



Owenogarney Arterial Drainage Scheme Embankment Refurbishment, Erosion Protection and Sluice Replacement



Screening for Appropriate Assessment & Natura Impact Statement

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Owenogarney Arterial Drainage Scheme Embankment Refurbishment, Erosion Protection and Sluice Replacement

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1. INTRODUCTION

Delichon Ecology have been commissioned by the Office of Public Works (OPW) to carry out a Screening for Appropriate Assessment (AA) and Natura Impact Statement (NIS) for proposed embankment refurbishment of the Owenogarney River and Cloverhill Stream upstream of Bunratty in addition to erosion protection and sluice replacement works downstream of Bunratty, Co. Clare. The locations of the proposed works are presented in Figure 1.1 and Figure 1.2.

This Screening for Appropriate Assessment & Natura Impact Statement (NIS) has been prepared to provide the competent authority, the OPW, with the relevant scientific information to conduct the Appropriate Assessment (AA). This information will allow OPW to determine, in view of best scientific knowledge, if the proposed project, individually or in combination with other plans and projects is likely to have a significant effect on European sites and, where necessary, to ascertain whether or not the proposed project would adversely affect the integrity of a European site(s).

1.1 Project Description

The proposed works will be served by 2 no of mobile site compounds welfare units. One of these compounds will be located upstream / north of Bunratty to facilitate the embankment protection works while the other will serve the proposed sluice replacement works, south of Bunratty. These site compounds shall be established in advance of the works and will support with designated areas for:

- Welfare Facilities
- Vehicle Parking
- Plant Storage
- Equipment Storage
- Materials Storage

The location of the proposed mobile site compound for the sluice replacement works is presented in Figure 1-2.

1.1.1 Works Plan

The works duration will be in the region of 16 weeks. It is likely that the works will not be completed in one complete block and there may be a number of repeated visits over the 16 week period.

The Foreman, Site Supervisor and excavator operators shall walk the site in advance of any works proceeding to assess ground conditions, determine suitability of the area for the placement of machinery, location of any services, such as overhead/underground power-lines or if there is a requirement for the use of bog mats. From the most recent site inspection it is not envisaged that bog mats will be required for the majority of this site. There was also no evidence of underground services or overhead power lines observed in the vicinity of the works area.

On all occasions, the excavator operator will be satisfied with the ground conditions upon which he intends to work from. Discussion will take place between the excavator operator and the operatives working in the vicinity of the plant.



1.1.2 Owenogarney Embankment Refurbishment

The work involves localised refurbishment along existing embankments E14, E16, E17 and E9 due to settlement and localised rutting. These works are located along the fringes of the Owenogarney River, and a tributary known as the Cloverhill Stream. The refurbishment works are needed as the crest level of the embankment which has been comprised and represents a flood risk to Bunratty village.

No in-channel works are required and no material or habitat shall be removed from the channel-side face of the embankment. All works shall be confined to the crest, rear-face and rear berm of the embankment for this reason.

Works on site will typically be carried out during standard OPW hours re: 08:00 – 16:30.

The embankment will be repaired in localised, 30 metre long sections. The in-situ topsoil/vegetation layer will be removed by the excavator and set aside for reuse.

An excavator will operate from the crest of the embankment and will spread the material evenly over the location being refurbished. The material will be tracked in with the excavator to ensure the seal and required level of consolidation is achieved. Topsoil will then be replaced and seed will be applied to ensure soil stabilisation and prevent erosion. All topsoil introduced to site will be certified free of invasive alien plant species. Topsoil will be procured from a licenced supplier, source site will be tested and assessed for presence of invasives prior to importing

Ground conditions at the site will be continually assessed to ensure suitable load bearing for mechanical excavators. Ground conditions will vary and will require reassessment throughout the works/after periods of wet weather. Bog mats will be used if necessary.

No in channel works will be required. All works will be undertaken from the dry side of the embankment along the back berm.

1.1.2.1 Works Methodology Embankment Refurbishment:

Embankment refurbishment work will involve increasing the height of the flood defence in areas of consolidation and strengthening the flood defence by reshaping in areas of subsidence (See Image 1.1). Competent material (Class 2C subsoil) will be imported and used in areas where a deficit of material exists. All imported material will be supplied with all the necessary certifications and will be screened for invasive species.

Raising of embankments will be to a level of 4.9/5.1m OD Malin. Image 1-2 outlines the levels of the embankment following topographical survey in 2022. Work will also involve restoring the embankment stability and cross section in areas where the width has reduced or weakened.

