent flood water from the Plassey Mill Race from entering the rear of the properties. There will be proposed drainage channels on the north and south sides of the elevated Greenway path (refer to Figure 3-98) and surface water will drain towards the existing land drain that discharges to the Plassey Mill Race (refer to drawing RHA-XX-DR-C-PD0011). A proposed flap valve will prevent water from back entering the rear of the Fisherman Cottage properties from the Plassey Mill Race.

There is no direct drainage route to the river at the rear of the cottages. The area drains overland south to the Plassey Mill Race and the Plassey Mill Race overspill drain adjacent to the worksite is dry. Sediment mats will be placed between the bund and the Plassey Mill Race on the overland drainage route to trap material. If the area at the rear of the cottages needs to be drained dry ahead of the works, a silt buster tank to remove sediment from water will be utilised, before the water will be returned to the Plassey Mill race.

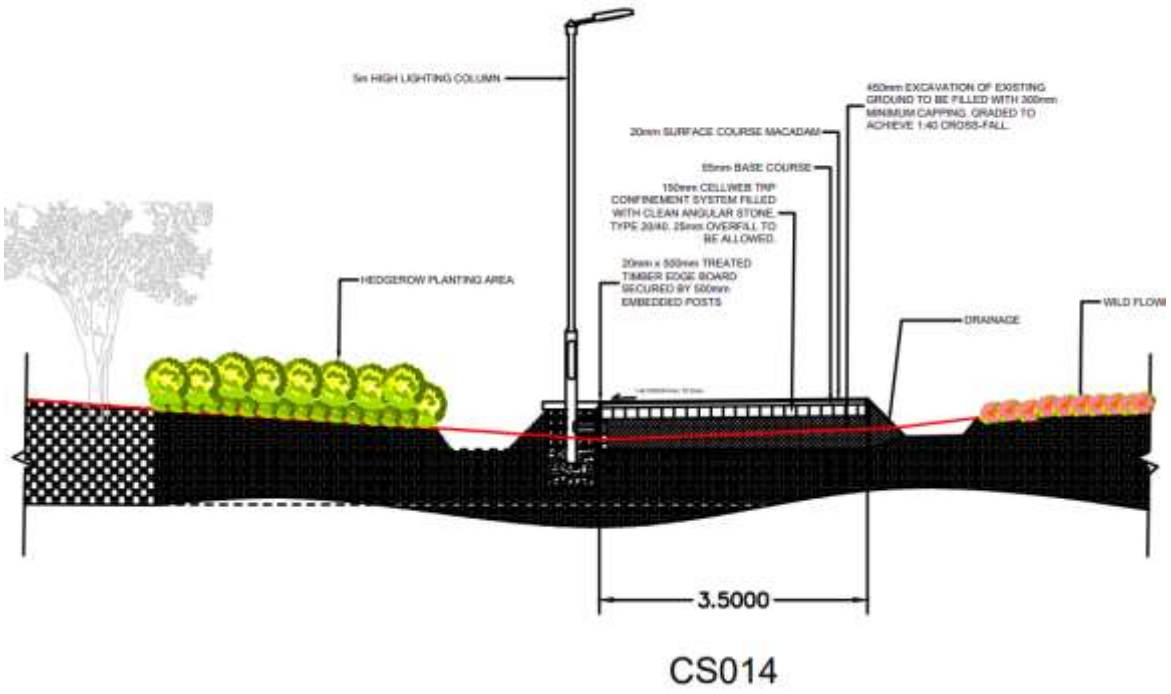

Figure 3-98: Cross Section 014 along proposed Greenway south of the Fisherman Cottages

Figure 3-99: Proposed Greenway south of the Fisherman cottages with proposed hedgerows and trees (looking west)

The proposed route will replace an existing gravel path going north towards Drumroe Village University Bridge, pass under the existing road bridge between Limerick and Clare, and turn east to continue along the River Shannon north of the Drumroe Student Village.

CH1320 to CH2180: Proposed Greenway through Annex 1 Alluvial Woodland forest area

East of the road bridge and east and west of the Living bridge between Co. Limerick and Co. Clare there is an Annex 1 Alluvial Woodland forested area outlined in green in Figure 3-100. The existing path is illustrated by the orange line, and the proposed path in a green field is illustrated by the green

line. The trees that are proposed to be cut down are illustrated in red outline. There is also an avenue of mature Beach trees along the riverbank within this wooded area and the proposed greenway avoids those trees.

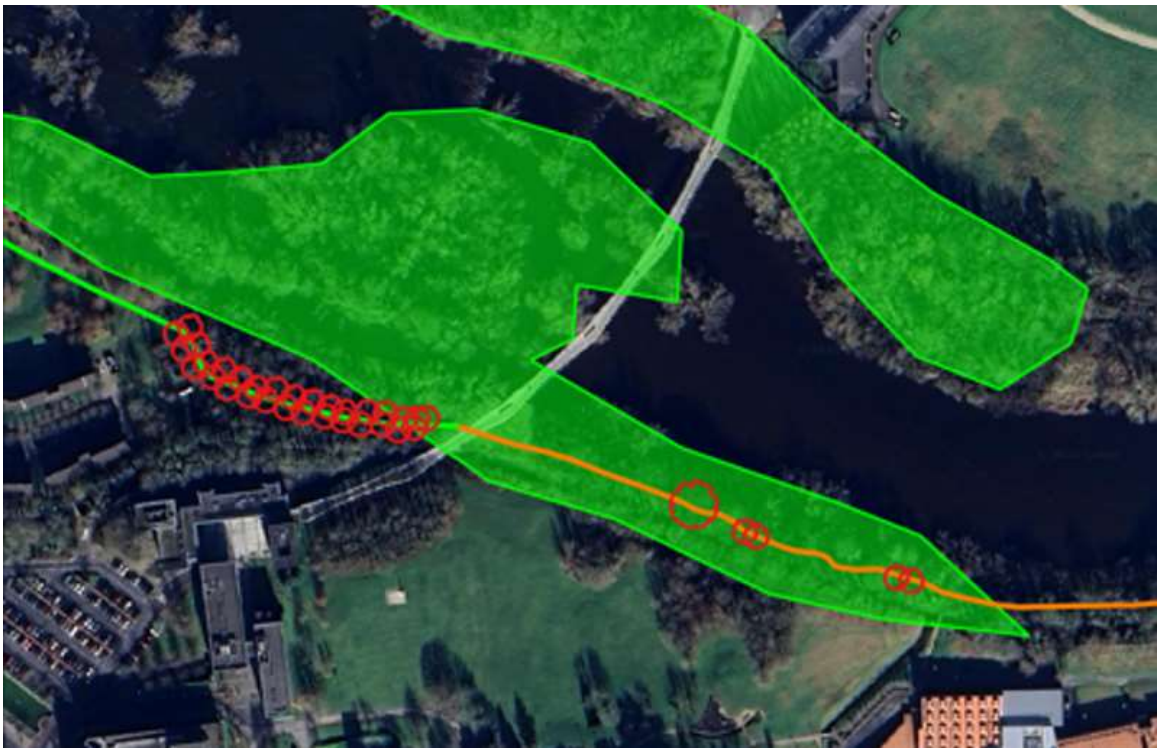

Figure 3-100: Existing Annex 1 Alluvial woodland

Figure 3-101: Proposed Greenway diverts from existing path to avoid the Annex 1 Alluvial Woodland north of Dromroe Student Village

The proposed Greenway avoids the mature Beach trees by diverting south of the existing gravel path (@ CH1420) to immature Birch trees where a 6m wide avenue of tree clearance will be required to construct the proposed Greenway. The trees that will be cut down are saplings and immature Birch with no habitat potential. Refer to Figure 3-132 later in this report. All trees shall be cut down between September and February and shall be inspected by an experienced and qualified Ecologist to check for nests and roosts. They shall be laid on the ground for at least 24 hours before they will be recycled or mulched.

These trees have been characterised as moderate quality by the project Arborist, namely '*Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality*'. Further information is available in the LCG Tree Survey Report_Rev0 in the EIA Part 3 Appendices.

Figure 3-102: Arborist map of moderate-quality trees east of the Living Bridge that will be removed for the proposed Greenway

The proposed Greenway will rejoin the existing gravel path and pass under the Living bridge (@ CH 1650).

Between the Living Bridge and Plassey Beach the proposed path will narrow to 3m at locations to avoid trees and will meander around existing trees. The new tarmac surface will be laid on top of the existing earth bank and no excavations will be carried out. Refer to Figure 3-104 for a photomontage where the proposed path will pass through the Annex 1 Alluvial Woodland forest with the River Shannon to the north and the Plassey Mill Race to the south.

Figure 3-103: Proposed Greenway under the Living Bridge (looking west)

Figure 3-104:Proposed Greenway in the Annex 1 Alluvial Woodland

CH2180 to CH2250: Proposed Bridge 5, Ramp to Plassey Beach, Rest area

The proposed infrastructure at Plassey Beach includes a new bridge, an access ramp to provide access from the path to the beach for all users, new seating for a rest area or for swimmers to change, new cycle stands, and new landscape planting areas as illustrated in Figure 3-105. The existing earthen embankment at the start of the Plassey Mill Race will be preserved.

The new bridge (Bridge 5) will facilitate pedestrians with limited mobility, wheelchair users, and cyclists to cross the Plassey Mill Race in this area whereas the existing bridge is narrow and has steps to access it which currently makes it inaccessible to users with limited mobility, buggies/prams, and wheelchair

users (refer to Figure 3-48, Figure 3-49, and Figure 3-50). This existing narrow concrete bridge at the mouth of the Plassey Mill Race will remain in place.

There will be a new ramp for people to walk down, wheelchair users to roll down, and children's prams/buggies to be pushed down from the proposed Greenway to Plassey Beach providing an amenity that provides access for all.

New public lighting will be provided using both 5m high and 1.6m high columns depending on existing tree cover.

The SAC boundary line runs south of the Plassey Mill Race stream (refer to the red line in Figure 3-105) and the existing and proposed bridge, retaining wall, and ramp are within the SAC.

The trees that have to be removed are illustrated in red in Figure 3-105. They will be cut down between September and February. All trees to be cut down shall be inspected by an experienced and qualified Ecologist to check for nests and roosts and shall be laid on the ground for at least 24 hours before they will be recycled or mulched.

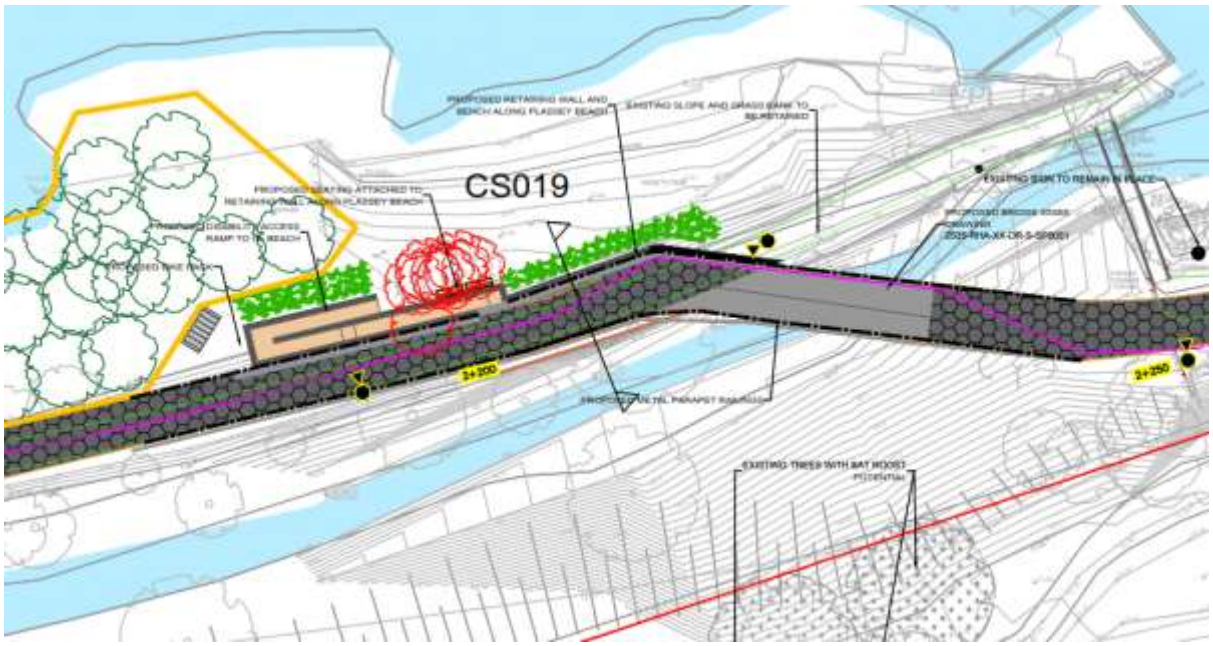

Figure 3-105: Proposed plan of ramp and Bridge 5 at Plassey Beach

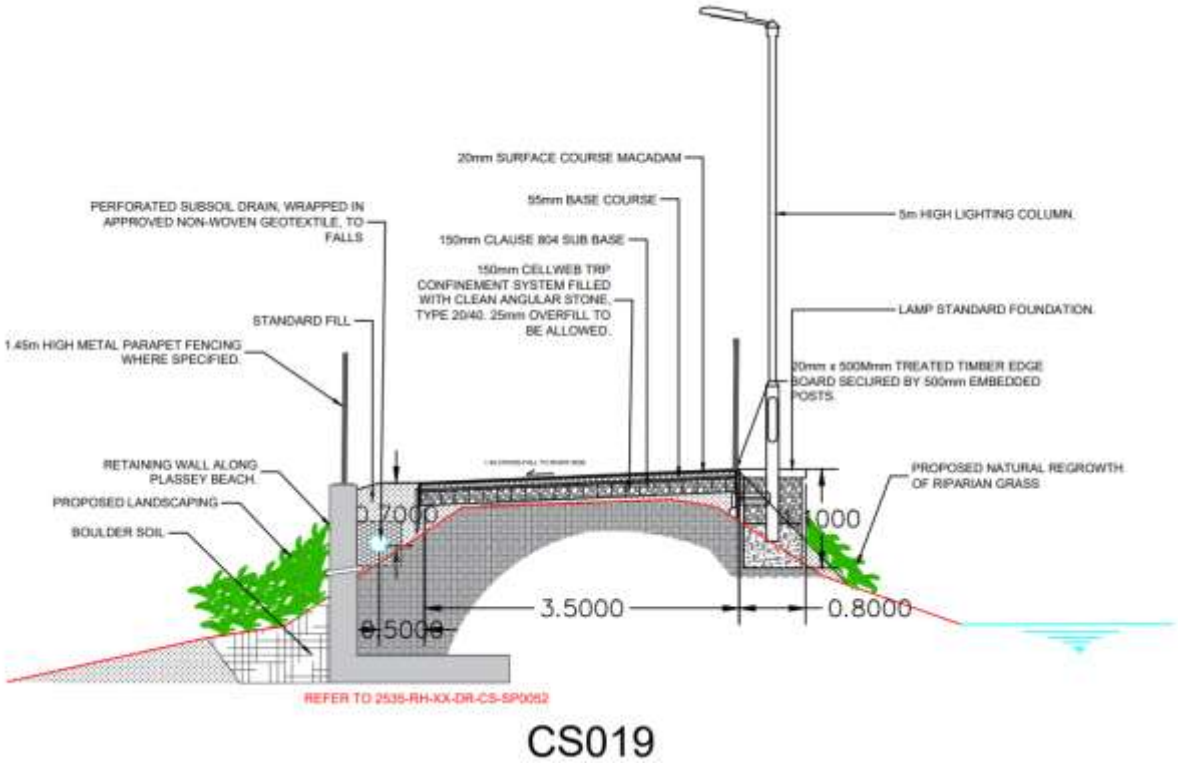

Figure 3-106: Proposed section of retaining wall for ramp at Plassey Beach

Figure 3-107: Proposed Bridge No. 5, existing embankment at Plassey Beach, and existing bridge in background

Figure 3-108: View of proposed Bridge 5 and ramp to Plassey Beach with landscaping, seating, and cycle stands

No instream works will take place at Plassey Beach or in the Plassey Mill Race. As per Bridge 1 and Bridge 2, the worksite will be protected from river water flooding by installing a water filled flood barrier on Plassey Beach, and the River Shannon and Plassey Mill Race will be protected from accidental spillages of contaminated water by proposed sheet piles and a silt curtain.

There will be a 100m long silt curtain installed in the River Shannon to catch any discharges from the worksite into the river. Silt curtains will catch materials that float or are suspended in the water. Silt curtains are typically made from PVC and closed-cell foam. They are a flexible, water permeable barrier that extends downwards in the body of water, where it is typically anchored or weighted to prevent the silt from moving. The foam provides buoyancy, while the PVC curtain controls sediment in the water. Example photos of a silt curtain in the River Corrib in Galway are provided in Figure 3-85 and Figure 3-86.

Dust will be suppressed during the construction works. To avoid water runoff carrying fines, a shade cloth will be erected immediately adjacent to the proposed concrete foundations and walls to trap dust arisings.

Dewatering of the area where the proposed foundations for the Bridge 5 abutment walls will be constructed will utilise a silt buster tank to remove silt from water before the water will be returned to the River Shannon.

The construction period of the bridge, the retaining wall, and the ramp is expected to take 4-5 weeks and the work will be carried out during the summer when it is expected to be dry and the river is at the lowest level during the year. The existing Mill Race stream under the proposed Bridge 5 will continue to run during the works and during the summer months the depth of this stream has been measured (during the summer of 2022) as being 100mm deep. The proposed sheet pile will prevent any loose soil or suspended material from running into the Mill Race stream. The proposed shade cloth will prevent airborne dust from floating onto the stream or River Shannon. The proposed water filled flood barrier will prevent river water from entering the worksite.

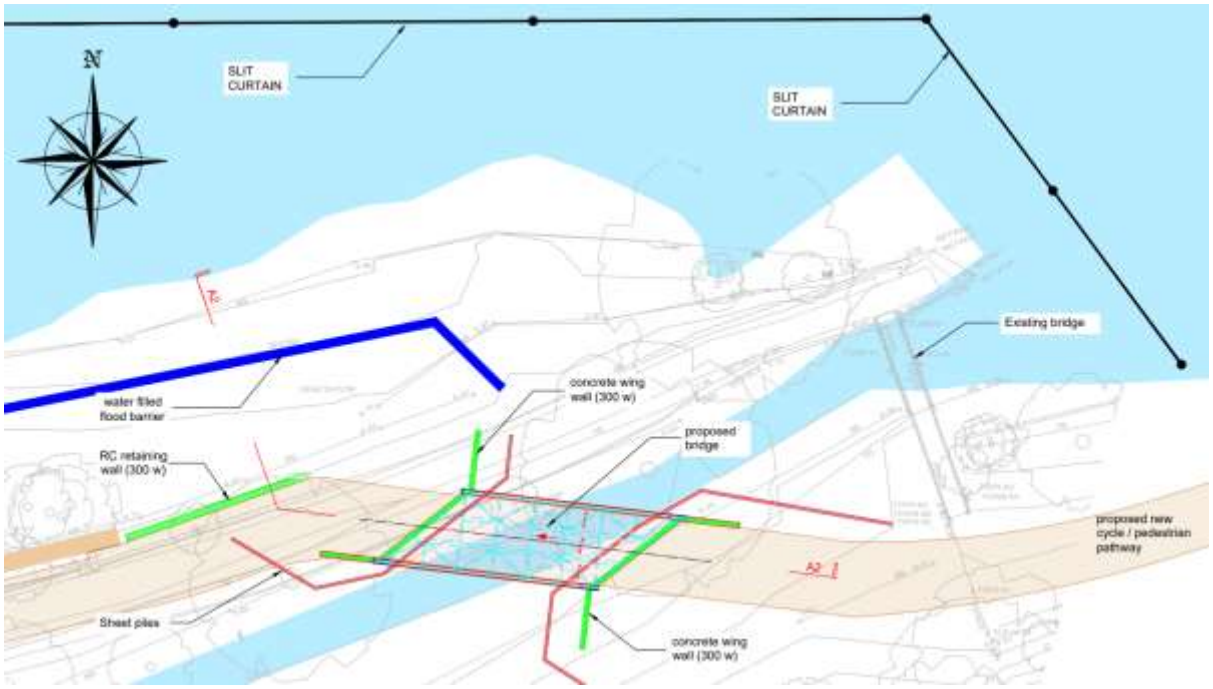

Figure 3-109: Plan of proposed Bridge 5 and proposed Ramp, showing proposed Silt Curtain, Sheet piles and water filled flood barrier (refer to drawing RHA-XX-DR-S-SP0052)

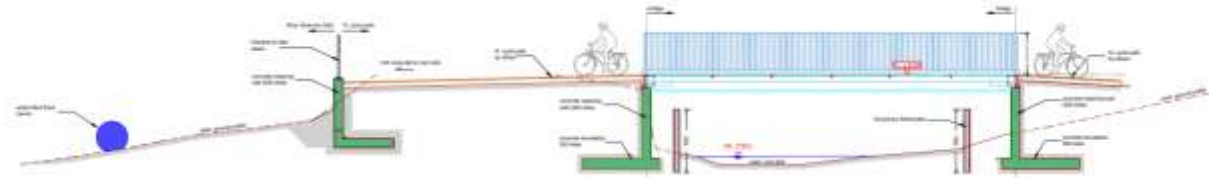

Figure 3-110: Section of retaining wall for proposed Ramp and Abutment walls for proposed Bridge 5 (refer to drawing RHA-XX-DR-S-SP0052)

The construction sequence for the bridge abutments is illustrated in the figure below.

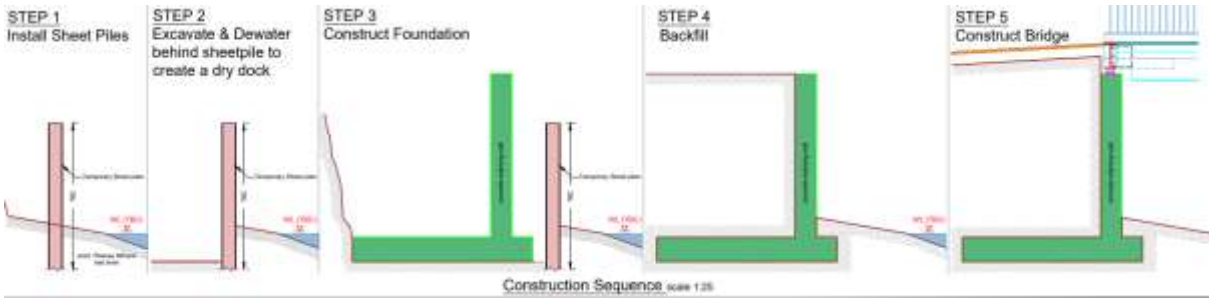

Figure 3-111: Construction sequence for abutment structures to support the steel deck of Bridge 5 (refer to drawing RHA-XX-DR-S-SP0052)

CH2250 to CH2500: Proposed Greenway on raised gravel path

East of Plassey Beach and north of Kilmurray Student village is an existing raised gravel path that will be covered with a tarmac surface. The proposed Greenway will cross an existing watercourse and the existing drainage pipe will be replaced with a proposed 900mm diameter culvert pipe.

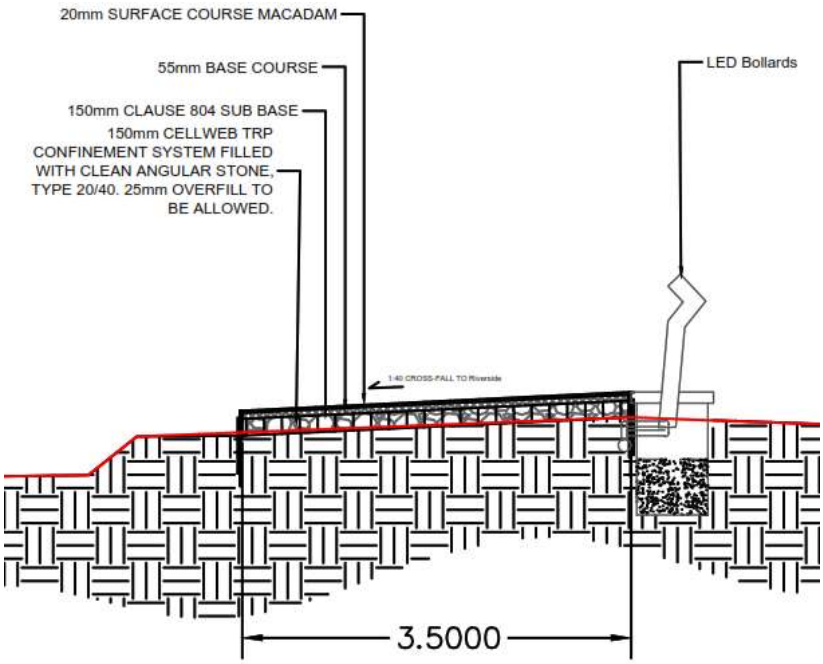

Figure 3-112: Proposed tarmac path and public lighting north of Kilmurray Student Village

At CH2500 the proposed Greenway will split into two paths. One will continue eastwards along an existing desire line to Cook Medical and onwards to McLaughlan Road. There will be a new swing gate installed at this junction so the section of proposed Greenway in the green field can be temporarily closed during and after significant flood events. The other path at the junction will turn south towards University Road and this is described in CH000_C to CH300_C.

Figure 3-113: Proposed junction on Greenway at CH2500 (refer to drawing RHA-XX-DR-C-PD0019)

CH2500 to CH3180: Proposed Greenway along desire line

The proposed Greenway route continues east and traversers amenity grassland and scrub areas where there is an unpaved desire line.

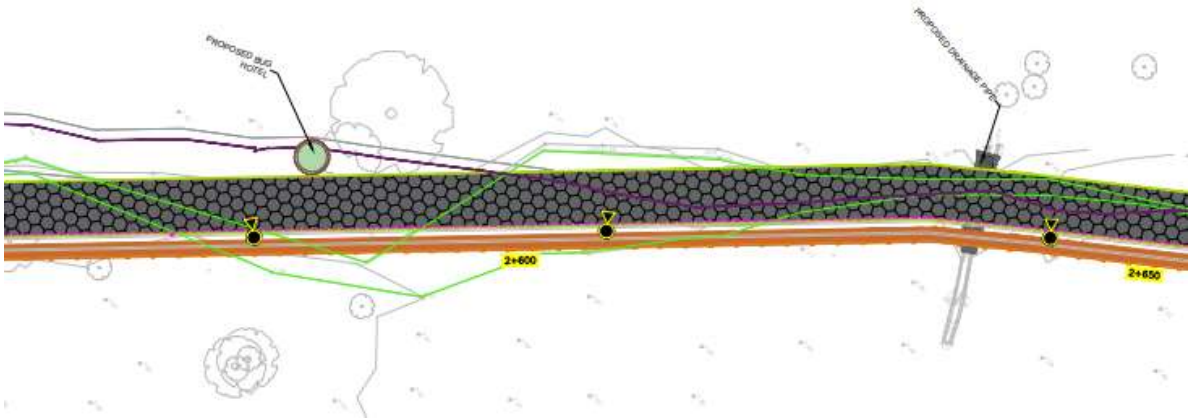

Figure 3-114: Proposed Greenway to replace existing grass desire line

There will be a new shallow land drain on the field side of the proposed Greenway and proposed drainage culverts will be constructed under the proposed path to drain surface water to the River Shannon, and to ensure the tarmac path can be utilised as soon as possible after flooding events (after LCCC maintenance personnel have inspected and cleared the path of flood debris).

The Flood Risk Assessment undertaken for this project, CFRAM flood mapping, confirms this part of the proposed Greenway will be subject to low probability (1 in 1000 year) and medium probability (1 in 100 year) flooding events. Anecdotal evidence collected during site visits and the public consultation event in August 2022 confirmed there will also be a high probability (1 in 10 year) of flooding events.

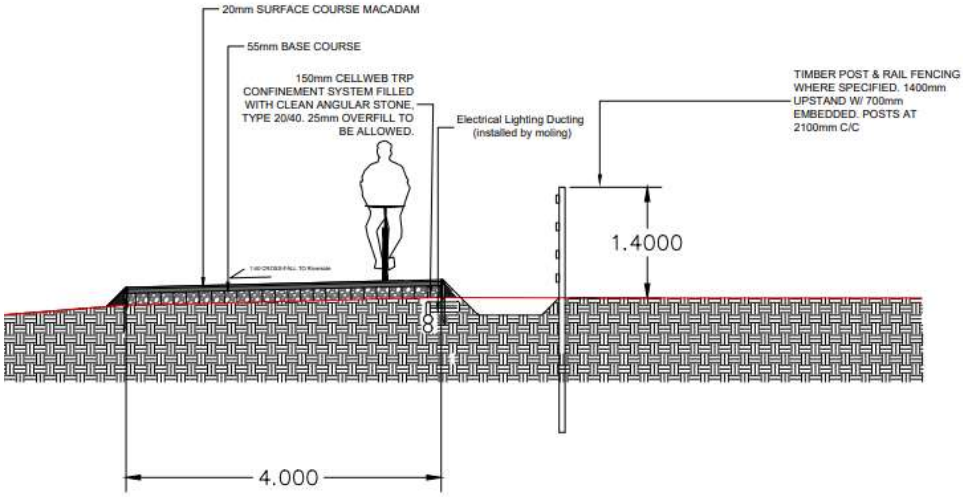

Figure 3-115: Proposed Greenway cross section in green field

CH3180 to CH3490: Proposed Greenway in green field

The proposed Greenway route turns south-east (CH 3180) to traverse the edge of trees, and through grassland and scrub areas. It will avoid the IDA's proposed surface water management system (shown in greyscale). There will be drainage channels along the east and west sides of the proposed Greenway to manage surface water and drain water towards the River Shannon.

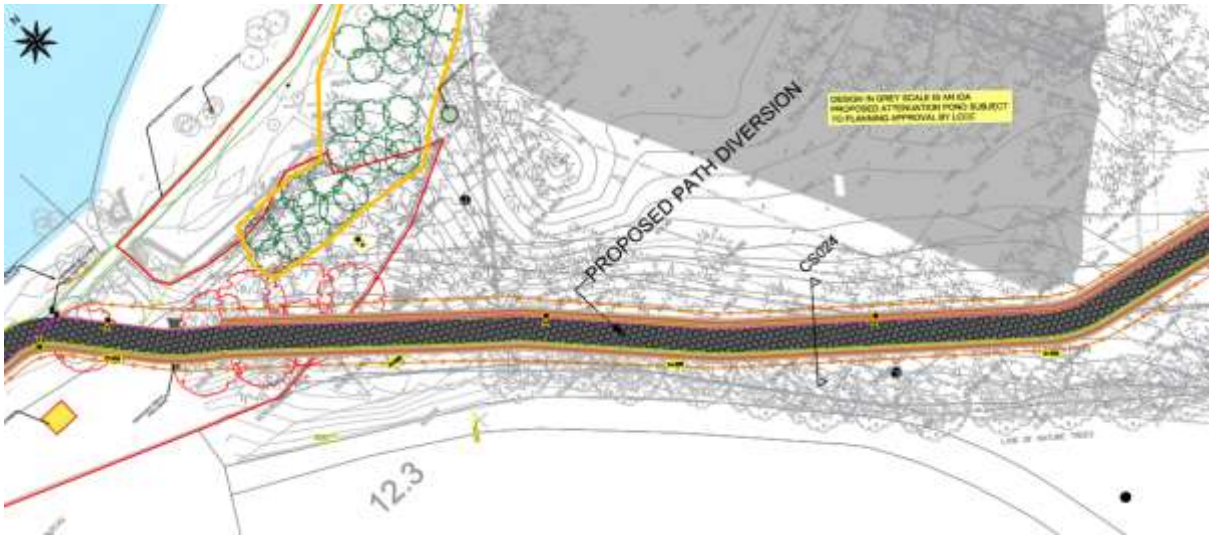

Figure 3-116: Proposed drainage alongside proposed path to manage surface water

The proposed Greenway will turn south-west to join to McLaughlan Road in the National Technology Park (NTP) at CH 3490.

CH3490 to CH3805: Proposed Cycle lane and Footpaths alongside McLaughlan Road

The proposed Greenway changes from a shared 3.5m wide greenway to Active Travel infrastructure with separate 1.8m wide footpaths and 1.8m wide cycle lanes along the eastern and western side of McLaughlan Road.

Figure 3-117: Proposed cycle lanes and footpath on McLaughlan Road where it joins the shared path

The proposed footpaths and cycle lanes will tie into existing footpaths and cycle lanes on Plassey Park Road at its junction with McLaughlan Road.

Figure 3-118: Proposed plan for footpaths and cycle lanes alongside McLaughlan Road

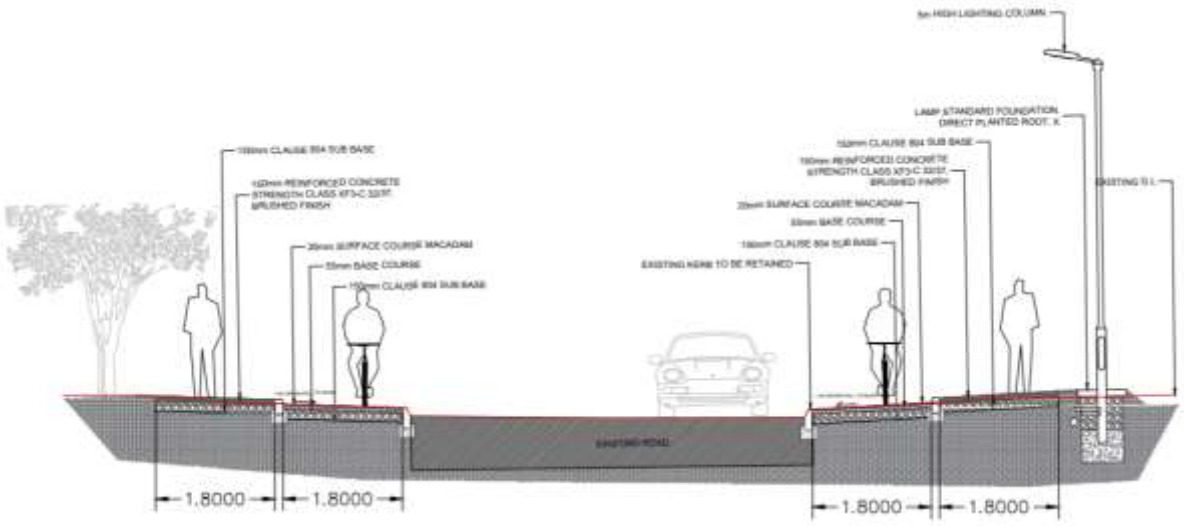

Figure 3-119: Proposed cross section for footpaths and cycle lanes alongside McLaughlan Road

An existing 2m wide raised table Zebra crossing on Plassey Park Road will be converted to a 6m wide Toucan crossing to prioritise crossings for pedestrians and cyclists and in accordance with design guidance for Toucan crossings on bus routes.

Figure 3-120: The existing Zebra crossing on Plassey Park Road proposed to be converted to a Toucan crossing

CH000_C to CH300_C:P Proposed Greenway east of Kilmurray Student Village

The proposed Greenway will run in a southerly direction past the eastern boundary of the UL Agricultural Laboratory building and Kilmurray Student Village. This short section of the Greenway will be a shared space between Greenway users and vehicles associated with the UL Agricultural laboratory, but removable bollards will be installed on the Greenway that will be operated by UL Facilities to manage vehicle movements. Typically the bollards would be locked in place to prevent unauthorized access for

vehicles to this section of the Grenway. Refer to drawing RHA-XX-DR-C-PD0029. The existing parking spaces to the east of Kilmurray Student Village will be reconstructed to accommodate the proposed Greenway. The existing rubbish bin area will be realigned for the same reason.

Figure 3-121: Proposed Greenway at UL Agricultural Laboratory building east of Kilmurray Student Village

Figure 3-122: Proposed Greenway approaching the eastern/rear entrance to Kilmurray Student Village

The proposed Greenway will leave the Kilmurray Student Village and join University Road.

Figure 3-123: Proposed Greenway at eastern entrance to Kilmurray Student Village

CH300_C to CH677_C: Proposed footpaths and cycle lanes on University Avenue

The proposed Greenway crosses the entrances to Kilmurry Student Village and the UL Gaelic grounds where it changes from a shared 3.5m wide greenway to Active Travel infrastructure with separate 1.8m wide footpaths and 2.0m wide cycle lanes along the eastern and western side of University Road.

Figure 3-124: Proposed Greenway on University Road

The proposed cycle lanes and footpaths on University Road will tie into Active Travel infrastructure which was constructed along Plassey Park Road as part of the Limerick Shannon Metropolitan Area Transport Strategy (refer to Figure 3-73).

3.3 Proposed Amenity/Rest areas, Landscaping and Tree Planting

In accordance with LCCC's replacement tree planting policy, there will be five native Irish trees (e.g.: Oak, Willow, Alder, Birch) are proposed to be planted for every tree that is cut down to enable construction of the proposed Greenway path.

There will be three new amenity/rest areas provided along the proposed Greenway with new seating and cycle stands.

There will be a new wildflower meadow (in accordance with the All-Ireland pollinator plan), a hedgerow, and tree planting south of the Fisherman cottages, and new understory planting at the Plassey Mills rest area. There will be new landscaping along the retaining wall and ramp at Plassey Beach.

CH000: Proposed Amenity/Rest area at Groody Bridge

There will be a proposed amenity/rest area east of Groody Bridge. The red line in Figure 3-125 is the SAC boundary line which passes through the existing path. Refer to drawings 2525-RHA-XX-DR-C-PD0001 and 2525-RHA-XX-DR-C-LA0002.

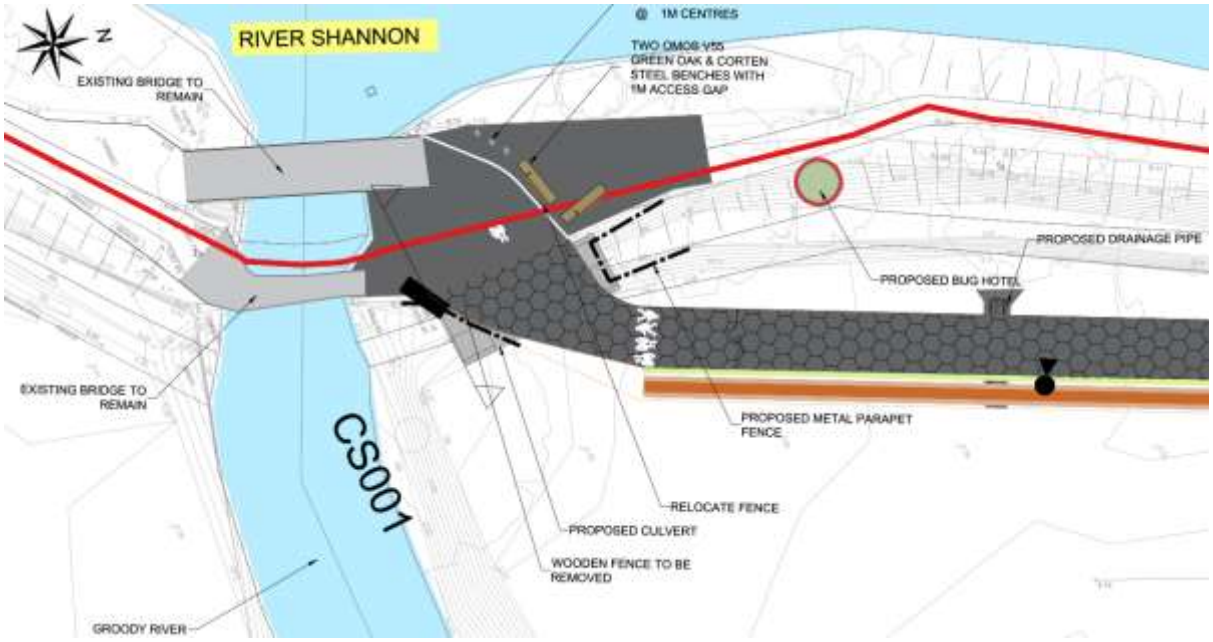

Figure 3-125: proposed amenity/rest area east of Groody Bridge

CH 770: Proposed Tree planting east of UL Boat Club

There will be native Irish trees planted along a proposed path between the proposed Greenway and an existing UL campus shared path. Refer to drawing 2525-RHA-XX-DR-C-PD0007. The replacement tree planting will support the propagation of and avoid gaps in the broad leaf woodland along the riverbank to the benefit of bats, especially the Lesser Horseshoe bat.