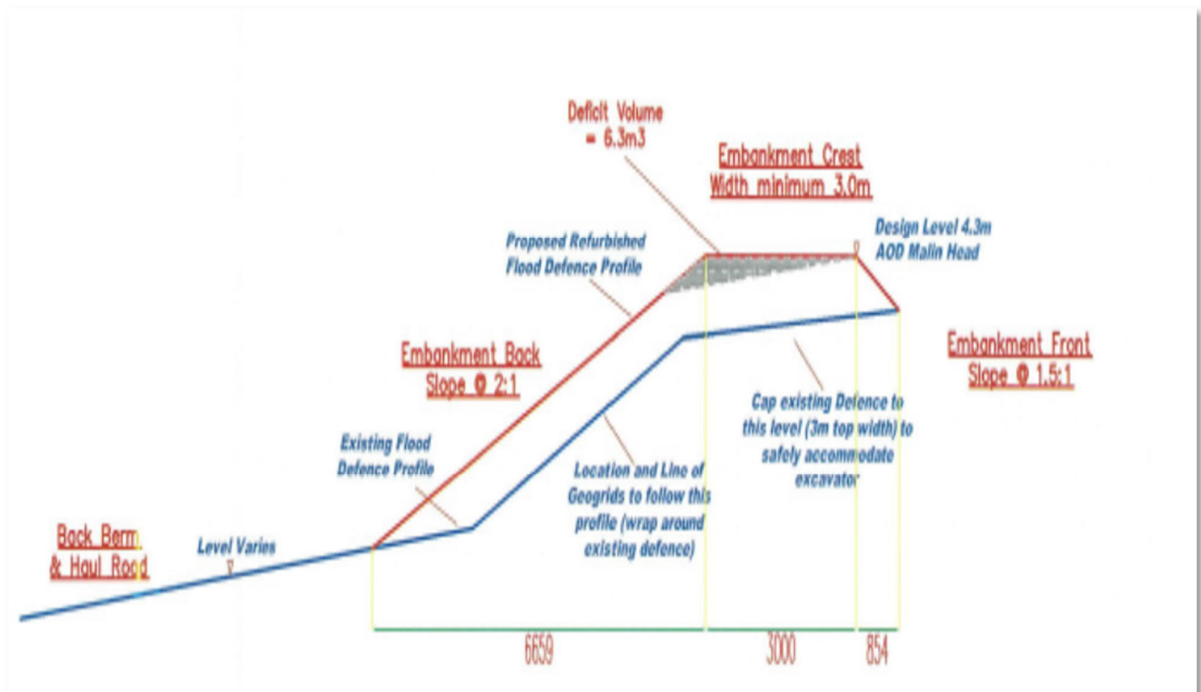


Image 1-1: Typical cross section of refurbished embankment

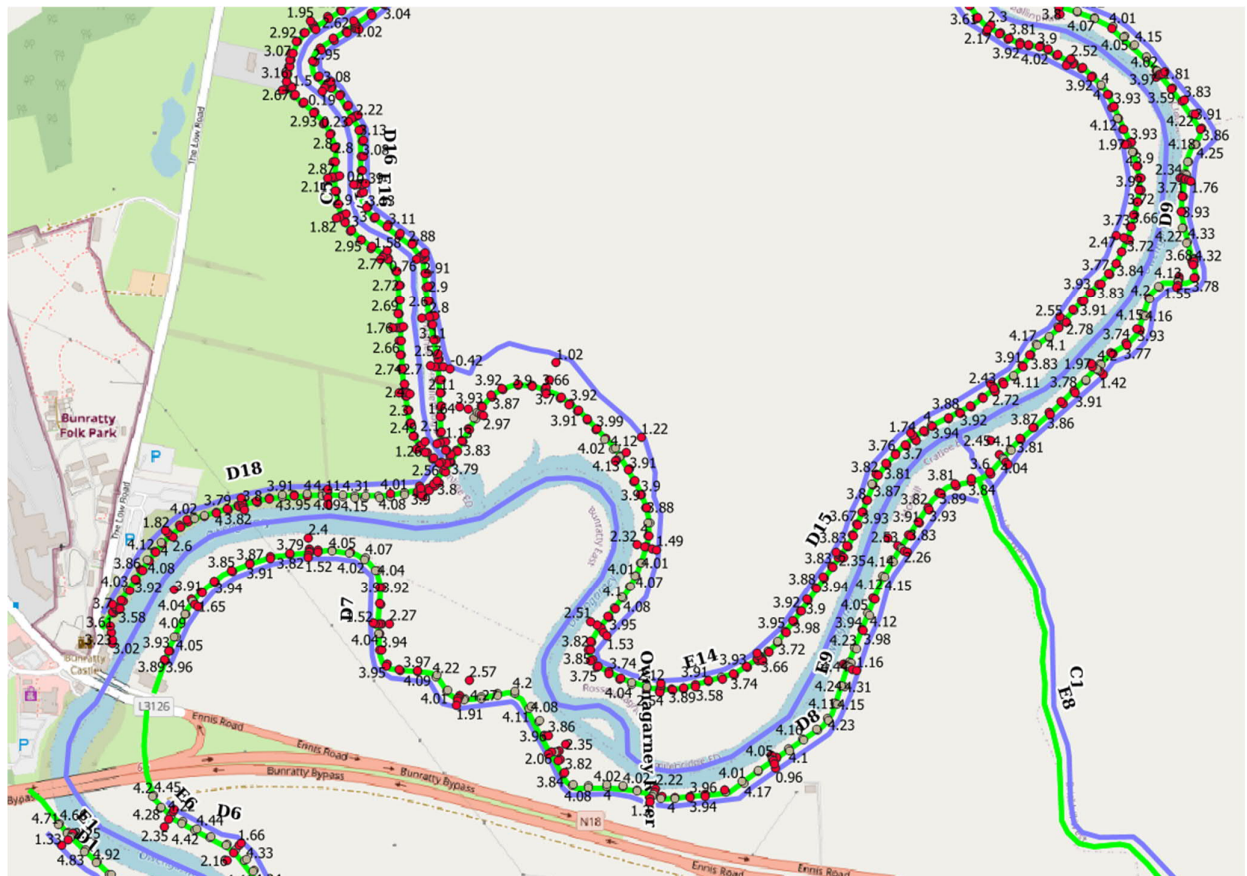


Image 1-2: Levels mOD on embankment E9, E14, E16 and E17 recorded in 2022

All works to the embankment will be undertaken from the landward side of the embankment.

The front slope of the flood defence will be left undisturbed as much as possible, and the embankment will be widened on the back slope (terrestrial side) as per the detail. Existing vegetation and trees present along the river (wet) side of the embankment will not be disturbed as part of works and the natural buffer will be retained. It should be noted that the habitats fringing the embankment are primarily open grassland habitat with little or no tree and shrub cover.

Ground conditions at the site are to be continually assessed to ensure suitable load bearing for mechanical excavators. Ground conditions will vary and will require reassessment throughout the works/after periods of wet weather.

The embankment will be refurbished in 30m sections. The topsoil/vegetation layer will be removed from the existing embankment cross section with the excavator and set aside for reuse. 6T wheeled dumper may be required to transport material in certain areas where space is limited. It is proposed to stockpile topsoil within an area of grassland north-west of the junction between E14 and E17 (See location on Figure 1-2). There will be no other stockpiling of topsoil for the proposed embankment repair works as further stockpiling would require double handling of material and increase workload



and could increase the surface area of the proposed works. Material will be delivered to the works area by tractor/trailer and tipped and placed on the embankment environs by excavator.

Operatives will lay a layer of geotextile between the old and new material to ensure a suitable band is achieved. The excavator will be responsible for securing the geotextile layer. A 360 excavator will operate from the haulage road and will be responsible for transporting the material to the top of the embankment.

A second excavator will operate from the crest of the embankment and will spread the material evenly over the previously installed geotextile. The imported material will be placed in 300mm layers until the design level is achieved.

The material is tracked in with the excavator to ensure the seal and required level of consolidation is achieved. Topsoil is then replaced along the newly formed embankment cross section and certified grass seed will be applied to ensure soil stabilisation and erosion.