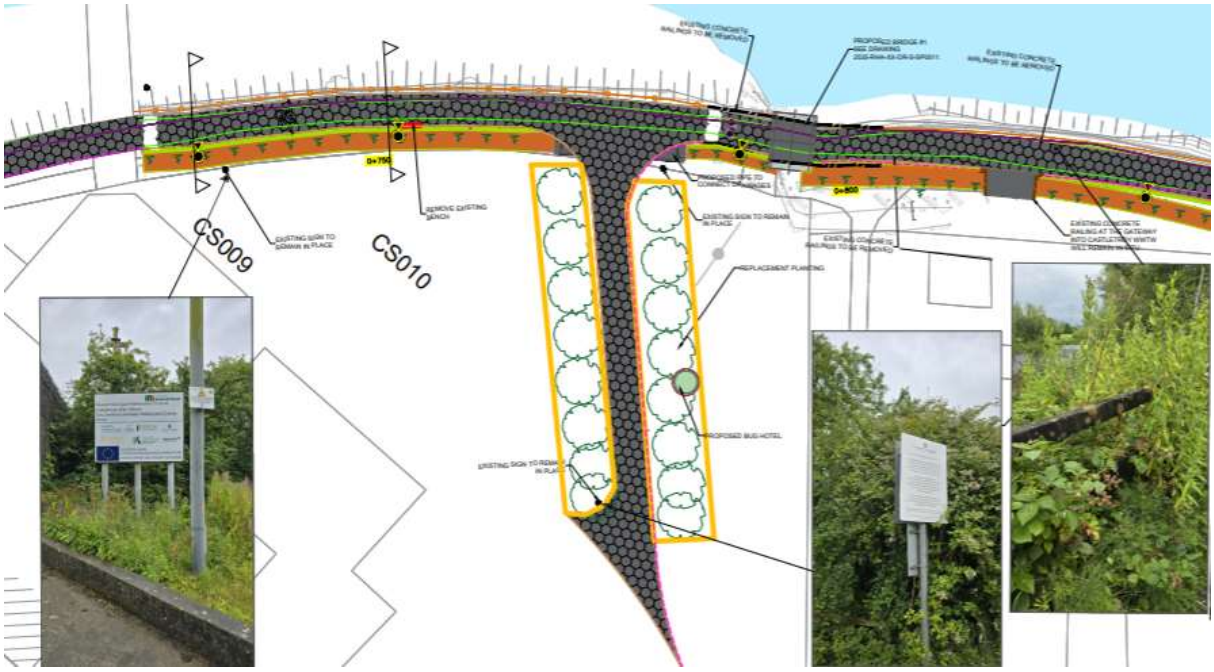

Figure 3-126: Proposed tree planting area west of proposed Bridge 1

CH1020: Proposed Amenity/Rest area at Plassey Mills

The proposed amenity/rest area at Plassey Mills will provide new seating and cycle stands. It could also function as a junction for any future usage of the currently sealed off Black bridge that crosses the River Shannon in this location.

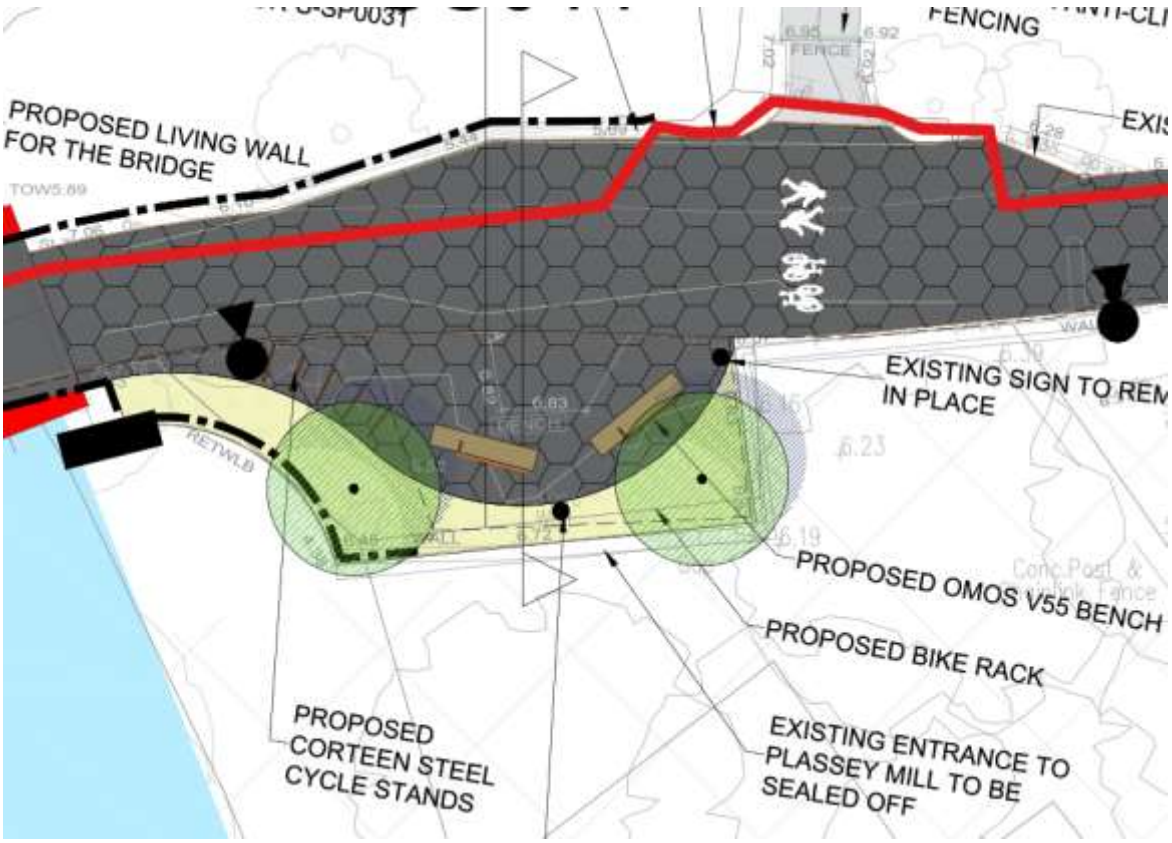

Figure 3-127: Proposed amenity/rest area at Plassey Mills

CH 1200; Proposed Landscaping south of the Fisherman cottages

There will be a new wildflower meadow (in accordance with the All-Ireland pollinator plan), a hedgerow, and tree planting south of the Fisherman cottages. Refer to drawings 2525-RHA-XX-DR-C-PD0001 and 2525-RHA-XX-DR-C-LA0003. The replacement tree planting will support the propagation of and avoid gaps in the broad leaf woodland along the riverbank to the benefit of bats, especially the Lesser Horseshoe bat.

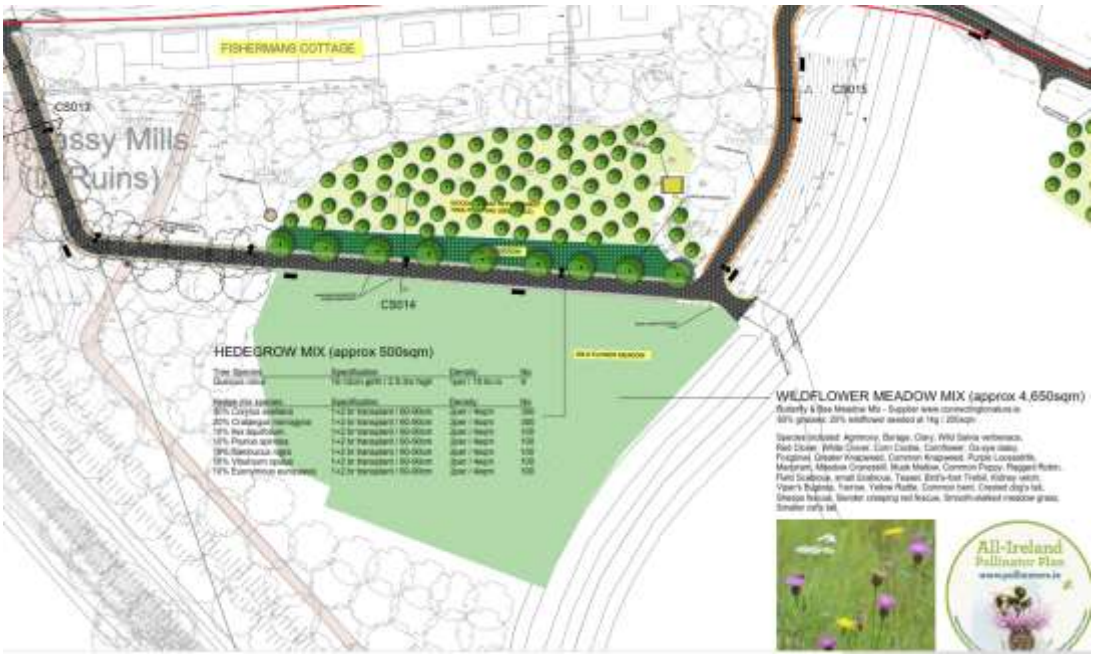

Figure 3-128: Proposed landscaping south of the Fisherman cottages

CH 1400-1520: Proposed Tree planting north of Dromroe Student Village

There will be replacement trees planted in a green field area to the north of Dromroe Student Village. Refer to drawings 2525-RHA-XX-DR-C-PD0011, 2525-RHA-XX-DR-C-PD0012, and 2525-RHA-XX-DR-C-LA0003. The replacement tree planting will support the propagation of and avoid gaps in the broad leaf woodland along the riverbank to the benefit of bats, especially the Lesser Horseshoe bat.

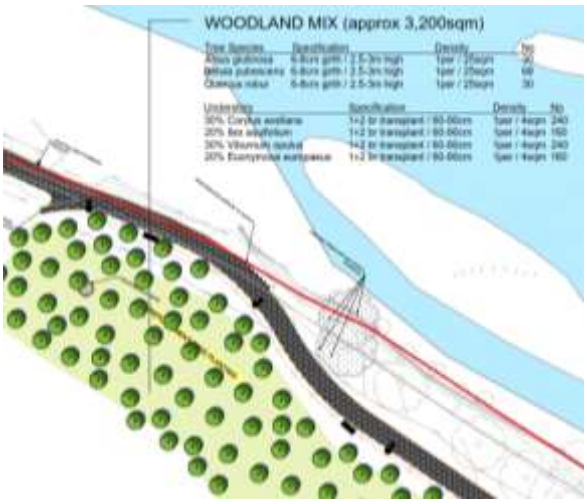

Figure 3-129: Proposed tree planting area north of Dromroe Student Village

CH 2105-2175: Proposed Landscaping and Amenity/Rest area at Plassey Beach

There will be new native Irish trees and new riverside shrubs planted at Plassey Beach. Refer to drawings 2525-RHA-XX-DR-C-PD0017 and 2525-RHA-XX-DR-C-LA0004. The replacement tree planting will support the propagation of and avoid gaps in the broad leaf woodland along the riverbank to the benefit of bats, especially the Lesser Horseshoe bat.

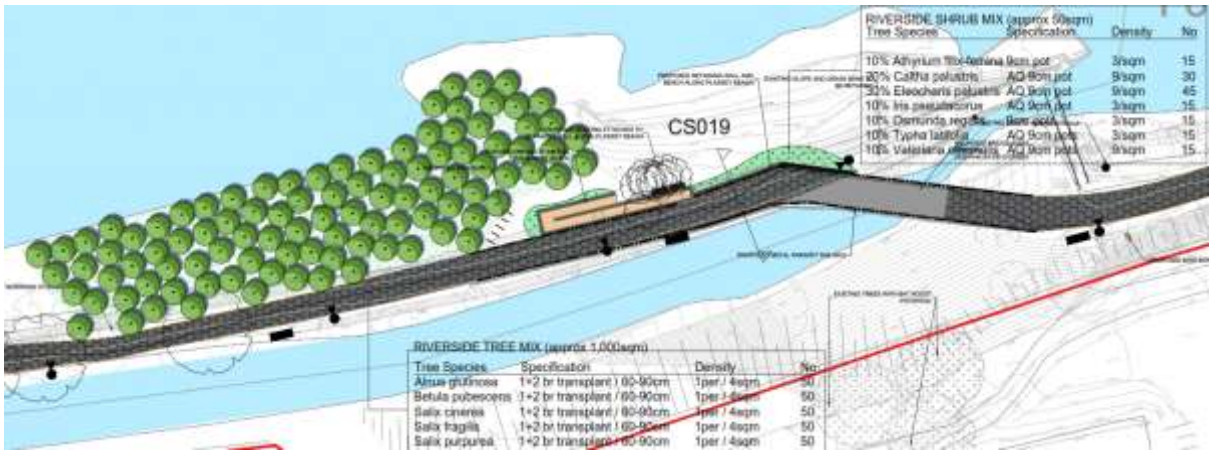

Figure 3-130: Proposed native Irish trees and new riverside shrubs at Plassey Beach

CH 3190-3450: Proposed Tree planting east of Cook Medical campus

There will be native Irish trees and an understory planted adjacent to the proposed path east of the Cook Medical campus and southwest of Troy Castle. Refer to drawing 2525-RHA-XX-DR-C-PD0023 and 2525-RHA-XX-DR-C-LA0005. The replacement tree planting will support the propagation of and avoid gaps in the broad leaf woodland along the riverbank to the benefit of bats, especially the Lesser Horseshoe bat.

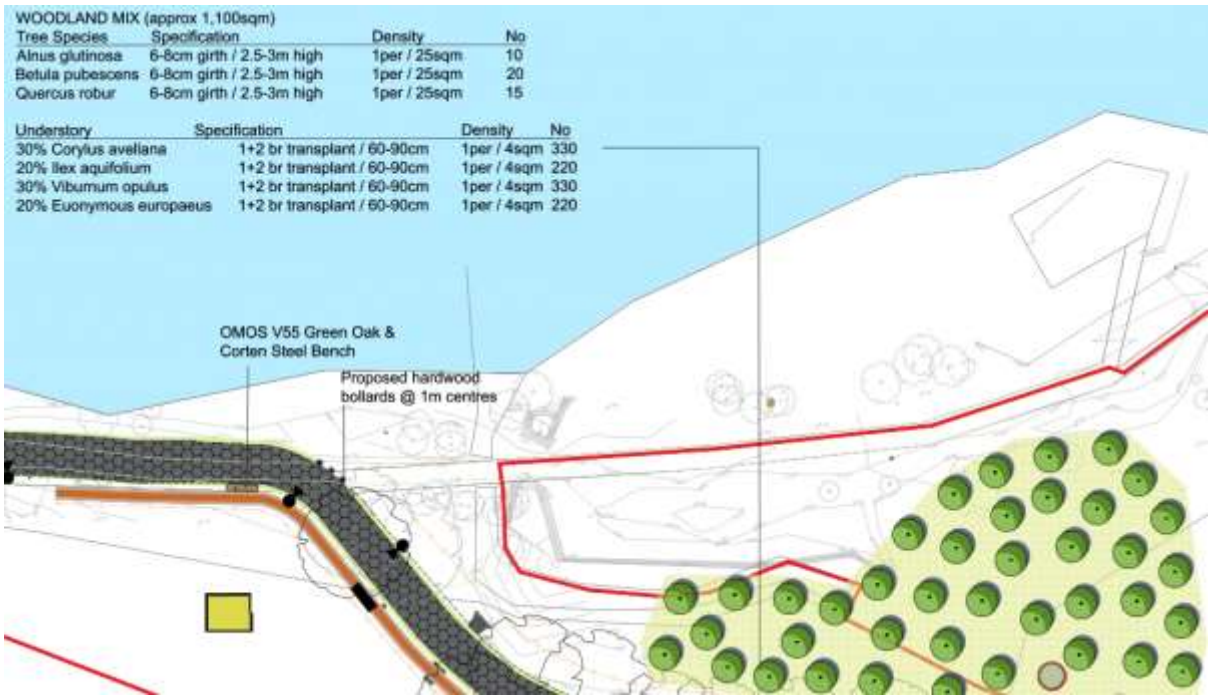

Figure 3-131: Proposed replacement tree planting east of Cook Medical

3.4 Description of Proposed Construction Works

3.4.1. Tree removal

The proposed works have been designed to minimise disturbance to the habitat and limit tree removal within the site, but there are trees that will be cut down to construct the proposed Greenway. In accordance Section 40 of the Wildlife Act 1976 as amended by Section 46 of the Wildlife Amendment Act 2000 the proposed trees can only be removed between and 1st September and the last day of February in the following year. The trees that have to be removed will be cut down during this period.

The proposed path has been designed to avoid existing mature trees except for one dead mature tree and one dead semi-mature tree that will be felled ahead of the construction works. Tree overhang from approximately 30 No. semi-mature and mature trees will be cut down along the proposed path. These trees have been assessed by an experienced and qualified Arborist and an experienced and qualified Ecologist, and they have very limited habitat potential. There is one dead mature tree and four immature trees that will be removed in the Annex 1 habitat Alluvial woodland forest (Refer to Figure 4.2). The remainder of the trees to be cut down are outside the Annex 1 habitat Alluvial woodland and they are saplings and immature trees with no habitat potential. Refer to Figure 3-132.

Figure 3-132: Saplings and immature trees that will be removed along the route of the Greenway

All trees to be cut down between September and February shall be inspected by an experienced and qualified Ecologist to check for nests and roosts and shall be laid on the ground for at least 24 hours before they will be recycled or mulched.

LCCC requires trees that are cut down to be replanted at a rate of 5:1 so over 300 native trees are proposed to be planted along the proposed Greenway. This will help to deliver the LDP Objective EH O10 to plant 'native trees, hedgerows and vegetation and the creation of new habitats in all new developments and public realm projects'.

Tree branches and immature trunks which are felled will be reused in the production of bug hotels. Any leftover trunks and branches will be chipped and mulched at the closest construction compound for reuse on site.

Figure 3-133: Scrubland that will be cleared ahead of the Greenway construction works

3.4.2. Site Clearance

Surface stripping will be required in greenfield areas where topsoil and subsoil will be stripped along the route of the path to an average depth of 300mm. The topsoil and subsoil will be mounded and seeded on the river side of the path and will be left in place as a permanent installation. To prevent soil washing into the river, a sediment barrier will be erected at the base of the mounds on the river side.

In advance of construction works existing infrastructure items will be removed and disposed off-site, these include:

- One steel kissing gates along the existing gravel track at Plassey Mills and disposal off site;
- Approximately 500m of existing wooden, concrete, and steel fencing and disposal off site;

Advance work in Section 2 will require the removal of a temporary steel bridge at the location of Bridge No. 3.

Advance works will also include cutting out of four existing concrete footbridges and one set of bridge abutments and crushing of concrete within the construction compounds so the aggregate can be reused during the construction works.

Extensive areas of vegetation will need to be cleared in advance of construction works. Trees which are felled will be chipped on site for mulch for use on site. Mulch will be added to slopes to prevent soil erosion, retain water, and manage weeds.

Vegetation clearance includes:

- Felling of trees and mulching for onsite use;
- Clearance of overhanging branches and mulching for onsite use;

- Clearance of native scrub from drainage channels, bagging, and disposal;
- Clearance of native scrub in heavy dense areas, bagging, and burial under soul mounds to prevent spread of invasive species.

A planting scheme is proposed to replace vegetation which has been removed as part of the works. Refer to the landscape drawings 2525-RHA-XX-DR-C-LA0001 to 2525-RHA-XX-DR-C-LA0005 for details of the proposed planting areas and species.

Advanced treatment and removal of invasive species including Giant Hogweed and Himalayan Balsam that have been surveyed in the work site shall be carried out ahead of construction works. Refer to the Invasive Species Management Plan in Appendix E for details.

If invasive species plants that spread by rhizomes (e.g. Japanese Knotweed) are encountered by site clearance crews, the plant will be removed in accordance with guidelines for managing invasive species, wrapped in plastic, and buried under topsoil and subsoil mounds so those invasive species plants cannot propagate. No invasive species will be moved to a different location within the works site or off site.

Site clearance will be required in advance of the Greenway's construction, as follows:

- At a minimum this will include excavation of topsoil and subsoil and establishment of permanent mounds (including reseeding) immediately alongside the stripped soil in green fields along the proposed route between Kilmurray Student village and Cook Medical;
- Existing infrastructure items obstructing the proposed path, such as metal gates, metal parapets, metal arisings from crushed concrete, and metal fences will be removed and disposed offsite to a licenced waste facility;
- Existing concrete footbridges will be or crushed in temporary construction compounds and the material will be reused as aggregate for haul roads during the works (metal arisings will be transported to a licenced waste facility);
- Vegetation clearance involves removing scrub and will be carried out in consideration of ecological restrictions between September and February.
- Trees which are felled will be mulched in a temporary construction compound for reuse on site to minimise soil erosion, keep soil wet, and prevent weed growth.
- Where excavation is required to remove roots from trees that have been cut down, any unconsolidated ground will be sown with grass seed following reinstatement to prevent erosion;

Temporary works will be put in place in advance of construction, including the provision of silt fences at all interfaces of the works area and the existing watercourse to prevent run off from the works area.

3.4.3. Temporary Construction Compounds

The temporary construction compounds will be temporarily surfaced with hard standing on a geomembrane to prevent generation and spreading of mud. Temporary perimeter fencing with silt curtains at the base and shade cloths to act as dust curtains will be erected around compounds. Delivery trucks will not cross through the compounds, and they will drop their loads within the compounds. The construction works vehicles will be permitted to work on the Greenway side of the compounds only and will not pass through the compound to exit onto public roads. This will control mud spreading onto public roads and will help to prevent the spread of invasive species that are evident along the proposed path. The compounds will be adequately buffered to prevent any surface water runoff. The construction compounds will be constructed in Flood Zone C areas only.

The compounds will comprise the following elements:

- temporary site office, portaloo toilets, facilities for staff, and car-parking areas;
- crushing and storage areas for construction materials;

- bunded containment areas for plant refuelling which will only be permitted within the compounds,
- maintenance area for construction vehicles and plant;
- wheel wash area for construction vehicles and plant with water capture and settlement to prevent the spread of invasive species;
- storage of fuels, oils, lubricants, solvents, and site generators;
- a dedicated waste storage area for any construction waste generated. Skips or bays will be provided for recyclable material;
- wheel wash area for delivery vehicles (or road cleaning to be carried out as an alternative subject to UL, IDA and LCCC requirements).