Once the previous 30m section is fully completed and reinstated, refurbishment along the next 30m of embankment will commence.

1.1.3 Bunratty Sluice Replacement and Rock Armour

The proposed sluice replacement site is located in the townland of Bunratty West, approximately 150m south of the N18. Access is from the N18 and via a proposed haul road located to the west and north-west of the embankment.

Immediately downstream of Bunratty on the western / south-western embankment (Embankment E1), it is proposed to remove and replace sluice SL1 and place rock armour in front of a section of the existing embankment E1, to arrest ongoing and future erosion works. The works will involve sheet piling the front (creek area) and rear of SL1 to provide a safe workplace. It is not expected that sheet piles will be hammered or vibrated into place as the ground is soft comprising estuarine silt. Once the sheet piles are in place, a section of the embankment will be removed (and temporarily stored within the site compound), excavating down to the old head removing it and forming a new foundation with steel and concrete. Once the foundation is in place, a new precast concrete headwall will be installed followed by a uPVC Pipe and uPVC door on the new headwall.

Following this it is proposed to excavate the remainder of the old pipe and install the new PVC pipe. This will be followed by forming a new foundation and rear headwall before replacing the material around the pipe. Once the rear headwall is in place, it is proposed to install geotextile around the front headwall before securing rock armour and backfilling the excavated material. Once the rock armour is in place, the embankment will be reformed and reseeded as necessary.

To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area.

Works on site will typically be carried out during standard OPW hours re: 08:00 – 16:30. Sluice 1 Embankment E1 is located adjacent the Owenogarney River, which is subject to tidal water. The flow



and water levels in the channel will vary depending on the tidal regime and time of year works are being undertaken. It is intended to carry out the works in during the spring, summer and early autumn months.

The Foreman, Site Supervisor and excavator operators shall walk the site in advance of any works proceeding to assess ground conditions, determine the suitability of the area for the placement of machinery, location of any services, such as overhead/underground power lines etc. There was also no evidence of underground services or overhead power lines observed in the vicinity of the works area.

The typical duration of Sluice works will be in the region of 6 weeks (37 - 40 man weeks). This will depend on site location, existing ground conditions and accessibility.

On all occasions, the excavator operator must be satisfied with the ground conditions upon which he intends to work.

When the excavator operator decides to position the excavator adjacent to the excavations, he must ensure the bank is stable, wide enough and has sufficient bearing capacity to accommodate the machine.

1.1.3.1 Setting up work site.

There is an existing entranceway and gates off the main N18. This entrance leads to a recently unmanaged pastoral field bound by a treeline and stonewall. It is proposed to install compound and turning pad in this using geogrid and 3" down material compacted every 200mm.

1.1.3.2 Install Sheet Piles

Install sheet piles into this berm until the berm meets the Embankment. The process will be repeated for the rear of the Sluice, use bog mats for plant placement if ground is too soft for access.

1.1.3.3 Removal of the Embankment

The Long Reach excavator will then remove a section of the Embankment down to ground level. The material will be transported away to a storage area.

1.1.3.4 Removal of the old Sluice Head wall

The excavator will remove and dispose of the old head wall and door.

1.1.3.5 Install of New headwalls, Pipe and Sluice door

Installation of new sluice gate headwalls, pipe and sluice door will following the following sequence:

- The excavator will excavate down to the new foundation level.
- The construction team will install shuttering and steel as per the drawings.
- Once the shuttering is secured, it is proposed to pour a concrete foundation. Once the concrete has set, it is proposed to strike the shuttering.
- Once foundation is in place, it is proposed to install the precast headwall.
- Install a length of UPVC pipe 800mm x 6m. Cast in-situ a concrete wall to tie the Pipe and headwall together.
- Install the Sluice door on the precast headwall.
- Install shuttering to create a wall behind the precast headwall.



- Excavate the remaining old pipe.
- Excavate a new foundation for the rear headwall.
- Install shuttering and steel. Pour concrete. Strike shuttering.
- Install The remaining PVC piping.
- Form a shuttering around the pipe. Install steel and pour concrete.
- Strike and repeat for the wing walls. Start covering the pipe with the excavated material.

1.1.3.6 Installing Rock Armour at Sluice

A layer of Terram to be installed around the front headwall. Large rocks will be placed over this. This will protect the head wall from erosion.

1.1.3.7 Replacement of the Embankment

The Material will be transported back from the storage area. The Excavator will place it and compact it in layers until the Embankment is reformed.

1.1.3.8 Remove the Sheet piles

Extract the sheet piles and remove the imported material. The berm will then be returned to its natural state.

1.1.3.9 Reinstatement

On completion of works the turning pad and compound to be removed, the surrounding area shall be reinstated to a condition similar to, or better than the pre-works situation. All construction waste will be removed and disposed of offsite.

1.1.3.10 Placement of Embankment Rock Armour

A layer of rock armour is required at the toe of the existing embankment E1, Ch 1200 to 1350m; i.e. a section ca. 150m long. Rock armour will be placed where erosion action is already taking place and washing away material in an attempt to protect the existing berm/embankment. Without intervention there will be definite loss of habitat.

The rock armour will be stored at the proposed compound area and transferred to the embankment when required. A layer of Terram is to be installed along the toe of the embankment. Large rocks will be placed over this to protect the embankment from further erosion.

1.2 Statement of Authority

Eamonn Delaney BSc, MSc, MCIEEM, CECOL prepared this Screening for Appropriate Assessment and Natura Impact Statement report. Eamonn has seventeen years consultancy experience and has prepared Screening for Appropriate Assessment and Natura Impact Statements for various projects, including residential, amenity, renewable energy and transport developments in addition to strategic policy and planning proposals. Eamonn conducted field visits to the proposed works area in March 2024. Eamonn's initial years in ecological consultancy involved botanical and habitat surveys for the purposes of EIA, EcIA and large scale habitat surveys for local authorities. This included plant species identification and habitat classification in a wide range of rural, urban and peri-urban environments. Eamonn is a member of the Botanical Society of Britain and Ireland (BSBI) and regularly attends local



and regional BSBI field meetings in addition to carrying out recording for the proposed BSBI 2020 Atlas, in north Co. Galway and south Co. Mayo.

Eamonn has extensive experience in the Ecological Clerk of Works (ECoW) role for Flood Relief Schemes, roads and pipeline developments which requires weekly site visits, monitoring of mitigation measures, reviewing contactors method statements in addition to ongoing liaison with site operational staff and the design team. Eamonn has also been involved in the preparation and review of numerous Screening for Appropriate Assessment reports, Natura Impact Statements, Ecological Impact Assessments and Invasive Species Management Plans for a range of project types including roads, water infrastructure, solar farms, wind farms and peatland rehabilitation works. Through his involvement in all of these projects, Eamonn has honed his skills in field based assessments and the subsequent reporting and interpretation of information yielded from desk and field based resources.