Temporary compounds and a working area will be required during the construction period to accommodate workforce and vehicle movements, stockpiling of excavated material, and the construction (and removal where required) of haul roads. For each compound the top-soil and sub soil will be removed and mounded on the compound footprint, a geotextile layer will be laid across the entre area, imported fill (40mm crushed rock) will be spread across the area, and the compounds will have a temporary fence set up on their boundary.

Provision has been made for four temporary compounds with areas typically measuring 40m x 40m but these dimensions will be adjusted to suit site conditions and avoid tree felling. There is one temporary working area proposed in Castletroy wastewater treatment plant (WwTP) to set up a crane to lift in prefabricated concrete and steel sections associated with Bridges 2 and 3. Each of the compounds facilitate access to the five different sections of the proposed Greenway. Sectioning of the route in this way will allow part of the existing path to remain open for the public while works are being carried out in other sections. Refer to Figure 3-134.

Each temporary compound and working area will be removed after works in each section are completed and the area will be reinstated back to its original state.

Upon completion of sections of the Greenway, the temporary construction compounds and haul roads will be decommissioned, and the grounds will be reinstated to their original condition. Where possible, hardstanding materials removed will be reused in the construction of other temporary compounds and used in the construction of the base layers of the proposed Greenway project.

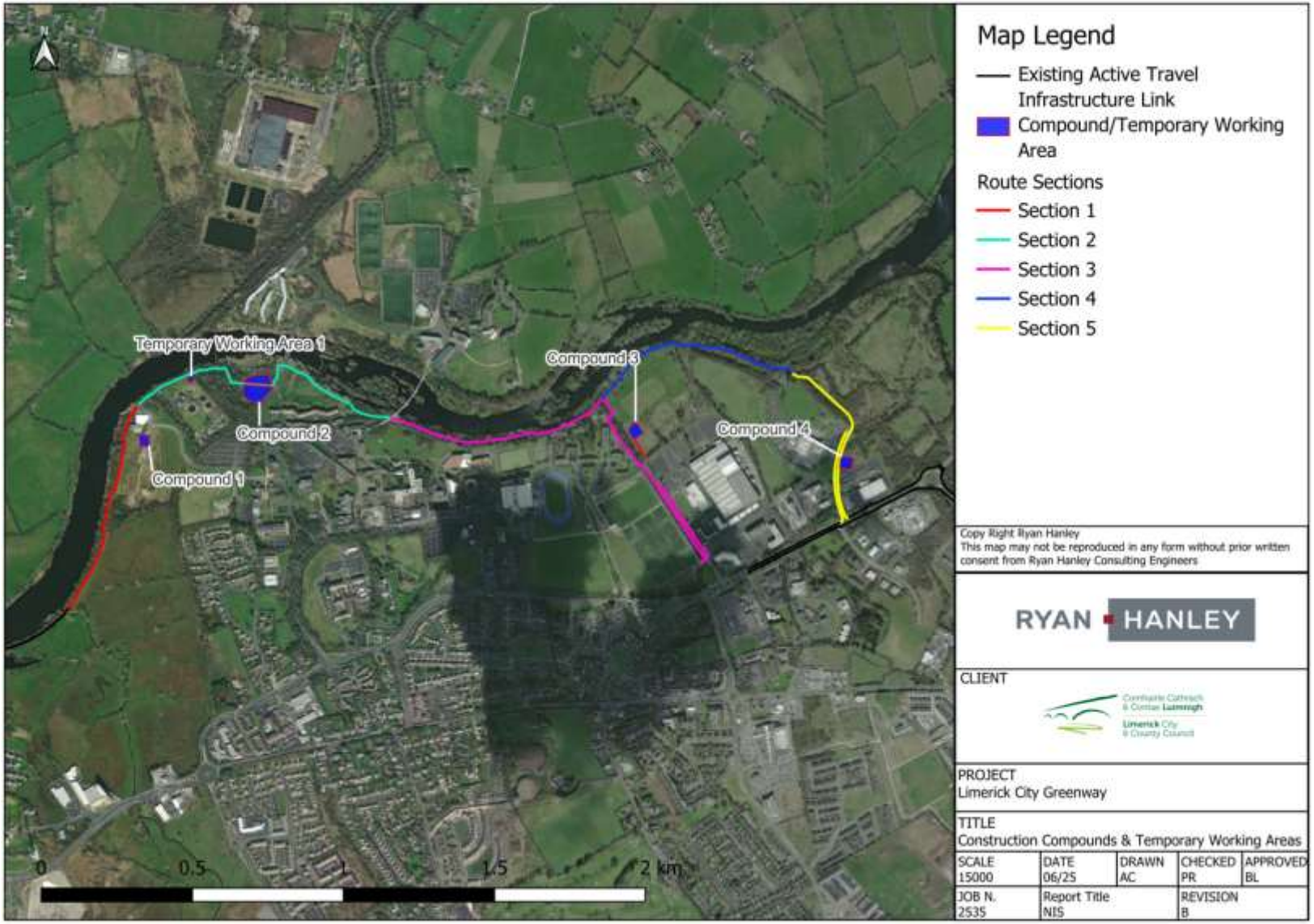

Figure 3-134: Proposed Sections, Compounds and Temporary Working area

3.4.4. Haul roads

Haul roads are required to facilitate the construction of the proposed Greenway. Haul road will be developed in green fields, scrublands, tree felling areas, and along existing gravel paths to enable construction vehicle movements. The haul roads will form the sub-base layer of the proposed path. Approximately 3.6km of haul roads will be developed along the proposed route as per Table 3-1.

Table 3-1: Lengths of Haul Roads per Section

Section Ref.	Haul Roads (m)
Section 1	736
Section 2	1005
Section 3	845
Section 4	725
Section 5	284
Total Length	3,595

The haul roads for construction vehicles will be developed along the route of the proposed path so the tarmac finished layer can be laid onto the haul road. The haul road will be approximately 3.5-4.0m wide and will comprise of the subbase layers of the proposed path: a geotextile layer, and crushed rock (UGM A). The depth of the subbase layer will generally be 300mm – 450mm depending on the ground conditions of the area and the haul roads will be laid in sections as the construction of the Greenway progresses.

Approximately 313m of temporary haul roads which do not lie along the proposed path will be constructed to facilitate access between the compounds and the works areas in each section. These haul roads will be removed after works in each section are completed and the area will be reinstated back to its original state.

Temporary haul roads will be constructed by excavating topsoil and subsoil and laying geotextile and aggregate/blinding (UGM A). The soil will be stored temporarily if it is required for reinstatement or will be permanently mounded and reseeded if it is not required for reinstatement. The haul roads will be laid in sections as construction of the path progresses.

On completion of sections of the proposed Greenway, the temporary haul roads will be removed, and materials will be reused in subsequent sections as the works advance, or the UGM A material, 55mm binder course and 20mm surface macadam course will be laid above the haul roads in greenfield areas. Lath edging (50 x 75mm) will be laid at both side of path attached to stakes located at 900mm c/c.

3.4.5. Earthworks

There will be no excavation required for the proposed Greenway along existing tarmac or gravel paths. To protect trees alongside the path a 'Cellweb®TRP' tree root protection system (or equivalent) will be laid onto the existing path and imported material (i.e., crushed rock and gravel to UGM A, overlaid with tarmacadam) will build up the level of the path. The sloping banks on the river side and the Plassey Mill Race will also have a 'Cellweb®TRP' system (or equivalent) to enable plant regrowth along the bank. Refer to Figure 3-135 for an example.

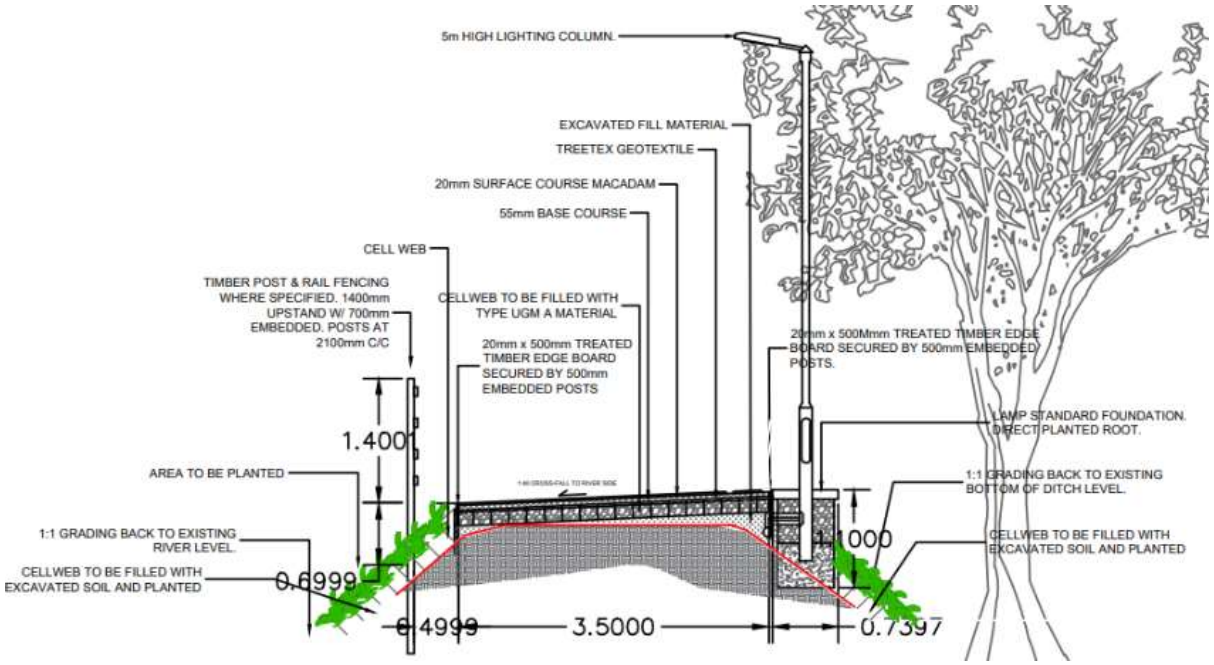

Figure 3-135: Tree root protection along proposed Greenway (Red line is existing ground level)

Excavation of topsoil and subsoil will be required where the proposed path passes through green field areas. Approx. 300mm depth of soil will be excavated and permanently left as a mound to be reseeded approximately 0.75m high and 2m wide on the river side of the path. Soil from areas that were contaminated with invasive species will be wrapped in plastic and buried under excavated soil. This accords with the project objective to ensure at least 95% of all waste is kept on site and not sent to a landfill.

Excavation of the carriageway, green verge, and footpaths will be required along University Road and McLaughlan Road to build up the concrete footpath and tarmac cycle lanes. A raised kerb will separate the existing roads from the proposed cycle lanes.

3.4.6. Testing of Imported Material

Clean Type UGM A fill material is required to be imported into the work site. To prevent cross contamination or pollution, a suite of testing from the source quarry will be required because the proposed Greenway is adjacent to water.

3.4.7. Traffic Management

A *Draft* Traffic Management Plan has been prepared for the proposed works and consultation has been carried out with UL Facilities and Uisce Éireann. The traffic management proposals have been presented to elected representatives. Construction and works delivery traffic will use the following existing roads/routes:

- The entrance road to the Castletroy WwTP;
- The road across the bridge to Co. Clare;
- University Road;
- McLaughlan Road;
- Plassey Park Road.

3.4.8. Construction of Greenway

Construction works should take place during daylight hours only with no temporary lighting on the site during the hours of darkness. Works shall only be carried between 08:00-18:00 during daytime hours

or between dawn and dusk to minimize disturbance to nocturnal Qualifying Interests species. Motion detection sensors to turn on lights were considered but have not been proposed because the existing path is well used by the public so the use of always on lights from dusk until 23:00 hours is preferred over lights turning on and off, and risking the creation of a strobe light effect for nocturnal Qualifying Interests species.

During construction, noise limits, noise control measures, hours of operation and selection of plant items will be considered in relation to disturbance of birds. Plant machinery will be turned off when not in use.

The design and construction of the 4.25km long and 3.5-4.0m wide shared path, 1.5-2.0m wide footpath, and 1.8-2.0m wide cycle lanes has been carried out in accordance with the following:

- Transport Infrastructure Ireland (TII) Rural Cycleway Design DN-GEO-03047 (2022);
- Department of the Transport and Department of Housing, Local Government and Heritage, Design Manual for Urban Roads and Streets (DMURS, 2023);
- National Transport Authority's Cycle Design Manual (2023); and,
- Department of Transport, Tourism & Sport document Traffic Signs Manual (TSM) (2019).

Construction of the path will be carried out in sections. The sequencing of works per section is flexible. Each section will be reinstated before works commence in the next section. Existing users of the gravel track along the River Shannon will be directed around each section and there are existing footpaths and cycle lanes in the UL campus and along Plassey Park Road to accommodate diversions.

Isolation of the works area, including erection of fencing around the temporary works area and traffic management will be set up as required. The fenced area will include the full area required to facilitate the works including the temporary site compounds and the temporary haul roads.

Construction of the Greenway along the existing gravel path in wooded areas will involve the installation of lath edging (50 x 75mm) at both sides of the proposed path attached to stakes located at 900mm c/c, laying a 150mm thick root protection material onto the gravel track, filling this with UGM A material, laying a 55mm binder course onto it and finishing with 20mm surface macadam course;

Construction of the path along the existing gravel path in non-wooded areas will involve the installation of lath edging (50 x 75mm) at both sides of the proposed path attached to stakes located at 900mm c/c, laying 150mm of UGM A material directly onto the existing gravel path, laying a 55mm binder course onto that, and finishing with 20mm surface macadam course;

Where the path is being laid in an area with an existing tar pavement (i.e., along University Road and McLaughlan Road, the top 250mm of the existing surface will be removed and subsequently the depth of the subbase layer in these areas will be reduced to approximately 180mm.

Storage of other excavated material will be on a temporary basis, on site within the temporary works area and separate from the topsoil storage. Excavated material will be reused on-site, primarily for backfilling against new bridge abutments and the proposed retaining wall at Plassey Beach. This material will be classified as a construction by-product in the context of Article 27 of the European Communities (Waste Directive) Regulations. If there is any surplus excavated material, it will be transported off site to an authorised waste or recovery facility. Large volumes of excavated material will not be allowed to accumulate within the temporary working areas.

The construction works for reinforced abutment walls, retaining walls, concrete culverts, open drains will be carried out in parallel with the path construction.

The construction works for lighting column foundations and trenches for ducting will be carried out in parallel with the path construction. To protect the tree roots, ducts will be moled to a minimum crown depth of 600mm wherever the ducts pass mature trees.

Additional works including the installation of; signage, safety barriers, fencing, park benches and tree planting will be completed along the path prior to reinstatement of works area and the works area being reopened.

The works area will be reinstated to its original condition. This will involve levelling, raking, and seeding with grass.

3.4.9. Construction of Bridges, Retaining wall, Ramp

The five bridges on which the proposed path will cross existing drains, a stream, and the Plassey Mill Race (at two locations). These are as follows:

- A 4.9m long single span, steel frame bridge and new concrete abutments will be constructed for both pedestrians and cyclists at CH795;
- A 9.6m long single span steel bridge and 41m of concrete retaining wall and abutments will run adjacent to an existing stone footbridge at CH970;
- A 5.4m long single span, steel frame bridge for both pedestrians and cyclists will be constructed on existing cut stone abutments at CH1000;
- A 5.1m long single span, steel frame bridge for both pedestrians and cyclists will be constructed on existing cut stone abutments at CH1045;
- A 12.9m long single span, steel frame bridge for both pedestrians and cyclists will be constructed on new concrete abutments and obliquely cross the Plassey Mill Race at CH2220-2235. 28m of concrete abutments will support the 12.9m long steel deck;
- A new 12m long concrete retaining wall will be constructed at Plassey Beach;
- A new fully accessible 20m long ramp at a 3% slope will be constructed at Plassey Beach to provide access from the proposed Greenway to the beach for all users.

Construction of the new bridges will take place as follows:

- Temporary works will be put in place including silt barrages, and temporary flumes will be installed to manage overland drainage water.
- To prevent pollution to the adjacent stream and river bio-degradable hydraulic oils are to be used in machinery, and spill kits shall be ready on site for immediate use.
- Works beside streams will be restricted as a result of the spawning season for salmonids so work will not be carried out during Nov-March.
- Biosecurity management for in-stream works will be strictly monitored. With the presence of Giant hogweed (*Heracleum mantegazzianum*) and Himalayan balsam (*Impatiens glandulifera*) along the path route, regular cleaning of machinery to prevent spread of non-native species is very important.
- The foundations and abutment walls will be excavated down to formation level. Excavated material will be stored on site for reuse as backfilling. Formwork will be erected, and aggregate and blinding will be tamped into place. Reinforcement bars will be placed into the formwork and concrete will be poured in using a concrete pump crane. After the required curing time has passed the formwork will be removed.
- The new bridges will be constructed using prefabricated steel frames that will be placed and fixed *in situ* onto the concrete abutments or onto the existing cut stone abutments. Steel frames will be delivered to the construction compound by truck, and then transported to the proposed

crossing location by digger. The steel frames will be swung into place using a crane or digger and placed and fixed by hand.

- The annulus between the new structures and the excavated areas will be backfilled with excavated material (and topped up with imported material if required), the area will be reinstated, and the section will be reopened.

3.4.10. Drainage infrastructure

A Flood Risk Assessment for the proposed greenway has been completed. The following figures illustrate the potential temporary impact that 1 in 100 year and 1 in 1000 year floods will have on the proposed Greenway, and demonstrates why a new drainage network of land drains and culverts will be required to convey surface water to the River Shannon after flood events. Maintenance of this drainage infrastructure by LCCC will be required.

Figure 3-136: Past Flood Events OPW database (www.floodinfo.ie)

Flood Mapping developed by the OPW CFRAM programme confirms that appreciable lengths of the proposed Greenway are in Flood Zone A (2.36km) and Flood Zone B (2.77km) associated with the River Shannon and its tributaries scheme floodplains.

Portions of the existing paths and the proposed greenway are below the 10% AEP flood level.

The proposed scheme, being an "Amenity open space, outdoor sports and recreation" facility, is classed as a Water Compatible development in the OPW Planning System and Flood Risk management Guidelines, and therefore is an appropriate development for both Flood Zone A and B.

A justification test for the development in accordance with the Flood Risk Management Guidelines, further confirmed that the proposed development is appropriate albeit with mitigations. The Greenway track should be constructed to be water compatible, i.e. one which is resistant to damage caused by flooding and prolonged inundation, e.g. sealed surface, appropriate drainage etc.

Figure 3-137: November 2009 River Shannon Flood Event at UL campus in Co. Limerick on left hand side, with UL campus in Co. Clare on right hand side of figure, OPW database (www.floodinfo.ie)

Figure 3-138: Sections of Greenway at Flood Risk (1 in 100 or 1% AEP)

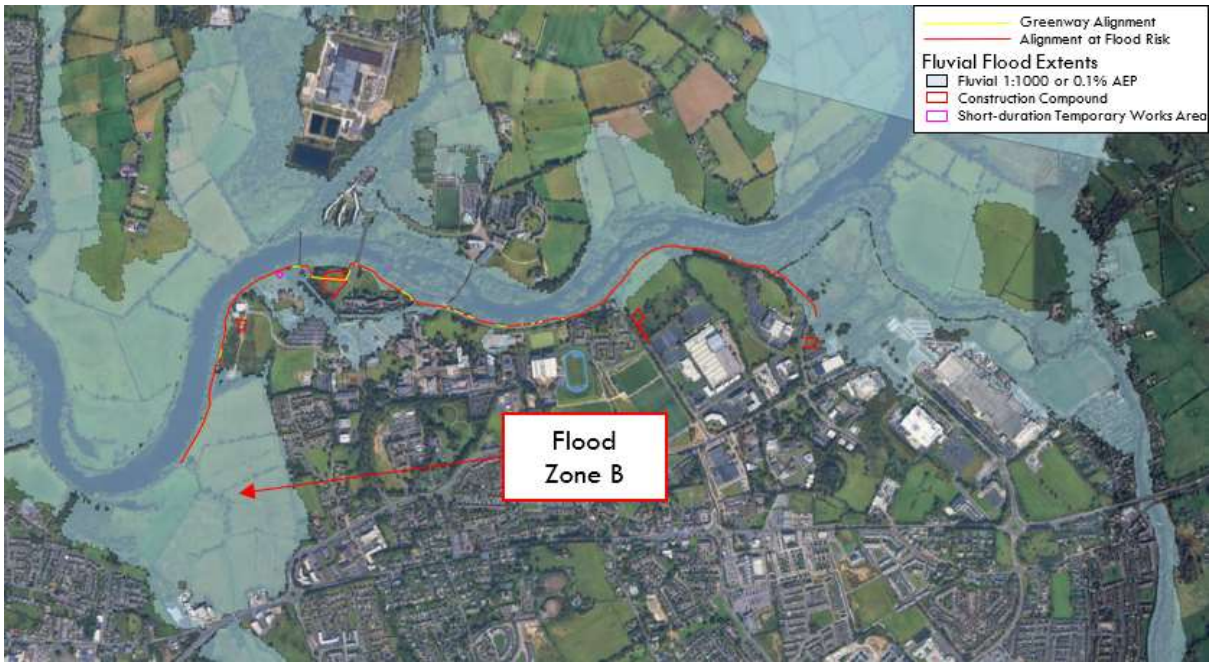

Figure 3-139: ***Sections of Greenway at Flood Risk (1 in 1000 or 0.1% AEP)***

Surface water will be managed through a series of existing open drains alongside the proposed Greenway and existing culverts under existing paths, proposed open drains alongside the proposed Greenway, and new culvert pipes under the proposed path.