Eamonn routinely drafts, reviews and completes AA's for numerous projects. As the project design is developed, Eamonn seeks to influence the project design and refine the AA process to avoid and reduce potential impacts to the habitats and species for which the potentially impacted European site is designated. The outcome ensures that the finalised AA has been developed through an iterative process where the findings of the AA inform and are being informed by the project design throughout.

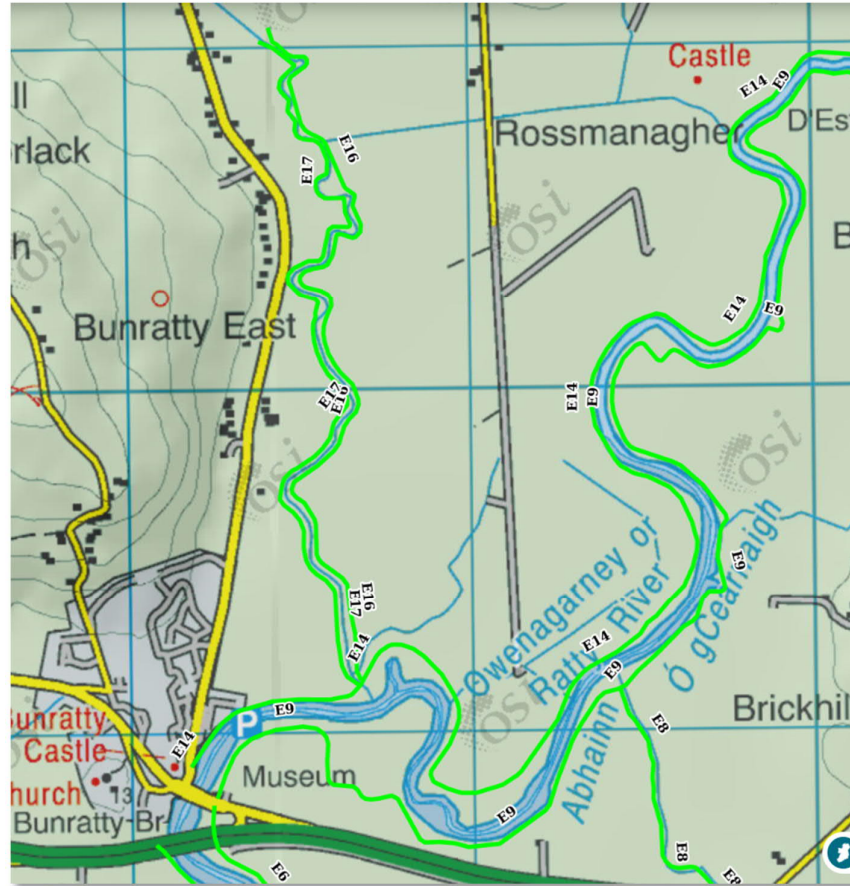


Figure 1-1: Location and extent of the proposed embankment repair works along the Owenagarney River and Cloverhill Stream