There will be 5 No. box culverts constructed in existing drainage channels where the proposed Greenway will cross it. Four are new culverts and one is a replacement culvert. They will have a minimum diameter of 0.9m and range up to 2.0m cross sectional diameter (exact diameters to be confirmed after completion of the Section 50 assessment).

22 No. precast concrete culvert pipes of 0.5m diameter and 6-8m in length and associated headwalls will cross under the proposed Greenway path at 100m intervals where there are no existing culverts. The purpose of these culverts is to enable groundwater which collects in the open drains alongside the path to be discharged to the rivers. The open drains will be shallow, approximately 1.0m wide and 200mm deep. The drains will collect storm water flows from the proposed path and runoff from the hilly green field in the IDA's National Technology Park. Water will flow in the drains to the 22 No. culverts and pass under the proposed path.

Following flood events there is a risk of debris in the minor watercourses culverts and drains pipes. Post flooding maintenance to clear the culverts of debris will be required by LCCC.

3.4.11. Public Lighting

The Public Lighting design for the proposed project will use best practice guidance notes "*Bats and artificial lighting in the UK*" as published by the Bat Conservation Trust, in respect of mitigation strategies, to minimise the impact of outdoor lighting upon bat populations. The LCCC Public Lighting standard has also been followed.

There will be new public lighting along the shared path which follows the south bank of the River Shannon for approximately 3km.

Public lighting will be controlled by light sensors so their turn on time will vary during the calendar year and turn on after dusk, but lights will turn off at 23:00 hours.

Light emitting diodes (LEDs) type lanterns of the cool white type in accordance with the LCCC Public Lighting standard will be installed. They will have a Colour Temperature of 2,700°Kelvin, because it is considered less disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations.

LED lanterns do not emit any ultraviolet or infra-red radiation, this again being a desirable feature in relation to impact upon bats, in terms of causing spatial exclusion from artificially lit areas.

Light levels have been kept as low as possible (P4 Class) by reference to levels specified in "Design of road lighting' - BS EN 5489-1: 2020, and these will be in accordance with the LCCC Public Lighting standard.

There will be two lighting columns; 1.6m high and 5m high. The 1.6m high lighting column will have an integrated lantern that will point directly onto the path, and they will be spaced 5m apart (Refer to the Preliminary design drawing 2535-RHA-XX-DR-C-PD-0016 for a photo of an equivalent lighting column). The Lanterns on 5m high columns will be mounted at 0° degree tilt and will be the fully cut off type with no light output above the horizontal plane. The 5m high lighting columns will be spaced approximately 35m apart to avoid siting lighting columns near mature trees with roost potential and the 1.6m high columns shall be used if there are any signs of bats in an area. The 1.6m high columns will be used in the Annex 1 Alluvial forest area.

Cable ducts for the public lighting will be installed by open trench to minimum 300mm cover in areas where no trees or tree roots are present, and by Moling technique in areas with trees. The moling will allow cable ducts to be installed to a minimum depth of 600mm so the cable ducts will pass under tree roots and protect them from damage.

Any temporary lighting required for health or safety reasons during the construction period shall be installed at a minimum of 10 metres from existing treelines and woodland habitats and directed away from such sensitive habitats.

3.4.12. Interface with roads

The proposed Greenway will interface with existing roads at several locations along the route. The features which define interfaces with roads relate to improving the safety of pedestrians, cyclists, and motorists where they interact. In addition to sign posting and path markings/decals, the following features have been included as safety measures at the interfaces with roads.

i) Tactile paving

Tactile paving will be installed on a footpath wherever a footpath crosses a road at road level and at raised tables to provide warning of approaching traffic for the visually impaired.

ii) Toucan Crossing

There will be 1 No. new Toucan crossing on Plassey Park Road to replace the existing raised table.

iii) Kerbs

Raised kerbs will run parallel to the proposed cycle lanes to provide a physical separation between the road and the proposed Greenway. At junctions, the proposed raised kerbs will transition to dipped kerbing to facilitate smooth for vehicles from the carriageway across the proposed cycle lanes and footpaths.

iv) Raised Tables

Alongside University Road, there will be raised tables crossing the road entrance into Kilmurry Village and the northern entrance to the UL Gaelic pitches. There will be raised tables at the southern part of McLaughlan Road. These raised tables will maintain a consistent level of the footpath and the cycle lanes where they cross a road, or a junction, and will signal traffic to slow down and check oncoming walkers and cyclists.

3.4.13. Road Markings

Cycle track markings will be carried out in line with Traffic Signs Manual, Chapter 7 – Road Markings – Department of Transport, Tourism & Sport (2019).

There will be decals on shared surfaces illustrating the side of the path that cyclists and walkers should adopt at transitions from shared surface paths to separated cycle lanes and footpaths.

3.4.14. Signage

There will be directional signs along the 4.25km of the proposed route. Existing signs along the proposed route will be retained. Refer to Figure 3-7 for a photo of an existing directional sign on the existing path.

Directional signage for the Greenway will be erected at the approach to junctions and interfaces with roads, and where the path splits into separate cycle lanes and footpaths. There will be signs to University Road, McLaughlan Road, Plassey Park Road, and at all the interface locations in the UL campus where the proposed path leads to other existing cycle lanes or interfaces with roads.

Speed control signs will be erected to remind cyclists to manage their speed and be mindful of other path users.

All signage will be clear and consistent and will be designed in accordance with the Department of Transport's 'Traffic Signs Manual'.

3.4.15. Information boards

Information boards will be erected at areas of interest including Plassey Beach and Plassey Mills. The information boards will include information about ecology (i.e., flora and fauna and biodiversity) and built heritage (architecture and/or structures of architectural or heritage importance).

3.4.16. Fencing

There will be 1.4m high timber post and rail fencing to Transport Infrastructure Ireland (TII) standard detail CC-SCD-00301 which will be erected at locations along the path including:

- Where the proposed Greenway runs adjacent to or crosses water
- Where the proposed Greenway approaches bridges or retaining walls;
- Where there is a ditch or steep slope adjacent to the path;
- At junctions;
- At sections of the boundary with UL;
- Along the boundary with private landowners; and,
- Along the boundary with the National Technology Park.

There will be 1.45m high corten steel fencing along the parapets of the proposed steel bridges and along the approaches to the existing stone bridges and cut stone abutments.

There will be 2.4m high anti-climb palisade fencing erected along the south-eastern boundary of Kilmurray Student Village and outside the commercial property BD-RCI Limerick on University Road to match the existing fence.

3.4.17. Amenity/Rest area Benches

Green Oak and corten steel benches will be installed in the amenity areas at Groody Bridge, Plassey Mills and Plassey Beach.

3.4.18. Construction Programme and sequencing

The construction duration for 4.25km of the proposed Greenway is approximately 30-60 months with works being carried out in one section at any one time. Sequencing of work in any of the five sections is flexible.

The works will be subject to ecological programme constraints as follows:

- Foreshore works (include preparatory work) beside all watercourses supporting salmonids shall be undertaken from May to October (inclusive) and in consultation with Inland Fisheries Ireland (IFI) to avoid accidental damage or siltation of spawning beds.
- To avoid impacting on bird nesting sites, the vegetation removal within the defined working area will not be carried out during the peak bird nesting season of March to August (inclusive) prior to the onset of works.
- Invasive species along the proposed greenway should be treated and removed prior to construction works.

3.4.19. Reinstatement works

The temporary working areas and compounds will be reinstated to their original condition following completion of the construction phase in each section.

Tree planning is proposed alongside the Greenway to compensate for tree felling along the route. For every tree that is felled, there will be five trees planted to compensate, so approximately 305 trees are proposed to be planted along the proposed Greenway.

3.4.20. Post construction Maintenance

Adherence to best practice codes such as the "Code of Best Practice for National and Regional Greenways" ensures that a continuously high standard of the proposed Greenway is provided for all users. LCCC be responsible for the upkeep and maintenance including litter control and invasive species management through ongoing maintenance plans.

4. Environmental Management

4.1 Introduction

The following sections give an overview of the construction management, waste management and invasive alien species control plans for the proposed works.

4.2 Construction Management Plans

A suite of construction management plans will be prepared by the appointed contractor to be incorporated into the detailed CEMP. These management plans be bound by the mitigation measures identified within this CEMP, NIS and associated documents and will reflect the requirements of the relevant consent applications (including planning) and any conditions by the Consenting Authority in advance of the final contract signing. The Construction Management Plans will comply with all requirements identified and include the topics listed in Sections 4.2.2 to 4.2.8 as a minimum.

4.2.1. Prevention Pollution Control Measures

The following measures will be put in place to prevent the transportation of potential silt laden water or pollutants from entering any of the drains and /or watercourses in the vicinity of the site or any of the wider environments including downstream watercourses.

- Excavation works will not take place during periods of high rainfall, and shall be scaled back or suspended if heavy rain is forecast;
- There will be no release of suspended solids to any watercourse as a direct or indirect result of the proposed works;
- Any requirement for temporary fills or stockpiles will be damped down or covered with polyethylene sheeting as required to avoid sediment release associated with heavy rainfall;
- Prior to the commencement of groundworks, silt fencing will be erected on the northern and eastern sides of the project site to prevent any runoff from the perimeter of the site. These will be embedded into the local soils to ensure all site water is captured and filtered; and
- Ground disturbance should be kept to a minimum, water from excavations should be filtered. Exposed surfaces should be re-vegetated as soon as possible following construction.

4.2.2. Dust Control

The '*Dust Minimisation Plan*' will be based on the industry guidelines in the Building Research Establishment document "*Control of Dust from Construction and Demolition Activities*."

The generation of dust and particulate matter is dependent on the construction activity being carried out and environmental factors such as rainfall, wind speed and wind direction. A worst-case scenario has been assumed in the assessment. In order to predict and reduce the volume of dust emissions pertaining to the construction phase of the proposed development, a dust minimisation plan has been developed and is included in the Construction Environmental Management Plan (CEMP). The construction works boundary is described in Section 2 of this CEMP, detailed in Chapter 4 of the EIAR and associated project drawings provided in Appendix 4A of the EIAR.

The following measures will be implemented in order to minimise dust impact:

- All site roads within the construction works boundary shall be regularly inspected, cleaned and maintained during the construction phase.
- Hard surface roads within the construction site boundary shall be regularly cleaned and dampened down to prevent the generation of dust;

- Any road that has the potential to give rise to dust emissions must be regularly inspected and watered during periods of dry and/or windy weather to minimise the movement of dust particles to the air and ensure that dust does not cause a nuisance;
- Speeds shall be restricted on hard surface roads and vehicles transporting materials with dust potential must ensure that the material is enclose or covered with tarpaulin at all times;
- The construction traffic routes as identified in Chapter 12 of the EIAR, shall be regularly inspected for cleanliness and cleaned as necessary to minimise the movement of dust particles to the air, as detailed in the CEMP;
- The dust minimisation plan shall be reviewed at regular intervals during the construction phase to ensure that best practice and procedures are in place to minimise dust emissions;
- All plant and materials shall be stored in dedicated compound areas on site;
- Stockpiling of material will be minimised, and stockpiles will be covered or fenced to prevent wind whipping. Materials which have the potential to produce dust will be removed from site as soon as possible;
- In the event of dust nuisance occurring outside the site boundary, movement of materials must be terminated immediately, and procedures implemented to rectify the problem; and
- A record of all dust and air quality complaints will be maintained, along with details of the cause of emissions and the measures implemented to reduce emissions. All records will be made available to LCCC.

4.2.3. Noise & Vibration Control

The potential noise impact of the proposed development on the surroundings will occur during the construction phase, much of which will be generated by construction plant and machinery.

There is no published statutory 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 noise limits at their discretion. The majority of the construction activity is expected to occur during normal working hours.

The following documents contain guidance in relation to acceptable noise control on construction sites:

- British Standard BS 5228 – 1: 2009+A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites: Noise;
- British Standard BS 5228-1: 2009: Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2: Vibration; and
- National Roads Authority (NRA) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004);

In the absence of specific noise limits, criteria relating to permissible construction noise levels for a development of this type may be found in the abovementioned documents and is summarised below.

BS 5228-1:2009 *Code of Practice for Noise and Vibration Control on Construction and Open Sites: Noise* sets out a procedure for determining the impacts of construction noise on surrounding receptors. **Table 4.1** sets out the threshold noise levels (L_{AEQ}) as set out in the Standard. The Standard recommends that total noise levels during construction should not exceed the threshold levels.

Table 4.1 Noise Threshold Levels determined in accordance with BS 5228-1:2009+A1:2014

Assessment Category and Threshold Value Period (L_{AEQ})	Threshold Value (dB)		
	Category A	Category B	Category C
Monday to Friday 07:00 to 19:00hrs Saturdays (07:00 – 13:00)	65	70	75
Monday to Friday 19:00 to 23:00hrs Saturday (13:00 – 23:00) Sunday (07:00-23:00)[i]	55	60	65
Monday – Sunday (23:00 – 07:00)	45	50	55

Note:

Category A: threshold values to use when ambient noise levels (when rounded to nearest 5 dB) are less than these values

Category B: threshold values to use when ambient noise levels (when rounded to nearest 5 dB) are the same as Category A values

Category C: threshold values to use when ambient noise levels (when rounded to nearest 5 dB) are higher than Category A values

The NRA (now known as Transport Infrastructure Ireland or TII) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004) also recommends threshold noise levels for the construction phase of road projects. **Table 4.2** indicates the maximum permissible noise levels at the facade of dwellings during the construction period as recommended by the NRA (Now TII). These limits are widely applied in Ireland to construction projects.

Table 4.2 Maximum permissible noise levels at the facade of dwellings during construction

Days and Times	Noise Levels (dB re. $2x10^{-5}$ Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

***Note:** Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

Based on the above, Table 4.3 suggests noise limits considered suitable for the construction of the proposed development. Given that the majority of receptors are located adjacent to local access routes, streets and roads, the Category B levels from Table 4.1 have been applied along with the TII (formally NRA) guidance levels. The threshold values specified in Table 4.3 should be adopted as the noise criteria at receptors

Table 4.3 Suggested noise levels at receptors during construction based on BS 5228:2009 and TII (formally NRA) Guidance

Days and Times	Noise Levels (dB re. $2x10^{-5}$ Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 23:00hrs	60	65
Saturdays 07:00 to 16:30hrs	65	75
Sundays & Bank Holidays 07:00 to 23:00hrs	60	65
Night-time 23:00 to 07:00	50	60

The TII (formally NRA) guidelines from 2004 detail the permissible vibration levels during construction phase for national road schemes and it is generally accepted that vibration from construction activities will be limited to these values as outline in Table 4.4 below.

Table 4.4 *Allowable Vibration During Construction Phase*

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50 Hz	50 to 100Hz (And above)
8 mm/s	12.5 mm/s	20 mm/s

In order to sufficiently improve the likely noise and vibration impacts from the proposed works, a schedule of noise and vibration control measures has been formulated for the construction phase. Best practice measures for noise control will be adhered to onsite during the construction phase of the proposed project in order to mitigate the potential temporary slight to significant negative impact associated with this phase of the Project. The measures include:

- All construction operations shall comply with guidelines set out in British Standard documents '*BS 5228-1: 2009: Code of Practice for Noise and Vibration Control on Construction and Open Sites: Noise*,' which offers detailed guidance on the control of noise & vibration from demolition and construction activities;
- All construction operations shall comply with guidelines set out in British Standard documents '*BS 5228-1: 2009: Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2: Vibration,*' which offers detailed guidance on the control of vibration from demolition and construction activities.
- Establishing channels of communication between the contractor/developer, Local Authority and residents; inform affected residents of time of anticipated noise impact 24 hours in advance;
- Appointing a site representative responsible for matters relating to noise and vibration;
- Construction noise will be limited by prescribing that standard construction work will be restricted to the specified working hours;
- Materials will be selected taking account of the characteristics for generation of noise and/or vibration emissions from each item. All materials and machinery used on site shall comply with relevant E.U. and Irish legislation in relation to noise emissions. The timing of on- and off-site movements of machinery near occupied properties will be controlled;
- Erection of noise screening (abatement) enclosures as necessary around noisy processes and items such as generators, consaw operations, heavy mechanical machinery or high duty compressors;
- Placing of noisy/vibratory machinery as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary;

- Training and supervision of operatives in proper techniques to reduce site noise, and self-monitoring of noise levels, if appropriate;
- Where, noise levels at noise sensitive locations (NSLs) are anticipated to exceed the daytime noise criteria, hoarding for noise abatement extending to a height of 2.4 m will be erected between the works area and the NSL. If such measures are installed, the construction operations are expected to meet or be less than the 70 dB LAeq(1hr) criterion in most cases;
- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- Monitoring typical levels of noise and vibration during critical periods and at sensitive locations where noise monitoring will be conducted during construction activities that have been identified as potentially exceeding the 70 dB $L_{Aeq(1hr)}$ criterion at NSLs. Vibration monitoring will measure the maximum PPV at each location over a sample period of 15 minutes, detailed notes will be taken in relation to the primary vibration sources and measurements will be conducted at the locations on a cyclical basis over the course of a typical day.

- The following mitigation measure shall be implemented in relation to exhaust emissions during the construction phase:
    - Machinery will be switched off when not in use; and
    - All construction vehicles and plant will be maintained in good operational order.
-

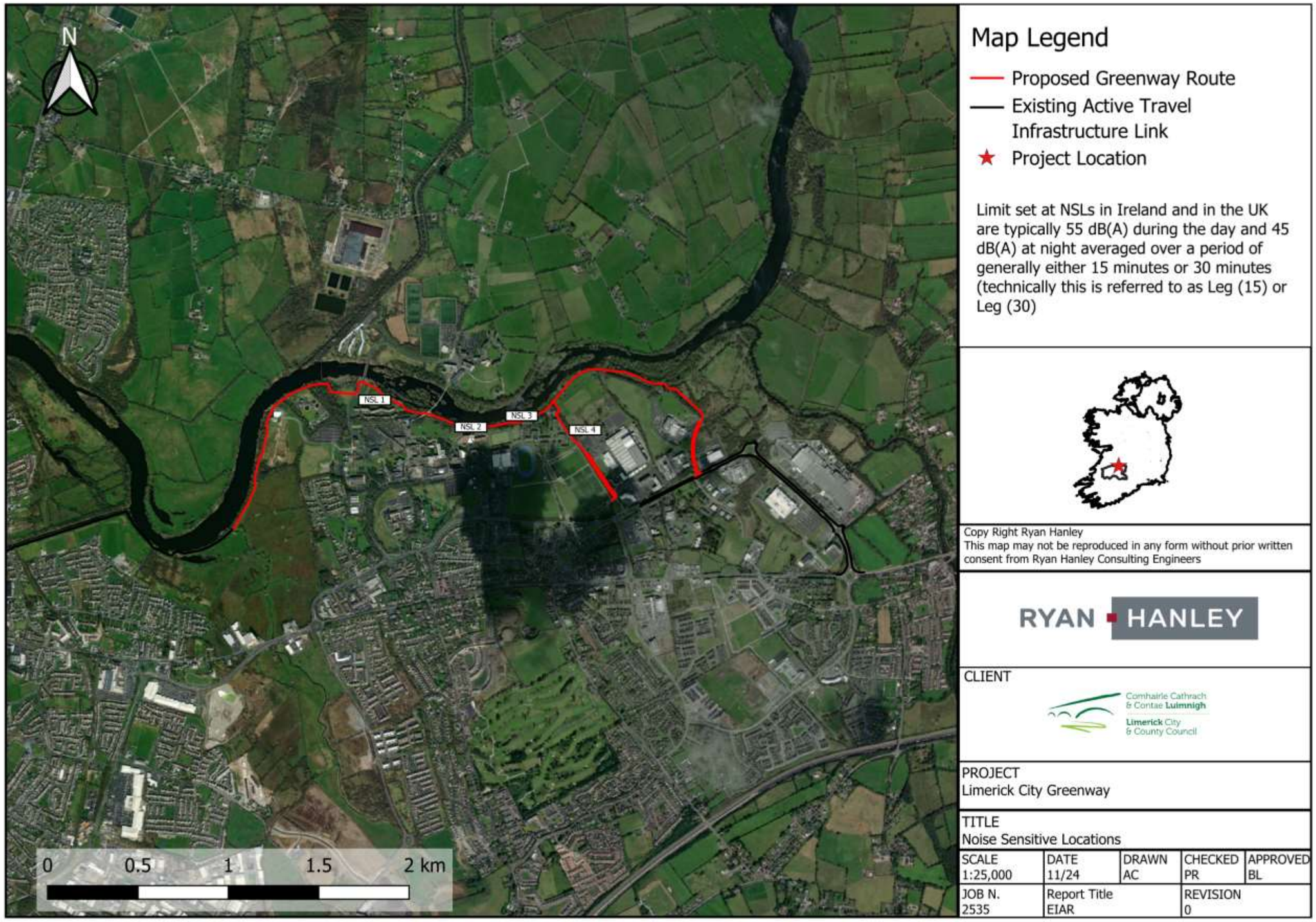

Figure 4.1 Noise Sensitive Locations (NSL) Map

4.2.4. Traffic Management

Localised traffic disruptions during the construction phase of the proposed development will be mitigated through the use of industry standard traffic management measures. These measures will be designed in accordance with the '*Guidance for the Control and Management of Traffic at Roadworks – Second Edition*' (Dept. of Transport; Road Safety Authority of Ireland – 2010).

A design stage Traffic Management Plan (TMP) with detailed drawings has been developed in advance of the construction phase which provides a basis for the management of traffic during the execution of the works by the contractor incorporating road disruptions, diversions and/or closures where necessary.

Local access will be maintained where possible throughout construction phase of the various sections of the Greenway with diversionary routes as detailed Chapter 13 of the EIAR. Any Increased vehicular activity during construction phase will be managed by the Traffic Management Plan

- Construction works will be sequenced so as to avoid unnecessary interruption to road users insofar as is practicable;
- All residents and interested parties shall be consulted when planning these road closures to optimise the timing of same;
- A complete schedule of road closures will be published in advance of the works commencing to facilitate residents in making alternative arrangements where necessary; and
- All road closures will be agreed in advance with LCCC and implemented as per conditions set out in Traffic Management Plans and Road Opening Licences.

All excavations on roads will be temporarily reinstated - with a permanent reinstatement to follow after 6 months - as per the following guidance:

- Guidelines for Managing Openings in Public Roads (April 2017) – for Local and Regional Roads.; and
- Requirements for the Reinstatement of Openings in National Roads (TII, May 2019) – for National Roads.

The following mitigation measures will also be required.

- Road signage on the public road network must comply with the Department of the Transport's Traffic Signs Manual "*Chapter 8 - Temporary Traffic Measures and Signs for Roadworks";*
- The contractor shall provide general condition and structural surveys of all transport infrastructure (roads, bridges, access tracks) on all routes, including haulage routes, that may be impacted as a result of the proposed scheme before works commence on site and after completion and provided to the relevant PSDP engineer;
- Site entrance locations from public roads may require a durable bound surface;
- Secure and visible junctions must be developed between access roads and public roads;
- A durable bound surface is required on access roads for a minimum distance of 10m from the public road;
- Adequate drainage to be maintained at all times to ensure that no surface water from the site or site access discharges to the public roads; and
- Cleaning regime for plant to be implemented in order to minimise mud/dust or other contaminants on public roads.

4.2.5. Water Quality and Soil

A '*Pollution Prevention and Control Management Plan*' will be put in place. The Plan will include the requirement for the best practice and adherence to Irish guidelines or international guidelines where relevant. This plan will

be included as part of the detailed CEMP and will include mitigations specified within the environmental reporting prepared for the project.

Material storage and handling measures will be implemented to contain potential sources of soil/groundwater pollution. Contractors will ensure that spill kits will be always accessible to construction personnel and all spills will be reported to the site environmental manager.

All contractors shall be responsible for ensuring the following measures (as well as measures specified in NIS and any relevant Environmental Management Plans) are adhered to implemented, monitored and audited:

- Engagement of an Ecological Clerk of Works (ECoW) to supervise the proposed works and implement the recommended mitigations, toolbox talks, surveys of the bankside and all areas where bank side work is proposed as well as other duties;
- Where bank side works are proposed, excessive ingress of sediment into the watercourse should be prevented where possible. Sediment barriers such as sediment netting/fences or silt traps should be used to temporarily trap sediment to prevent sediment transport into the river;
- Bankside works should be undertaken at times of good weather and low flow in the River where there is no potential for the works area to become inundated with water and no potential for significant volumes of surface water runoff from the works area;
- All works undertaken on the banks should be fully consolidated to prevent scour and run off of silt. Consolidation may include use of protective and biodegradable matting (coirmesh) on the banks and also the sowing of grass seed on bare soil;
- Dewatering of any excavation will be undertaken as necessary. In the event that dewatering pumps and silt filtration systems are required then they will be positioned in strategic locations adjacent to the excavation;
- Temporary or permanent loss of riparian and marginal habitat during both the pre- and post-construction phases should be avoided;
- To prevent noise and disturbance to designated species and habitats where possible, works should be timed to avoid the key periods of sensitivity for migratory fish species. Works and construction activities should also be confined to standard daylight hours. In order to reduce disturbance to fish species, areas where bank side works are required should be accessed from the bank/ existing path;
- There will be no refuelling of machinery near the river channel. Refuelling will take place at designated locations in the site compound on an impermeable surface at distances of greater than 30 metres from the watercourse;
- No vehicles will be left unattended when refuelling and a spill kit including an oil containment boom and absorbent pads will always be on site;
- Any fuel that is stored on the site will be in a double skinned, bunded container that will be located within a designated site compound at a location that is removed from the river;
- During the construction phase site materials will be stored in temporary construction compounds in Flood Zone C area which are outside of the present-day high likelihood flood extent. Site managers should regularly consult the Met Eireann flood warnings website https://www.met.ie/warnings/today if significant flooding is expected;
- Sediment barriers such as sediment netting/ fences or silt traps should be used to temporarily trap sediment and prevent sediment transport into watercourse, at all interfaces of the works area with a waterbody in advance of construction works on the banks of the watercourse;
- Works undertaken on the banks should be fully consolidated to prevent scour and run off of silt, Consolidation may include use of protective and biodegradable matting (coirmesh) on the banks and may also the sowing of grass seed on bare soil;

- Particular care to prevent run-off of sediment or pollutants into the river should be taken at the Compound Site 1, Compound Site 2 and Compound Site 3, where their proximity to the River as having the potential for the highest surface runoff;
- All construction materials and plant should be stored in the site compounds. Compounds will be located on ground that is not prone to flooding (in Flood Zone C). A geotextile layer will be laid across the entire compound area, imported fill (40mm crushed rock) will be spread across the area, and the compounds will have a temporary fence set up on their boundary;
- Excess top-soil and sub soil will be removed and mounded on the compound footprint;
- All vehicles should be regularly maintained and checked for fuel and oil leaks; and
- Guidelines for minimizing impacts on water quality and fisheries in relation to Construction shall be implemented including, but not limited to, CIRIA C532 *"Control of water pollution from construction sites - Guidance for consultants and contractors*", Inland Fisheries Ireland (IFI) guidelines and Transport Infrastructure Ireland (TII) guidelines.

Stockpiles

- Daily monitoring of excavations and works areas by a suitably qualified person such as the Environmental Manager (EM) or the Environmental Clerk of Works (ECoW) will occur during the construction phase.
- Run-off from works, stockpile and/or compound areas will be monitored and observed daily by ECoW to ensure that it is not impacting on any local watercourses.
- Large volumes of excavated material will not be allowed to accumulate within the temporary working areas unless to be left as a permanently mound to on the river side of the path.
- Any stockpiling of soils will be confined to compound areas and runoff will be prevented by the use of a silt fence or bund
- Stockpiles will not be located adjacent to watercourses and shall be surrounded with a continuous silt fence;

4.2.6. Biodiversity

The proposed development area is of high ecological value at a local level. It is extremely important that all measures should be taken to preserve the current ecological receptors at the site and to increase biodiversity in the operational phase.

The following measures will be implemented on site for the protection of flora and fauna:

- Any measures specified within the Natura Impact Statement (NIS) and Biodiversity Management Plan (BMP);
- A suitable qualified Ecological Clerk of Works (ECoW) shall be appointed for part time attendance for the full duration of the works and will supervise all aspects of the construction of the Greenway;
- The ECoW will hold a minimum University degree in Environmental Science, (NFQ Level 8); Minimum of 5 years' post-graduate experience in ecological assessment, appraisal techniques and mitigation monitoring;
- The ECoW will be responsible for biodiversity monitoring elements and providing toolbox talks;
- The ECoW will be responsible for monitoring water quality throughout the works duration. Discrete monitoring (field and laboratory analysis) will be undertaken during all phases of the proposed works and frequency will be determined by the Water Quality Monitoring Plan to de developed before any works commence. It is essential to monitor indicator parameters that have the greatest potential to be impacted. The main concern in relation to the construction activity and water quality are potential increases in siltation and release of P and N. At least the following surface water parameters are to be tested/analysed in the field and/or in the laboratory: alkalinity (mg/l $CaCO_3$), molybdate reactive phosphorus (mg/l P), ammonia (mg/l NH_3), nitrate (mg/l N), nitrite (mg/l N), biochemical oxygen

demand (mg/l), total suspended solids (mg/l), pH, temperature, dissolved oxygen, electrical conductivity, ammonium (NH_4), turbidity. Sondes will be employed to measure turbidity in the main channel upstream and downstream of the works area during the construction stage. Sondes will be employed within the River Shannon to determine a baseline Nephelometric Turbidity Unit (NTU) value. During the construction period, alarms will trigger where there is a 20% difference between the NTU value recorded in the upstream and downstream Sondes when NTU is above its baseline value. All works will cease immediately until the source is identified and rectified (if caused by the construction works). The ECoW, project manager and contractor site manager should be contacted. If the increase is not attributed to the construction works, works will proceed.

- All personnel involved with the project shall be informed of the requirement for protection of designated habitats including the aquatic environment, i.e. Lower River Shannon SAC, and best practice methodologies to be employed via toolbox talks or formal presentation from the ECoW;
- The ECoW shall be onsite part time until all works have finished and all machinery has been demobilised and has left the site;
- The access location to the proposed works shall be clearly marked out prior to the commencement of works. No works will be permitted outside of this works area;
- Appropriate fencing shall be installed and maintained for the duration of the works to prevent the public from entering the works site;
- Clearance of vegetation shall be undertaken as early as possible prior to the commencement of works and maintained until work commences to prevent bird nesting. In the event that vegetation clearance is not possible before the commencement of works, upon agreement by the NPWS, a check to confirm the absence of nesting birds should be carried out by a suitably experienced ecologist no more than 48 hours prior to works;
- Works shall only be carried out in dry, low flow conditions. Met Eireann five-day forecasts will be monitored on a daily basis prior to works commencing and no gravel removal will be carried out during prolonged wet weather;
- Works shall be carried out during daytime hours only (08:00-18:00);
- Full Method Statements and Risk Assessments shall be provided and approved prior to the commencement of works;
- Tree roots will be protected by using non-invasive construction methods;
    - Avoidance of digging into the existing gravel track so as not to encounter tree roots;
    - Installing Cellweb®TRP tree root protection directly onto the existing gravel path and build up od subsequent path layers on it. The system allows continued water permeation and gas exchange. It is also extremely effective at spreading point loads and reducing the load that is applied to the soils beneath. This in turn minimises soil compaction, maintaining an open soil structure which allows continued gas exchange, water permeation and migration;
    - Where dense tree coverage exists along the Greenway, service ducts for the public lighting and CCTV will be installed by Moling technique which allows for trench-less installations of services without having to excavate trenches and protecting tree roots from damage; and
- The outdoor lighting scheme, designed for proposed development, has taken into account published best practice including BS EN 5489-1: 2020 to minimise the impact of outdoor lighting upon bat populations. Warm white LED lanterns are specified which are considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations.

4.2.7. Refuelling, Fuel and Hazardous Material Storage

The following mitigation measures will be implemented to avoid release of hydrocarbons at the site:

- Refuelling of machinery will be carried out in a contained bunded area in the temporary construction compounds on impermeable ground by trained staff and spill kits at appropriate locations;
- Refuelling areas in the compounds will be identified prior to commencement of the project;
- Refuelling shall not be undertaken adjacent to any watercourses;
- All machinery and plant used will be regularly maintained and serviced and will comply with appropriate standards to ensure that leakage of diesel, oil and lubricants is minimised; and
- Fuels, oils, greases, and hydraulic fluids will be fully bunded (110 percent) at a designated area within the works compounds used for the storage of materials and machinery.

4.2.8. Cement Based Products Control Measures

The following mitigation measures will be implemented to avoid release of cement at the site:

- Precast concrete products and culverts will be used where possible, however where necessary, concrete pouring will be planned for dry days where possible by following weather forecasts;
- Concrete pours will be supervised by the Construction Manager;
- Where concrete is delivered to the site and pour is complete, the concrete truck will be directed to a designated tank filling area (which shall be) lined with an impermeable membrane and permitted to fill the concrete hopper/tank before leaving site to return to the origin quarry;
- No discharges of washed water shall be permitted in the construction compounds; and
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.

4.3 Invasive Species Management and Biosecurity Measures

Invasive alien species (IAS) surveys were carried along the route of the proposed site from 2020 to 2024 to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). A number of invasive alien species (IAS) including Himalayan balsam (Impatiens glandulifera) and Giant hogweed (Heracleum mategzzianum) were recorded during these walkovers and documented growing within the Study Area of the proposed Greenway project. A Invasive Species Management Plan (ISMP) has been developed outlining advanced treatment, biosecurity and best practice measures (Ryan Hanley, 2024).

All personnel that will be working on the proposed greenway route will be educated through tailored toolbox talks to recognise each of the invasive species present within the footprint of the works. Biosecurity zones must be established on-site prior to site works commencing and will specify the area of the zones, the required actions that must be taken in each zone and who must carry out the actions. All staff will be educated on the health and safety and biosecurity measures that should be followed around each species. Personnel must be familiar with the location of all biosecurity zones, and emergency procedures should they encounter Giant Hogweed material. Only those who have been inducted into biosecurity measures on-site should enter the biosecurity zones within the works area. Should any risk of contaminated material escaping be observed by the site supervisor, additional toolbox talks and any additional necessary training that is needed will be given.

Maintaining biosecurity measures at all times in an area where invasive species are present is essential to prevent further spread. Biosecurity measures are also necessary in areas where invasive species are not present, but where there is risk of contaminated material being brought to site- i.e., site machinery being used on multiple sites, construction staff travelling between infested and not infested sites. Careful preparation of the site and planning of the works is crucial to successful treatment of invasive species.

At all site locations during the construction stage, the contractor will adhere to the following best practice biosecurity measures to avoid the spread and introduction of invasive species where applicable:

- Adherence to biosecurity and best practice measures outlined in the Invasive Species Management Plan (ISMP);
- An Environmental Clerk of Works should be on site to monitor and oversee the implementation of this ISMP and this installation of the biosecurity zones;
- Pre-construction surveys for invasive species will be conducted at the earliest stage possible to update and inform on the status of invasive plant species in or near the works area;
- All staff will be trained by the ECoWs through tookbox talks in the identification of invasive species and noxious weeds and the associated biosecurity measures required when working on site;
- Fence off (biosecurity zones) 8m from the furthermost stand of invasive species in infested areas prior to and during construction where possible to avoid spreading seeds or plant fragments around or off the construction site. If this is not possible the biosecurity zones will be determined by a suitably qualified person in agreement with the site manager;
- Clearly identify and mark out infested areas. Erect signs at the construction site entrances and by the biosecurity zones to inform site users of the risk;
- Dedicated biosecurity zone entry and exit points should be created for operators on foot and for mobile plant equipment;
- Personnel working on or between biosecurity zones should ensure their clothing and footwear are cleaned where appropriate to prevent spread;
- Avoid, if possible, using machinery with caterpillar tracks in infested areas. Machinery tyres and tracks must be cleared prior to exiting the biosecurity zones;
- Clearly identify and mark out areas where contaminated soil is to be stockpiled in the temporary construction compounds, which will not be within 50m of any watercourse. Biosecurity zones need to be fenced and surround all stockpiles of contaminated soils containing invasive species;
- Infested areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery;
- Appropriate silt barriers will be installed in drains that may occur within infested areas;
- Biosecurity facilities must be installed on-site prior to site works commencing. Installation of a dedicated footwear and vehicular wheel wash down facility, into a contained area by the entrance and exit points of the construction site and in the biosecurity zones, away from drains and watercourses. All run-off will be isolated and treated as contaminated material;
- Vehicles entering and leaving the construction site and biosecurity zones will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain seed and plant material;
- Where there is potential for cross-contamination on site (machinery or personnel moving from one biosecurity zone to another or from the biosecurity zone to other areas on site), consideration should be given to designating vehicles or machinery to specific sites to prevent spread;
- Vehicles leaving the site to be inspected for any plant material and will be washed down into a dedicated wastewater contained storage area then tinkered off site to a licenced waste facility; and
- If soil is imported to the site for landscaping, infilling or embankments, the contractor shall gain documentation from suppliers that it is free from invasive species.

4.4 Waste Management

This section of the CEMP contains a summary of the information to be contained within a project Waste Management Plan (WMP), which will set out the best practice procedures during the excavation and construction stages of the proposed scheme. A WMP will be developed further by the contractor prior to construction. Section 4.4.1 below, identifies the key legislation relevant to waste management requirements. All waste disposals will be recorded by the contractor through a Waste Disposal Register.

4.4.1. Legislation

The primary legislative requirement applicable to the project and that governs waste management in Ireland is The Waste Management Act 1996 and its subsequent amendments. The Waste Management Act 1996 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 EU legislation.

4.4.2. Waste Management Hierarchy

Waste management actions that can be undertaken on site should follow the principles of the waste hierarchy, where preventing waste is the preferred option and sending waste to landfill should be the last resort (**Figure 4.1**). The primary aim of a WMP is to prevent and minimise to amount of waste generated. Reuse and recycling of waste generated on site, reduces the quantities of waste required for disposal which is considered as last resort. Waste will be segregated and disposed of appropriately. Working methods will be reviewed to ensure waste minimisation and sustainability during construction.

Figure 4-1: Schematic of the Waste Hierarchy Model (Waste Framework Directive, 2020).

4.4.3. Construction Phase Waste Management

4.4.3.1. Description of the Works

The Limerick City Greenway (UL to NTP) will produce a significant volume of excavated material during the construction phase. Excavations for the proposed scheme, pedestrian/road crossings and road works will give rise to a surplus volume of material during the construction phase of the proposed scheme. The excavated material will be reused as a subbase layer and/or edge grading. It is anticipated that no soil will require exporting off site. There will be Bitumous Material and Concrete arising from existing road/footpath surfaces on University Road, and McLaughlan Road.

The main non-hazardous and hazardous waste types arising from the construction phase of the project are outlined in Table 4..5 below. The List of Waste (LoW) code (as effected from 1st of June 2015 and referred to as the European Waste Code of EWC) for each waste stream is also shown.

Table 4.5: Expected waste material arising during the Construction Stage.

Waste Material	LoW Code
Soil, stones and dredged spoil	17 05
Bituminous mixtures, coal tar and tarred products	17 03
Concrete, Bricks, Tiles and Ceramics	17 01

Metals (including their alloys)	17 04
Waste Hydraulic Oils*	13 01
Wastes of Liquid Fuels*	13 07

Note 1 * - Denotes Hazardous Materials.

Where hazardous materials are used/encountered on site, i.e. bituminous mixtures containing coal tar, timber with paint; a specialist contractor will be engaged. The specialist contractor will be licensed under the 'Waste Management (Collection Permit) Regulations, 2007' (as amended). All contaminated materials will be disposed of at an appropriately licensed facility.

The estimated construction and demolition waste resulting from the proposed scheme is provided in Table 4.6 There will be Bitumous Material and Concrete arising from existing road/footpath surfaces on University Road, and McLaughlan Road.

Table 4.6: Estimated C&D Waste resulting from the proposed scheme

Origin of Waste	LoW Code	Estimated Tonnage of Waste
Red Section	17 05/17 03	0
Cyan Section	17 05/17 03	
Magenta Section	17 05/17 03	897
Purple Section	17 05/17 03	
Yellow Section	17 05/17 03	
Orange Section	17 05/17 03	
Green Section	17 05/17 03	
Miscellaneous	17 01, 17 04, 13 01, 13 07	746
	Total	**1643**

4.4.3.2. Proposals for Minimisation, Reuse and Recycling of Construction Waste

All current and applicable waste management legislation will be applied and adhered to. Contractors that are engaged in the transport of waste off-site will comply with the provisions of the Waste Management Act (1996) (as amended), associated Regulations and the Waste Management Plan prepared in accordance with '*Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects (2021)*'. The Contractor must handle, transport, and dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities. A waste collection permit to transport the waste which has been issued by the National Waste Collection Permit Office must be held by the relevant contractor.