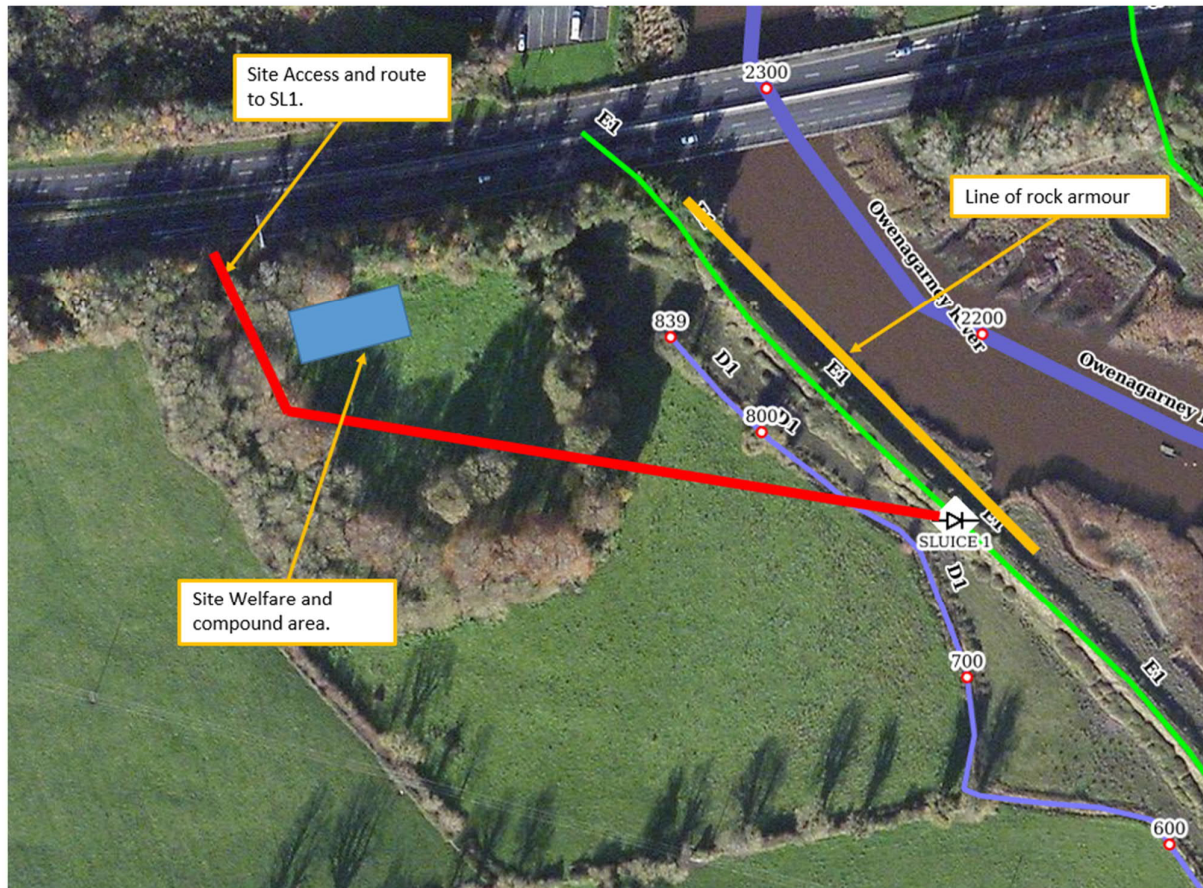


Figure 1-2: Location and extent of proposed sluice replacement and embankment protected works downstream of Bunratty



2 METHODOLOGY

The Department of the Environment, Heritage and Local Government guidelines (DEHLG, 2009, rev. 2010) outlines the European Commission’s methodological guidance (EC, 2002) promoting a four-stage process to complete the AA, and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in Figure 2-1. Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

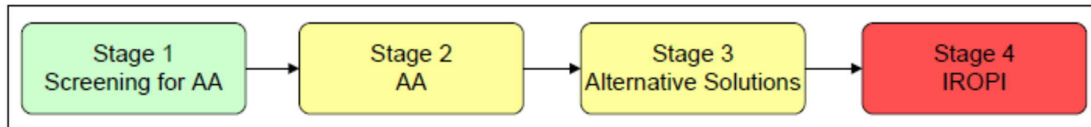


Figure 2-1: Four Stages of Appropriate Assessment

2.1.1 Stage 1 – Screening for Appropriate Assessment

Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

Whether a plan or project is directly connected to or necessary for the management of the site, and whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a European site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). Screening should be undertaken without the inclusion of mitigation, unless potential impacts clearly can be avoided through the modification or redesign of the plan or project, in which case the screening process is repeated on the altered plan. The greatest level of evidence and justification will be needed in circumstances when the process ends at screening stage on grounds of no impact.

2.1.2 Stage 2 – Appropriate Assessment (Natura Impact Statement)

The aim of Stage 2 of the AA process is to identify any adverse impacts that the plan or project might have on the integrity of relevant European sites. As part of the assessment, a key consideration is ‘in combination’ effects with other plans or projects. Where adverse impacts are identified, mitigation measures can be proposed that would avoid, reduce or remedy any such negative impacts and the plan or project should then be amended accordingly, thereby avoiding the need to progress to Step 3.

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The proponent of the plan or project will be required to submit a Natura Impact Statement, i.e. the report of a targeted professional scientific examination of the plan or project and the relevant European sites, to identify and characterise any possible implications for the site in view of the site’s conservation objectives, taking account of in-



combination effects. This should provide information to enable the public authority to carry out the AA.

The information required in a Natura Impact Statement, is outlined in Regulation 42(5) (a) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) as amended, as follows:

A Natura Impact Statement shall, in addition to addressing the issues referred to in the interpretation contained in Regulation 2(1), include such information or data as the public authority considers necessary, and specifies in a notice given under paragraph (3), to enable it to ascertain if the plan or project will affect the integrity of the site.

Where appropriate, a Natura Impact Statement shall include, in addition—

- i. the alternative solutions that have been considered and the reasons why they have not been adopted,
- ii. the imperative reasons of overriding public interest that are being relied upon to indicate that the plan or project should proceed notwithstanding that it may adversely affect the integrity of a European site,
- iii. the compensatory measures that are being proposed.

If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to Stage 3, or the plan or project should be abandoned. The competent authority must make a determination to that effect before proceeding to the next stage.

2.1.3 Guidance

This Screening for AA and NIS report has been prepared with regard to the relevant provisions of the EU Council Directive 92/43/EEC and Ireland's EU (Birds and Natural Habitats) Regulations 2011 (as amended).

The methodology followed for this assessment has had regard to the following guidance and legislation:

- DoEHLG (2009, rev. 2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government;
- DoEHLG Circular NPWS 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities;
- European Commission (EC) (2018), Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats Directive' 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission;
- EC (2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission;



- EC (2021) Assessment of Plans and Projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC;
- EC (2007a) Guidance document on Article 6(4) of the ‘Habitats Directive’ 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission;
- EC, (2007b), Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC. European Commission;
- EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission;
- Inland Fisheries Ireland (2021a). Guidance Notes for AA Screenings in the Vicinity of Watercourses;
- Inland Fisheries Ireland (2021b). Guidance Notes for Natura Impact Statements (NIS) in the Vicinity of Watercourses;
- Chartered Institute of Ecology and Environmental Management (CIEEM) Version 1.1 (September 2019), Guidelines for Ecological Impact Assessment in the UK and Ireland;
- NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report;
- NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report;
- Office of the Planning Regulator (OPR) (2021) Practice Note PN01 – Appropriate Assessment Screening for Development Management.
- Brew, T., Gilligan, N. (2019) Environmental Guidance: Drainage Maintenance and Construction. Series of Ecological Assessments on Arterial Drainage Maintenance No 13. Environment Section. Office of Public Works, Trim, Co. Meath, Ireland;
- Office of Public Works (OPW) (2011) The Office of Public Works Arterial Drainage Maintenance Service Environmental Management Protocols & Standard Operating Procedures;
- The European Communities (Birds and Natural Habitats) Regulations 2011 as amended;
- The Planning and Development Act 2000 as amended;
- The Planning and Development Regulations 2001 as amended; and
- Recent Irish and European case law on the Habitats Directive.

2.1.4 Information Consulted for this Report

This assessment has been informed by the following sources of data:

- Information on the location, nature and design of the proposed project as provided by the client;
- Department of Housing, Planning, Community and Local Government (DHPCLG) online land-use mapping (www.myplan.ie/en/index.html);
- Office of Public Works (OPW) National Flood Hazard Mapping website (www.floodmaps.ie);
- Review of the National Biodiversity Data Centre (NBDC) webmapper <https://maps.biodiversityireland.ie/Map>



- Geological Survey of Ireland – National Draft Bedrock Aquifer map;
- Geological Survey of Ireland – Groundwater Database (www.gsi.ie);
- Environmental Protection Agency (EPA) geoportal mapping tool (<https://gis.epa.ie/EPAMaps/>);
- National Parks and Wildlife Service protected site and species information and data (<https://www.npws.ie/protected-sites>);
- Spatial data in respect of Article 17 reporting, available online at <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17>.
- Spatial data in respect of Article 12 reporting, available online at <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-12-data>.
- National Biodiversity Data Centre (www.biodiversityireland.ie); and
- Ordnance Survey of Ireland mapping and aerial photography (www.osi.ie).



3 EUROPEAN SITES

3.1 European Sites within the Project Zone of Influence

This stage of the screening for AA process describes European Sites within the Zone of Influence (Zoi) of the proposed project.

Section 3.2.3 of the Guidance for Planning Authorities (DoEHLG, 2010) states that the approach to Appropriate Assessment screening can be different for different plans and projects depending on the scale of the plan, project or programme and the likely associated effects. The overriding criteria determining whether a European Site will be impacted and potentially consequently effected by a proposal is the distance between proposal and a European Site and whether there are pathways for effect linking the proposal to European Sites.

Both UK (Scott Wilson et al., 2006) and Irish guidance (DoEHLG, 2010) outline that a distance of 15km may suffice as a likely Zone of Impact (Zoi) in the case of plans on European Sites and may be sufficient to cover the geographic extent over which significant ecological effects are likely to occur. However for certain projects, the DoEHLG (2010) guidance recognises that the likely Zoi could be 'much less than 15km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects'.

Recent guidance from Office of the Planning Regulator (2021) indicates that the zone of influence for a proposal is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European Site. This guidance indicates that the zone of influence should be established on a case-by-case basis using the Source-Pathway-Receptor framework. Using the Source » Pathway » Receptor approach and having regard for the location, the nature of the works, and the small size and scale of the works, it is considered for the purpose of this assessment that the likely Zoi on European Sites is the zone immediately around the proposed works and ancillary works, in addition to any sites with a hydrological connection downstream of the works and/or with an ecological connection, where distance would be dependent on the qualifying interests of the site. To that end the following sites are located within the Source» Pathway » Receptor zone of influence of the proposed works

- Lower River Shannon SAC (002165); and
- River Shannon and River Fergus Estuaries SPA (004077).

The assessment of connectivity between the European Sites and the proposed works follows the potential source-pathway-receptor model, which identifies the source of likely significant impacts, if any, the pathway (land, air, hydrological, hydrogeological pathways, etc) along which those impacts may be transferred from the source to the receiving environmental receptors (i.e. European Sites and/or features for which the sites are designated).