Waste receiving facilities must also be appropriately licensed or permitted for the waste being received. Operators of such facilities cannot receive any waste, unless in possession of a waste permit granted by the Local Authority under the '*Waste Management (Facility Permit & Registration) Regulations 2007*' (as amended) or a waste license granted by the EPA. The permit/license held will specify the type and quantity of waste

able to be received, stored, sorted, recycled and/or disposed of at the specific site. The contractor shall provide details of all proposed waste facilities to the Contract Administrator before works commence on site. It has been confirmed that there are appropriate facilities in the area available to receive and process waste material.

The construction compounds for the proposed works will have a dedicated Waste Storage Area (WSA) for any construction waste generated. Receptacles/skips or bays will be provided for relevant recyclable material.

Construction workers on site will generate waste e.g., organic/food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, aluminium cans, and tins), mixed non-recyclables and potentially sewage sludge from temporary onsite welfare facilities. Waste electrical and electronic equipment (WEEE), waste batteries and waste printer/toner cartridges may also be generated from site offices. There are numerous specialist waste service contractors in the Limerick City, County and Munster region.

Examples of appropriate measures that should be taken to ensure construction waste generated is minimised, are as follows;

- Ordering of materials should be on an '*as needed*' basis to prevent over supply to 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; and
- Use reclaimed/ recycled materials in the construction works where practicable.

The contractor will address the role of monitoring and inspections to ensure that waste produced on site is dealt with in a safe, efficient, and legal manner. All waste generated on site will be segregated and placed in appropriate waste streams designated for recycling, reuse, or disposal. Waste streams will be monitored and Key Performance Indicator's (KPIs) maintained for all waste taken on site, recording quantity (tonnage) of individual waste streams. Records will be maintained.

4.4.3.3. Reuse

Possibilities for re-use of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. Where excavation material cannot be re-used within the proposed works, every effort will be made to send material for re-use as a by-product, recovery or recycling as far as is reasonably practicable. If any material is to be reused on another site or construction projects in the vicinity as a by-product (and not as a waste), this will be done in accordance with Article 27 of the European Communities (Waste Directive) Regulations where the material is classified as a construction by-product.

A guide to by-products under Article 27 was produced by the EPA in 2020 and provides guidance on assessment, classification and submitting a notification of material. Plastic packaging, pallets etc. can be used to cover materials on site or reused for the delivery of other materials.

Many construction materials can be reused a number of times before they must be disposed of – examples listed below:

- It may be possible to reuse stone as aggregate backfilling material in some locations;
- Plastic packaging etc. can be used to cover materials on site or reused for the delivery of other materials; and
- Excavated subsoil will be reused as fill where possible and timber can be used several times for shuttering of concrete.

4.4.3.4. Recycling

As outlined in Section 4.4.2, if a certain type of construction material cannot be reused onsite, then recycling is the most suitable option.

All waste that is produced during the construction phase including dry recyclables will be deposited in the on-site dedicated waste skips initially and sent for subsequent recycling at an offsite facility.

4.4.3.5. Record Keeping

A recording system to be put in place to record construction waste generated on site. The system will enable the contractor to maintain records for all waste material which leaves the site, either for reuse on another site, recycling, or disposal.

The licensed waste contractor employed to remove waste from the site will be required to provide documented records for each movement of waste off-site. Each record will contain the following:

- Consignment Reference Number;
- Material Type(s) and European Waste Catalogue (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; and
- Site Address of Destination Facility.

4.4.3.6. Basic Waste Management Training

The appointed Environmental Manager or Waste Manager will communicate effectively with all employees on site in relation to the aims and objectives of the WMP. All employees working on site will be trained in materials management and should be able to:

- Distinguish reusable materials from those suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with site manager on the best locations for stockpiling reusable materials;
- Separate materials for recovery; and
- Identify and liaise with waste contractors and waste facility operators.

4.4.3.7. Waste Management Plan Conclusion

The details provided above outline some of the main objectives that are to be adhered to for the preparation of the detailed WMP to be completed at construction stage. The appointed contractor will be required to produce the detailed WMP prior to commencement of works.

5. Environmental Management Implementation

5.1 Responsibilities

5.1.1. The Contractor

A contractor will be appointed to undertake the works. The Contract will allocate responsibility for compliance with the terms of this CEMP and detailed CEMP during construction.

All staff and subcontractors have the responsibility to:

- Work to agreed methods and procedures to eliminate and minimise environmental impacts and note areas of sensitive receptors;
- Understand the importance of avoiding pollution on-site, including water, noise and dust and report all incidents to avoid or limit environmental impact; and
- Co-operate with site inspections and audits as required.

The contractor shall appoint an Environmental Manager who will be the project focal point relating to construction-related environmental issues. In general, the Environmental Manager will maintain responsibility for monitoring the Works and the contractors/sub-contractors from an environmental perspective. The Environmental Manager will act as the regulatory interface on environmental matters by reporting to and liaising with the Employer's Representative, LCCC representatives (if appropriate), and other statutory bodies as required. The Environmental Manager will report directly to the Environmental Manager.

5.1.2. Site Manager

A Site Manager will be appointed by the contractor to oversee the day-to-day management of working areas within the site and ensure that effective, safe, planned construction activities are delivered on an ongoing basis to the highest standards. The Site Manager will be a suitably qualified, competent, and experienced professional that will oversee site logistics, communicate regularly with construction staff, accommodate project-specific inductions for staff on site and ensure that all work is compliant with the relevant design standards and health and safety legislation.

5.1.3. Environmental Manager

An Environmental Manager will be appointed by the contractor to ensure that the CEMP is effectively implemented. The Environmental Manager will be a suitably qualified, competent, and experienced professional that would perform the necessary tasks, review environmental procedures, and consult with the members of the construction team and stakeholders as requited. The Environmental Manager would be responsible for:

- Preparing, maintaining, and implementing the CEMP;
- Establishing, implementing, and maintaining the Environmental Management System (EMS) in line with ISO 14001;
- Conducting regular environmental inspections and audits as specified in the contract and checking adherence to the CEMP;
- Ensuring that construction occurs in accordance with the relevant environmental requirements and that such compliance is adequately recorded and documented;
- Completing a site inspection and compiling an environmental compliance report on a monthly basis;
- Attending site and stakeholder meetings as required;
- Keeping up to date with relevant environmental best practices and legislative changes;
- Liaising with relevant staff to prepare Method Statements and relevant plans for all activities where there is a risk of environmental damage;
- Having a detailed level of knowledge on all aspects of environmental information associated with the proposed development at University Limerick greenway;
- Ensuring all personnel have undertaken adequate environmental inductions, awareness briefings and training (inducting subcontractors); and

- Managing and responding to environmental incidents and ensuring that all incidents are recorded and reported in an appropriate manner.

5.2 Environmental Awareness and Training

Environmental training and awareness are considered a crucial element in the appreciation and implementation of the detailed CEMP. The detailed CEMP will be distributed to members of the project team, including subcontractors as necessary to ensure that environmental and health and safety requirements are adequately communicated.

The Site Manager and the Environmental Manager will be responsible for ensuring that all people on-site are provided with relevant information concerning environmental obligations. All staff and operatives will receive a site-specific safety and environmental induction prior to commencing any work on-site. Toolbox talks will be provided to all staff for (but not limited to) working with concrete and biosecurity requirements on site. Training records for staff will be held on a central database. Training and awareness will be targeted at sensitive environmental elements including:

- Good Housekeeping practices, including storage of material etc;
- Archaeology;
- Traffic Management;
- Waste Management;
- Landscaping restrictions and requirements;
- Noise abatement;
- Dust control;
- Sensitive receptors (people, wildlife, water, soil etc);
- List of mitigation measures and how they will be implemented and by who doing or avoiding what and why;
- Emergency responses e.g., to an oil or fuel spill;
- Ecology – protected flora and fauna identification; and
- Awareness, when to stop working or report a concern to the supervisor or manager (taking responsibility).

5.2.1. 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:

- An outline of the CEMP structure;
- A discussion of the applicable Works Method Statements;
- The roles and responsibilities of staff, including contractors, in relation to environmental management;
- Pollution incident control and reporting;
- Basic details and information regarding the WMP; and
- An outline of the Environmental Incident Management Procedure.

5.2.2. Toolbox Talks

Toolbox talks will be held by the Environmental Manager or Site Manager at the commencement of works, or at the commencement of new activities. The aim of the toolbox talks is 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 would be identified and discussed prior to the commencement of the day's activities. The toolbox talks will include training and awareness on topics including:

- On-site Ecological Sensitivities both aquatic and terrestrial;

- Sediment and erosion control;
- Good site practice;
- Fuel storage; and
- Materials and waste procedures.

Site meetings will be held on a regular basis involving all relevant site personnel. The objective of site meetings is to discuss the coming week's 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.

During construction of the proposed development, all staff will be made aware of and adhere to the most up to date version of the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013*'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.

5.3 Environmental Legislative and Regulatory Requirements

A register of regulatory, legal, and other requirements will be developed by the Environmental Manager. This will be a summary list of the major environmental legislation and other requirements with which the project must comply. A typical register of environmental legislation is divided into several categories, which include:

- General Environmental Legislation;
- Flora & Fauna;
- Emissions to Air and Dust generation;
- Emissions to Water & Groundwater and water pollution;
- Waste Management; and
- Noise & Vibration.

For each piece of legislation, the following information will be provided:

- Index Number;
- Title of Legislation;
- Summary of Legislation; and
- Relevance.

All legislation included in this Register can be readily accessed on http://www.irishstatutebook.ie/ or will be available through the Construction Manager's office. The Register of Legislation will be reviewed and updated on a minimum six-monthly basis. This is a controlled document and as such will comply with all the requirements of the contractor document control procedure as part of the contractor's quality management procedure.

5.4 Stakeholders Liaison

The contractor will put in place a Communications Strategy (to be reviewed and agreed by the Employer and Employer's Representative) which will provide a two-way mechanism for members of the public to communicate with a designated member of the contractor's staff and for the contractor to communicate essential information on aspects of the works. The communications strategy will include:

- Procedures to inform stakeholders affected by the construction phase on schedules for any activity which is likely to affect them, and minimise any disruption;
- Preparation and distribution of information leaflets/notices to be distributed to affected parties;
- Sight and road signage;
- A Public Information Programme to provide construction and temporary traffic management information to road users, residents, businesses, consumers, trade organisations and other relevant parties; and
- Details of a contact name and number for any complaints that may arise during the works.

A complaints register/tracking system will form part of the communications strategy, and all complaints will be handled in an efficient manner. The register will have prescribed methodologies for documenting and actioning complaints received from the public and the relevant stakeholders.

6. Emergency Incident Response Plan

6.1 Overview

It shall be the responsibility of the contractor to develop an (Emergency) Incident Response Plan (IRP) which shall be subject to approval by the Employer's Representative.

The contractor shall be required to comply as a minimum with requirements for incident management in accordance with the procedures outlined in the LCCC Incident Management and Emergency Response Plan Procedure and associated documents. The contractor's IRP will take LCCC's incident management requirements into account and will form part of the contractor's detailed CEMP.

The primary objective of the IRP shall be to ensure the safety to all workers and visitors on the works site.

The IRP will detail the emergency incident response procedures that will ensure that all countermeasures proceed in a controlled manner so that greater damages are avoided and the possible effects upon persons, the environment and property are avoided or minimised.

The contractor will include within the plan, a pollution incident response procedure that is site/activity specific and will include at a minimum; locations and operating procedures for emergency equipment, identification of pollution scenarios, staff training and responsibilities as well as Safety Data Sheets (SDS) of all chemicals on site.

The IRP will be regularly reviewed by the contractor and amended to ensure it is applicable to the current construction activities, outlining the associated risks and recommended emergency responses procedures.

The IRP will provide a list of emergency contacts depending on the incident, a number of these is provided in Table 6.1 below. The IRP shall also detail the contact details for the personal assigned responsibility of following up once an incident has occurred and the procedure to be adhered to in such an event.

6.2 Incident Reporting

In the event of an incident occurring, the contractor shall be required to outline in a report at the minimum the following points:

- A detailed description of the incident, including the location, time, weather conditions, affected parties;
- Potential contributing factors;
- Negative effects;
- Current mitigation control measures in place; and
- Recommended improvements/ corrective actions to reduce risk of recurrence.

The contractor shall submit to the Employer's Representative an initial incident report as detailed above, within a 24-hour period of the incident occurring. Incidents shall be reported to the relevant Emergency Services.

6.3 Emergency Contact Details

The IRP shall include emergency contact details for key personal and emergency services, methods of notifying local authorities, statutory bodies, and relevant stakeholders. These numbers will be posted at suitable noticeboards/welfare facilities. Emergency Contracts will include (but not limited to):

Table 6-.1: Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Hospital – University Hospital Limerick, St Nessans Road, Dooradoyle, Limerick	(061) 301 111
ESB Emergency Services	1850 372 999
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí – Mayorstone Park Garda Station, Limerick	(+353) 61456980
Health and Safety Co-ordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Project Supervisor Construction Stage (PSCS)	TBC
Project Supervisor Design Process (PSDP)	TBC
Client: Limerick City & County Council (LCCC)	(+353) 61 556000

6.4 Resources and Training

The contractor shall ensure that the relevant staff will be trained in the implementation of the IRP. A list of all staff that received training on the topic shall be provided to the Employer's Site Representative outlining the person's name, contact number and the date the training was provided.

6.5 Emergency Access and Equipment

The contractor shall ensure that at each of the proposed work locations, there will be adequate space provided during construction to allow for emergency access routes. These emergency access routes shall be maintained for the duration of the construction stage.

Locations of pollution control plant/spill kits shall be provided by the contractor to the Employer's Site Representative. All pollution control equipment shall be checked regularly throughout the duration of the site works to ensure that it is in working order.

6.6 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. Provision of a siren, fog-horn or congruent notify all personnel of an emergency;
- An assembly point will be designated in the construction compound area 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; and
- 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 will 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 the site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping records of such drills.

6.7 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the project. Oil/fuel spillages are one of the main environmental risks that will exist on the site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following steps provide the procedure to be followed in the event of such an incident:

- 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, clean up as much as possible using the spill control materials;
- Set up temporary barriers or exclusion zones to keep personnel and the public away from the contaminated area;
- 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;
- Spill containment zones will be located within the temporary construction compounds, on impermeable areas and equipped with all necessary materials to respond to any potential spill;
- Notify the EM 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; and
- The EM will notify LCCC as the appropriate regulatory body 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. Any environmental incident must be investigated in accordance with the following steps:

- The EM must be immediately notified;
- If necessary, the EM 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 on an Environmental Incident Form which will provide information such as the cause, extent, actions, and remedial measures used to follow the incident. The form will also include any recommendations made to avoid reoccurrence of the incident;
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species, or designated conservation site (SPA or SAC), the EM will liaise with a project ecologist; and
- A record of all environmental incidents will be kept on file by the EM and the Main Contractor. These records will be made available to the LCCC and EPA if required.

The EM 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, and will advise the Main Contractor as appropriate.

6.8 Corrective Action

Where an incident has occurred, or a site audit/ inspection has identified a non-conformance, it is imperative that a reoccurrence of a similar incident is avoided. Once the source of the incident has been identified, appropriate measures shall be implemented. Depending on the correction action required, these measures may involve additional training to site personal, updating construction activity procedures, providing additional pollution protection equipment. Revised work methods, training requirements or any corrective action required to ensure an incident does not reoccur will be documented by the contractor in an updated IRP and CEMP.

6.9 Emergency Incident Response Plan – Key Points

- The IRP is a live document and shall be updated regularly by the contractor as necessary to include corrective actions implemented, revisions to regulations, and requests from Employer's Representative;
- The IRP shall full comply;
- Detail list of key personal to be contacted in the event of an emergency/incident;
- Notification of incident and detailed incident investigation report provided to the Employer's Representative;
- Identify and implement corrective actions;
- Site specific pollution emergency response plan for risks associated with chemical/fuel spills; and
- Initial training to staff prior to construction work commencing and regular training (e.g., Toolbox Talks) throughout the duration of the construction stage.

7. Mitigation and Monitoring Proposals

This section of the CEMP groups together all mitigation measures and monitoring proposals currently identified for the proposed development including those specified in the environmental reporting prepared for the project.

The mitigation measures are presented in the following pages, and a reference number has been applied to each of the measures for ease of reference.

Presenting the mitigation measures and monitoring proposals in tabular format provides an easy to audit list that can be reviewed and reported on during the project. This can be further expanded on, if necessary.

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
General					
MM1	Detailed CEMP and Method Statements	CEMP Sections 4.2.	A suite of **Construction Management Plans** will be prepared by the appointed contractor and included within the detailed CEMP. **Method Statements** will be provided for all works and will be approved by the Employer's Representatives prior to the commencement of constructions works. The CEMP will be distributed to members of the project team, including subcontractors as necessary to ensure that environmental and health and safety requirements are adequately communicated.		
MM2	Safety Induction	CEMP Section 5.2	All staff and operatives will receive a site-specific safety and environmental induction prior to commencing any work on-site. All personnel involved with the project shall be informed of the requirement for protection of designated habitats including the aquatic environment, i.e., River Shannon SAC, and best practice methodologies to be employed.		
MM3	Toolbox Talks	CEMP Section 5.2	Toolbox talks will be provided to all staff for (but not limited to) working with concrete and biosecurity requirements on site. Toolbox talks will be held by the Environmental Manager or Site Manager at the commencement of works, or at the commencement of new activities.		
MM6	Health and Safety	CEMP Section 4.2	During construction of the proposed development, all staff will be made aware of and adhere to the most up to date version of the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013*'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.		
MM7	Health and Safety	General	Appropriate fencing will be erected around any excavations to prevent uncontrolled access to this area. Appropriate health and safety signage will also be erected on this fencing and at locations around the site.		
MM8	Ecological Walkover Survey	CEMP Section 4.2.6 & 4.3	An ecological walkover survey by the project ecologist and construction team will be complete prior to the commencement of works.		
MM9	Emergency Incident Response Training	CEMP Section 6.4	The contractor will ensure that the relevant staff will be trained in the implementation of the IRP. A list of all staff that received training on the		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			topic shall be provided to the Employer's Site Representative outlining the person's name, contact number and the date the training was provided.		
MM10	Emergency Access Routes	CEMP Section 6.5	The contractor shall ensure that there will be adequate space provided during construction to allow for emergency access routes. These emergency access routes shall be maintained for the duration of the construction stage.		
MM11	Site Evacuation Procedure	CEMP Section 6.6	A site evacuation/fire drill procedure will be established by the contractor and will provide the basis for carrying out the immediate evacuation of all site personnel in the event of an emergency.		
Flora and Fauna					
Biodiversity - General					
MM13	Biodiversity	CEMP Section 4.2.6	▪ The surrounding immediate construction area will be fenced off, or otherwise demarcated, to prevent inadvertent intrusion from construction plant; ▪ Adherence to LCCC Biodiversity Action Plan and Key Objectives; and ▪ Planting as per the proposed Landscape Plan shall be included at construction stage.		
Trees and Hedgerows					
MM16	Protection of Vegetation during Construction	General	▪ Good planning and site management will be followed during construction works to ensure areas are not adversely impacted by construction activities; ▪ Recommendations for the specific measures advised regarding management of the trees in relation to this development will be detailed in the Method Statements.		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
MM17	Protection of Vegetation during Construction	General	▪ Removal of scrub vegetation will be performed in winter outside of the bird breeding season (1st March – 31st August); and ▪ Tree felling/Hedgerow cutting should be preceded by a competent assessment as to the presence of any protected wildlife species, where required specialist advice should be sought if necessary.		
MM18	Protection of Vegetation post-construction	General	▪ The proposed Landscape Plan should be fully implemented and monitored to ensure success of the planting scheme through periodic surveys. Additionally invasive species should be controlled to limit their growth and spread along the greenway route.		
Vegetation					
MM18	Invasive Species	CEMP Section 4.3	▪ A risk assessment and biosecurity method statement must be provided by the contractor prior to commencing works. ▪ Good construction site hygiene should be employed on site. ▪ Any material that is imported onto any site will be verified by a suitably qualified ecologist to be free from any invasive species listed on the 'Third Schedule' of Regulations 49 & 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I 477 of 2011).		
Water Quality, Soil and Groundwater					
MM19	Water Quality	General and CEMP 4.2.5 & CEMP 4.2.7.	▪ The works site and area will be strictly demarcated to prevent any machinery operation and movement or works activities on adjacent land or fields outside the site. ▪ There will be no storage of machinery (including drill rigs), fuel or chemicals in areas prone to flooding or within 30m of any drain or watercourse.		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			▪ Refuelling of machinery will be carried out off site or in a contained bunded area on site. ▪ Spill kits will always be present on sites and wherever fuel bowsers are parked or operating where there is interaction with an open waterway; ▪ Hydraulic fluid leaks will be addressed, using the Spill kit that will be present on the site as soon as they are identified. ▪ The plant in question will immediately be moved to a safe area where leakage of fluid into the water way is not possible. ▪ Storage tanks shall have secondary containment provided by means of an above ground bund to capture any oil leakage irrespective of whether it arises from leakage of the tank itself or from associated equipment such as filling and off-take points, sighting gauges, etc., all of which should be located within the bund. Bund specification should conform to the current best practice for oil storage (Enterprise Ireland, BPGCS005). ▪ Oil booms and oil soakage pads should be maintained on-site to enable a rapid and effective response to any accidental spillage or discharge. ▪ Waste oils and hydraulic fluids shall be collected in suitable leak-proof containers and transported from the Site and Off-Site Areas for disposal or recycling. ▪ Where feasible, all construction machinery shall use biodegradable oils and fuels. ▪ Machinery used on site shall be regularly inspected to ensure there is no leakage from them and to ensure the machinery shall not cause contamination of watercourses. ▪ Protection measures shall be put in place by the contractor to ensure that all hydrocarbons used during the works are appropriately		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			handled, stored, and disposed of in accordance with recognised standards as detailed by the Environmental Protection Agency. ▪ Guidelines for minimising impacts on water quality and fisheries in relation to Construction shall be implemented including, but not limited to, CIRIA C532 "Control of water pollution from construction sites - Guidance for consultants and contractors", Inland Fisheries Ireland guidelines and TII guidelines. ▪ Works shall not be carried out during or immediately following heavy rainfall events, when the potential for surface water and overland runoff is increased.		
MM20	Excavation	CEMP Section 4.2.5.	▪ Topsoil will be stripped as necessary to prepare for open cut trench excavation. ▪ Topsoil will be stockpiled for reuse within the works area or stored for reuse in a dedicated site compound which will be protected with silt fences. Where it is necessary to store topsoil for a significant period, it will be sown with grass seed to prevent any windblow or water erosion and subsequent run-off. ▪ Excavated material will be reused where possible. In the event it is not required for re-use, it will be removed by a licenced waste contractor. ▪ A silt filtration system will be used, as appropriate, to prevent contamination of any drains or watercourse.		
MM21	Pollution Control – Site Compound	CEMP Section 2.3.4, 4.2.1 & 4.2.7.	▪ The compound will be adequately buffered to prevent any surface water run off or will incorporate a surface water collection and treatment system if required. The compound areas will be monitored and observed daily to ensure that it is not impacting on any local watercourses. The site compound will also include the following mitigations:		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			▪ Bunded (minimum 110% bunding of all fuels) and impermeable containment areas for plant refuelling, maintenance, washing, storage of fuels and site generators. The bunded area shall have sufficient volume to contain any spills and all mitigation measures for these activities are outlined below in their various sections; ▪ A dedicated waste storage area for any construction waste generated. All skips or bays will be labelled/signage for segregated recyclable material i.e., a skip labelled for recycled timber; ▪ A wheel wash area for construction and delivery vehicles. ▪ Availability of a designated wash out tank for wash out of concrete trucks following concrete pours.		
MM22	Pollution Control	CEMP Section 4.2.5	▪ Dewatering of any excavation will be undertaken as necessary. In the event that dewatering pumps and silt filtration systems are required then they will be positioned in strategic locations adjacent to the excavation.		
MM23	Pollution Control	CEMP Section 4.2.1 & 4.2.7.	▪ Material storage and handling measures will be implemented to contain potential sources of soil/groundwater pollution. Contractors will ensure that spill kits will be accessible to construction personnel at all times and all spills will be reported to the site environmental manager; ▪ All liquids, solids and powder containers will be clearly labelled and stored in sealable containers; ▪ All liquid and hazardous materials will be stored in a designated and temporarily bunded areas with appropriate signage. This area should be within the construction compound or at an alternative location agreed with the Site Environmental Manager;		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			▪ All bunding must have a minimum capacity of 110% of the volume of the largest tank or 25% of the total storage capacity, whichever is the greater. Bunding shall be impermeable to the substance that is being stored in the tank; ▪ Where a contractor is responsible for materials stored in a bunded area, that contractor shall implement measures for the regular inspection of bunds and emptying of rainwater (when uncontaminated); ▪ Material storage areas will be at a safe distance from live construction activities; ▪ Spill kits will be provided in areas where liquids are stored and refuelling areas; ▪ Chemicals/fuels/materials brought on-site must be accompanied by a Safety Data Sheet (SDS). A copy of the SDS should be provided to the Site Manager and kept in a file in the site office; ▪ Materials will be stored in accordance with any specific requirements of the SDS; ▪ A complete register of all SDSs in use on-site will be maintained and retain copies of all SDS on-site; ▪ Ordering of materials will be completed in such a manner as to minimise quantities present on-site; ▪ Excess materials will not be stored on-site for extended periods; ▪ Contractors will be responsible for ensuring the regular maintenance of construction plant and equipment, to prevent leaks		
MM24	Refuelling Fuel and Hazardous Material	CEMP Section 4.2.7	▪ All machinery and plant used will be regularly maintained and serviced and will comply with appropriate standards to ensure that leakage of diesel, oil and lubricants is minimised;		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			▪ Fuels, oils, greases, and hydraulic fluids will be fully bunded (110%), works compounds used for the storage of materials and machinery will be located in a designated area; ▪ Refuelling of machinery will be carried out off site (if convenient and situation allows) or in a contained bunded area on site.		
MM25	Cement Based Products	CEMP Section 4.2.8	▪ Concrete pouring will be planned for dry days were possible by following weather forecasts; and ▪ Where concrete is delivered to the site and pour is complete, truck will be directed to a designated concrete washout area which will be lined with an impermeable membrane.		
MM26	Fuel/ Oil Spillages	CEMP Section 6.7	▪ An emergency incident response procedure will be established for oil/fuel spillages.		
Air Quality & Climate, Noise & Vibration					
MM27	Dust	CEMP Section 4.2.2	▪ Site roads/access paths shall be regularly cleaned and maintained as appropriate; ▪ Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only. Furthermore, any road that has the potential to give rise to fugitive dust must be regularly dampened by water sprinklers, as appropriate, during dry and/or windy conditions; ▪ Vehicles using site roads shall have their speeds restricted where there is a potential for dust generation. Vehicles delivering material with dust potential should be always enclosed or covered with tarpaulin to restrict the escape of dust; ▪ Vehicles exiting the site areas shall make use of a wheel wash facility where appropriate, prior to entering onto public roads, to		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			ensure mud and other wastes are not tracked onto public roads. Public roads outside the site should be regularly inspected for cleanliness and cleaned as necessary. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions; ▪ Material handling systems and site stockpiling of materials should 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. Spoil stockpiles that will remain in-situ for a duration greater than 6 months will be hydroseeded and maintained throughout the construction phases to prevent dust; ▪ At all times, dust levels and extent as well as control the procedures put in place will be strictly monitored by the site engineer and the environmental manager and assessed and reviewed as necessary. In the event of dust nuisance occurring outside the site boundary, satisfactory procedures will be implemented to rectify the problem, in consideration of all stakeholders including pedestrians and cyclists; ▪ 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 using best practice and procedures;		
MM28	Noise	CEMP Section 4.2.3	▪ Management of Noise emissions will be following British Standard BS5228:2009 – Noise and Vibration control on construction and open sites Part 1 – Noise; ▪ Any plant such as generators and pumps which are required to work outside the site working hours, shall be surrounded by an acoustic		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			enclosure, or fitted with other approved noise reduction measure to the approval of the Employer's representative; ▪ 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; ▪ The best means practicable (BPM), including proper maintenance of plant, no idling of plant etc. will be employed to minimise the noise produced by on site operations; ▪ 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 have attenuated 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; and ▪ Machinery which are used intermittently, will be shut down or throttled back during those periods when they are not in use.		
MM29	Noise & Vibration Standards	General	It is recommended that appointed contractor(s) be required to adopt practices set out in British Standard BS 5228:2009 Code of practice for noise and vibration control on construction and open sites Part 1: Noise and Part 2: Vibration (2009). Measures recommended in the standard include: ▪ Appointing a project representative responsible for noise and vibration issues, and for liaising with local representatives. A clear communication channel should be established between all parties prior to project commencement; ▪ Requiring that contractors ensure that site personnel are familiar with potential noise and vibration issues, and that personnel apply		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			a common-sense approach to eliminating unnecessary noise emissions; ▪ Use of quieter plant and methods where possible; ▪ Installation of temporary barriers or enclosures around local sources such as compressors and generators; and ▪ Limiting times of activities which may generate elevated noise or vibration emissions.		
Waste Management					
MM30	Waste Management	CEMP Section 4.4	All current and applicable waste management legislation will be applied and adhered to. Contractors that are engaged in the transport of waste off-site will comply with the provisions of the Waste Management Act (1996) (as amended), associated Regulations and the Waste Management Plan prepared in accordance with '*Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006)'. As such, the contractor must handle, transport, and dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities. A collection permit to transport waste must be held by the relevant contractor which has been issued by the Local Authority where the waste has been generated i.e., LCCC		
MM31	Waste Management	CEMP Section 4.4	▪ The construction compound for the proposed scheme should have a dedicated Waste Storage Area (WSA) for any construction waste generated. Receptacles/skips or bays will be provided for each recyclable material.		
MM32	Segregation of Waste	CEMP Section 4.4	▪ All waste generated on site will be segregated and placed in appropriate waste streams designated for recycling, reuse, or disposal.		
MM33	Waste Documentation	CEMP Section 4.4.3.5	▪ A recording system to be put in place to record construction waste generated on site. The system will enable the contractor to maintain		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			records for all waste material which leaves the site, either for reuse on another site, recycling, or disposal; ▪ The licensed waste contractor employed to remove waste from the site will be required to provide documented records for each movement of waste off-site; ▪ All information will be entered into the waste management system to be maintained on site.		
Existing Services					
MM34	Existing Services	General	The contractor must adhere to the ESB Code of Practice for Avoiding Danger from Overhead Electricity Lines, 2008 and the HSA Code of Practice for Avoiding Danger from Underground Services, 2010.		
MM35	Existing Services	General	▪ Prior to excavation, the contractor will assess record drawings and the results of the Site Investigation in order to determine the exact depth and location of the existing service networks within the works area; ▪ Prior to any excavation works all known existing underground services will be clearly marked on the ground. These will be located by personnel trained in the location of underground services; and ▪ All overhead electrical lines will be clearly marked and delineated with goalposts, Crossing points, onsite in accordance with the ESB Networks Code of Practice. All exclusion zones to be clearly identified on site and appropriate plant and machinery selected for works within the exclusion zone with particular attention given to maximum reach of the machinery being used for lifting operations while constructing for excavation works.		
MM36	Existing Services	General	▪ Any anticipated clashes between the existing utilities and the proposed works will be identified during the design phase and any		

Ref No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			diversions necessary to avoid accidental clashes during the construction phase will be designed, planned, and agreed with the utility company in advance of the construction phase of the Scheme.		
Archaeology and Built Heritage					
MM37	Archaeological Monitoring	General	The area under assessment in this report comprises an area spanning the southern bank of the River Shannon, approximately 2kms to the east of Limerick City in the townlands of Dromore, Sreelane, Newcastle, and Castletroy. The proposed development extends for approximately 4.5kms within mixed use landscape. In the event that any previously unrecorded archaeological features are uncovered during monitoring of ground works then they will be recorded and securely cordoned off while the IW Project Archaeologist, the LCCC Archaeologist and the NMS are consulted to determine appropriate further mitigation measures, which may entail preservation in situ (by avoidance) or preservation by record (archaeological excavation).		

8. Programme of Works

8.1 Construction Schedule

The finalised construction works programme was not available at the time of formulating this outline CEMP, however it should include the following will be subject to the following constraints.

The following mitigation calendar shall be applied and followed to ensure protection of habitats and species during construction and operational phases of the greenway. In general, the construction works should be planned during the 'green' periods in the calendar year, as long as appropriate mitigation measures are implemented. The exception to this is Fish (salmonoid spawning) because foreshore works (including preparatory work) beside all watercourses supporting salmonids shall be undertaken from May to October (inclusive) and in consultation with Inland Fisheries Ireland (IFI) to avoid accidental damage or siltation of spawning beds.

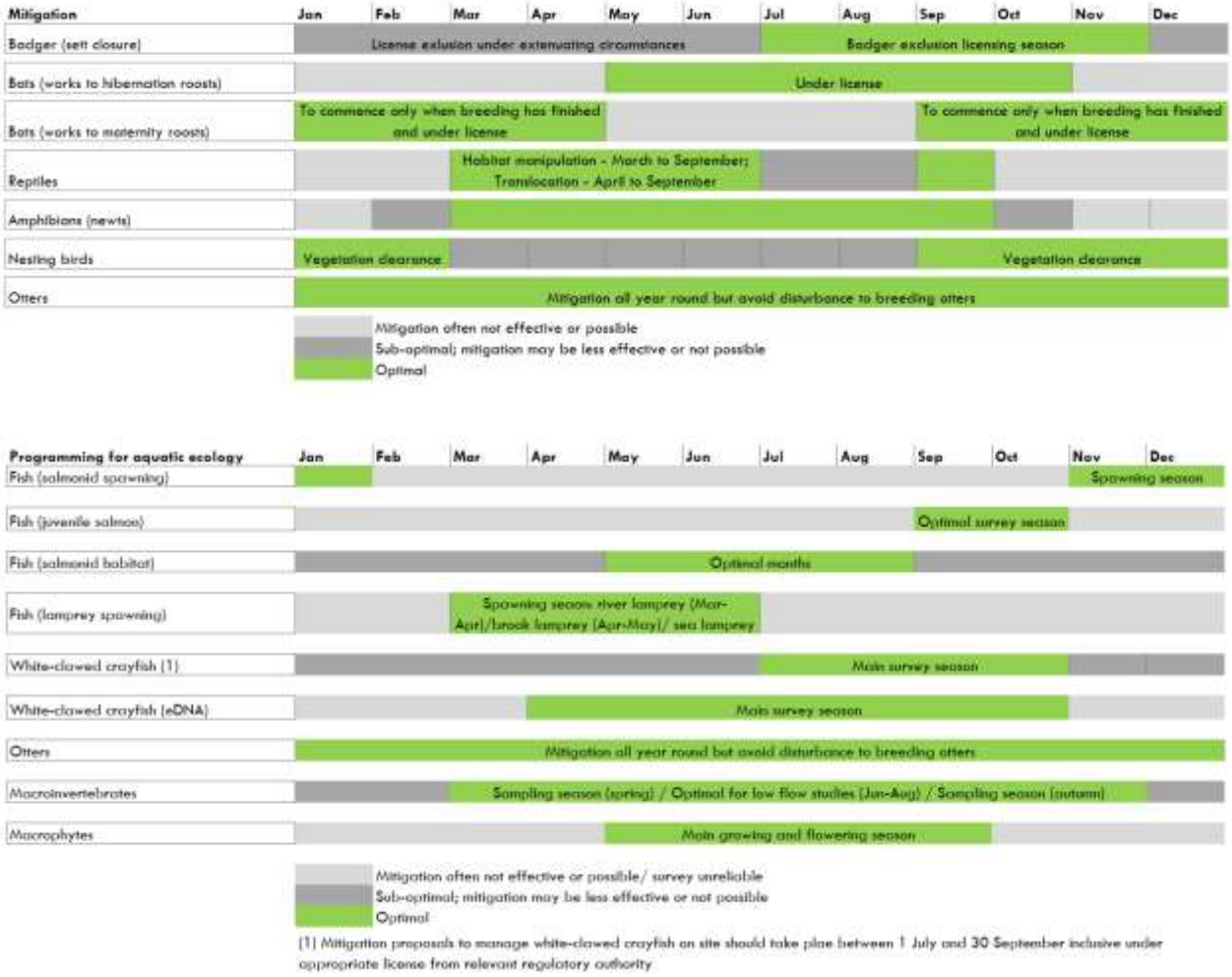

Figure 8-1: Ecological calendar

8.1.1. Ecological Clerk of Works

Where the construction programme does not allow this seasonal restriction to be observed, vegetated areas will be inspected by a suitably qualified ecologist for the presence of breeding birds prior to clearance as outlined in Section 4.2.6 of this CEMP.

8.1.2. Tree and scrub clearance

To avoid impacting on bird nesting sites, vegetation (e.g., hedgerows, woodland, tree, scrub, and grassland) will not be removed between 1st of March and 31st of August inclusive, to avoid impacts on nesting birds.

Although the Wildlife Acts provide an exemption from this seasonal restriction for road construction, there is no exemption provided for intentional nest destruction.

8.1.3. National Holidays

- Christmas non-working time is from the beginning of the third week of December to the end of the first week of January; and
- Other non-working times including bank holidays, '*builders*' holidays etc.

8.2 Working Hours

The normal working times are set out in the section below. Works other than safety requirements, security and emergency works will not be undertaken outside these working hours without the written permission from LCCC. This permission, if granted, can be withdrawn at any time should the working regulations be breached.

Night is defined as 18:00 to 08:00hrs.

No rock breaking works or works involving the using of pneumatic breaking equipment shall take place between the hours of 22:00 and 07:00. Should rock occur on sections where any night works are specified then alternative working hours shall be agreed with the Employer's Representative.

It is proposed (unless otherwise specified by the Local Authority or planning conditions) that the construction activities will operate during daylight hours and between dawn and dusk during shortened daylight hours. During daylight hours the following will constitute the normal working hours;

- Monday to Friday – 08:00 to 18:00;
- Saturday – 08:00 to 13:00; and
- Sundays or Bank Holidays – no works permitted.

Where additional or alternative working hours are required, these will be agreed in advance via written agreement with LCCC. Approval to vary the prescribed hours may be sought based on the following considerations:

- Traffic management issues;
- Safety requirements including risk to the public;
- Sequential/timing measures;
- Requirements of other authorities (e.g., ESB, Eircom); and
- Public interest.

Emergency work may include the replacement of warning lights, signs and other safety items on public roads, the repair of damaged temporary works and all repairs.

9. Compliance and Review

9.1 Site Inspections and Environmental Audits

Daily and weekly environmental inspections of construction activities will be carried out by the Environmental Manager and the Site Construction Manager in accordance with the CEMP to ensure all controls to prevent environmental impact, relevant to the construction activities taking place at the time, are in place.

9.2 Auditing

It will be the responsibility of the contractor to implement the mitigation and monitoring measures specified in the AA Screening Report and the CEMP. The contractor will also ensure that all construction staff understand the importance of implementing the mitigation measures. The implementation of the mitigation measures will be overseen by the Environmental Manager.

Throughout the construction phase, environmental audits will be carried out by a suitably qualified and experienced person. A schedule of audits will be agreed with the Employers Representative in advance of commencement of works. The purpose of the environmental audits is to identify any underlying causes of non-compliance and determine whether the CEMP is being properly implemented and maintained. Audits also allow for the identification of system and performance improvement opportunities. The contractor may carry out the environmental audit themselves or appoint external personnel acting on their behalf. The results of environmental audits will be provided to the project management team.

An audit of compliance with the pre-commencement mitigation measures will be completed by the Environmental Manager prior to the commencement of construction. Monthly audits of compliance with the construction phase mitigation measures will be completed as construction is ongoing. The findings of each audit will be documented by the Environmental Manager and made available to LCCC and other statutory bodies on request.

Once the scheme is operational and has been commissioned, a report of compliance with operational phase mitigation measures will be completed.

9.3 Environmental Compliance

The following definitions shown in Table 9.1 shall apply in relation to the classification of Environmental Occurrences during construction:

Table 9.1: Environmental Occurrences

Occurrence	Definition
Environmental Near Miss	An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.
Environmental Occurrence	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 indicated that limits for a particular environmental parameter 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.
Environmental Non-Compliance	A non-compliance occurs when there is non-fulfilment of a requirement, and includes any deviations from established procedures, programmes and other arrangements related to the Environmental Management System (EMS).

The proposed greenway project will comply with all relevant environmental regulations and guidance set out by key regulatory bodies, including the Environmental Protection Agency (EPA), the National Parks and Wildlife Service (NPWS), and other relevant authorities. The proposed development will adhere to the provision set out

in the Habitats Directive and Birds Directive, ensuring the protection of the Qualifying Interests of the Lower River Shannon Special Area of Conservation. Specific measures to prevent pollution will be in line with the Water Framework Directive and the European Communities (Water Policy) Regulations. Compliance will be ensured through monitoring, audits and consultations with the relevant authorities and any mitigation measures will be undertaken in accordance with their recommendations.

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/Environmental Manager, as advised by LCCC, or the Employer's Representative. Corrective actions may be required as a result of the following:

- Environmental audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and
- Environmental Complaints.

A Corrective Action Notice will be used by the Employer's Representative 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, direct communication between the Site Manager/Environmental Manager will be conducted. This will then be passed down to the site staff involved. A Corrective Action Notice will then be completed.

Appendix A Preliminary Design Drawings

Appendix B Landscape Architecture Drawings

Appendix C Structural Design Drawings