Where it is evident that there is no connectivity between the proposed work and receptors (i.e. European Sites and/or features for which the sites are designated), the receptors are excluded from the AA process. Similarly, where connectivity exists between the proposed work and receptors but is



deemed not to result in likely significant effects to the receptor, the receptor can be screened out (i.e. likely significant effects to receptors excluded; receptor not considered further in AA process).

In contrast to the above, where it is not possible to exclude likely significant effects on the basis of best scientific knowledge, a more detailed scientific assessment of the proposed works is required which focuses on the European Sites likely to be affected and the relevant designated feature in question.

The integrity of a European Site (referred to in Article 6.3 of the EU Habitats Directive) is determined based on the Conservation Status of the features (habitats and/ or species) for which SACs and SPAs are designated. The Qualifying Interests (QI) and Special Conservation Interests (SCIs) for protected sites have been obtained through a review of the Conservation Objectives documents available from the NPWS website www.npws.ie.

Figure 3-1 shows the European sites within the Zone of Influence of the proposed works. Table 3-1 itemises the features of qualifying interest and details on the distance and connectivity of European Sites within the zone of influence of the proposed works.



Table 3-1: European Sites within the zone of influence of the proposed works

Site Code	Site Name	Features of Qualifying Interest (SAC) / Special Conservation Interest (SPA)	Distance from Study Area	Connectivity
002165	Lower River Shannon SAC	1029 Freshwater Pearl Mussel <i>Margaritifera margaritifera</i> 1095 Sea Lamprey <i>Petromyzon marinus</i> 1096 Brook Lamprey <i>Lampetra planeri</i> 1099 River Lamprey <i>Lampetra fluviatilis</i> 1106 Atlantic Salmon <i>Salmo salar</i> (only in fresh water) 1110 Sandbanks which are slightly covered by sea water all the time 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1150 *Coastal lagoons 1160 Large shallow inlets and bays 1170 Reefs 1220 Perennial vegetation of stony banks 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 1310 Salicornia and other annuals colonizing mud and sand 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) 1349 Bottlenose Dolphin <i>Tursiops truncatus</i> 1355 Otter <i>Lutra lutra</i> 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	Adjoins the southern extent of E16 & E17. Partially overlaps E14 & E9 for ca. 2.0km Overlaps E1 downstream of Bunratty	Potential for direct and indirect connectivity due to the proximity and partial overlap between some of the works with this European Site.



Site Code	Site Name	Features of Qualifying Interest (SAC) / Special Conservation Interest (SPA)	Distance from Study Area	Connectivity
		3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) 91E0 *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)		
004077	River Shannon and River Fergus Estuaries SPA	A017 Cormorant <i>Phalacrocorax carbo</i> breeding + wintering A038 Whooper Swan <i>Cygnus cygnus</i> wintering A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> wintering A048 Shelduck <i>Tadorna tadorna</i> wintering A050 Wigeon <i>Anas penelope</i> wintering A052 Teal <i>Anas crecca</i> wintering A054 Pintail <i>Anas acuta</i> wintering A056 Shoveler <i>Anas clypeata</i> wintering A062 Scaup <i>Aythya marila</i> wintering A137 Ringed Plover <i>Charadrius hiaticula</i> wintering A140 Golden Plover <i>Pluvialis apricaria</i> wintering A141 Grey Plover <i>Pluvialis squatarola</i> wintering A142 Lapwing <i>Vanellus vanellus</i> wintering A143 Knot <i>Calidris canutus</i> wintering A149 Dunlin <i>Calidris alpina</i> wintering A156 Black-tailed Godwit <i>Limosa limosa</i> wintering A157 Bar-tailed Godwit <i>Limosa lapponica</i> wintering	250 metres downstream of E14 and E9. 760 metres downstream of E16 & E17 Overlaps E1 and Sluice SL1	Potential for direct and indirect connectivity due to the proximity and partial overlap between some of the works with this European Site.



Site Code	Site Name	Features of Qualifying Interest (SAC) / Special Conservation Interest (SPA)	Distance from Study Area	Connectivity
		A160 Curlew <i>Numenius arquata</i> wintering A162 Redshank <i>Tringa totanus</i> wintering A164 Greenshank <i>Tringa nebularia</i> wintering A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> wintering A999 Wetlands		

The proposed works are partially located within the bounds of Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. As a result these is the potential for direct and indirect connectivity. Given the overlap and potential indirect interconnectivity with these European Sites, potential impacts and consequent effects are considered further in the below text.

Finally, the proposed works support remote and extremely tenuous connectivity with European Sites within the lower, coastal sections of the River Shannon catchment; the Kerry Head Shoal SAC (ca. 83km downstream) and the Loop Head SPA (ca. 81km downstream). Given the nature and scale of the proposed works, the attenuation capacity of the large estuarine waterbody of the Shannon Estuary and the remote and extremely tenuous connectivity between the proposed works and these European Sites, potential for impacts and consequent likely significant effects are not possible.

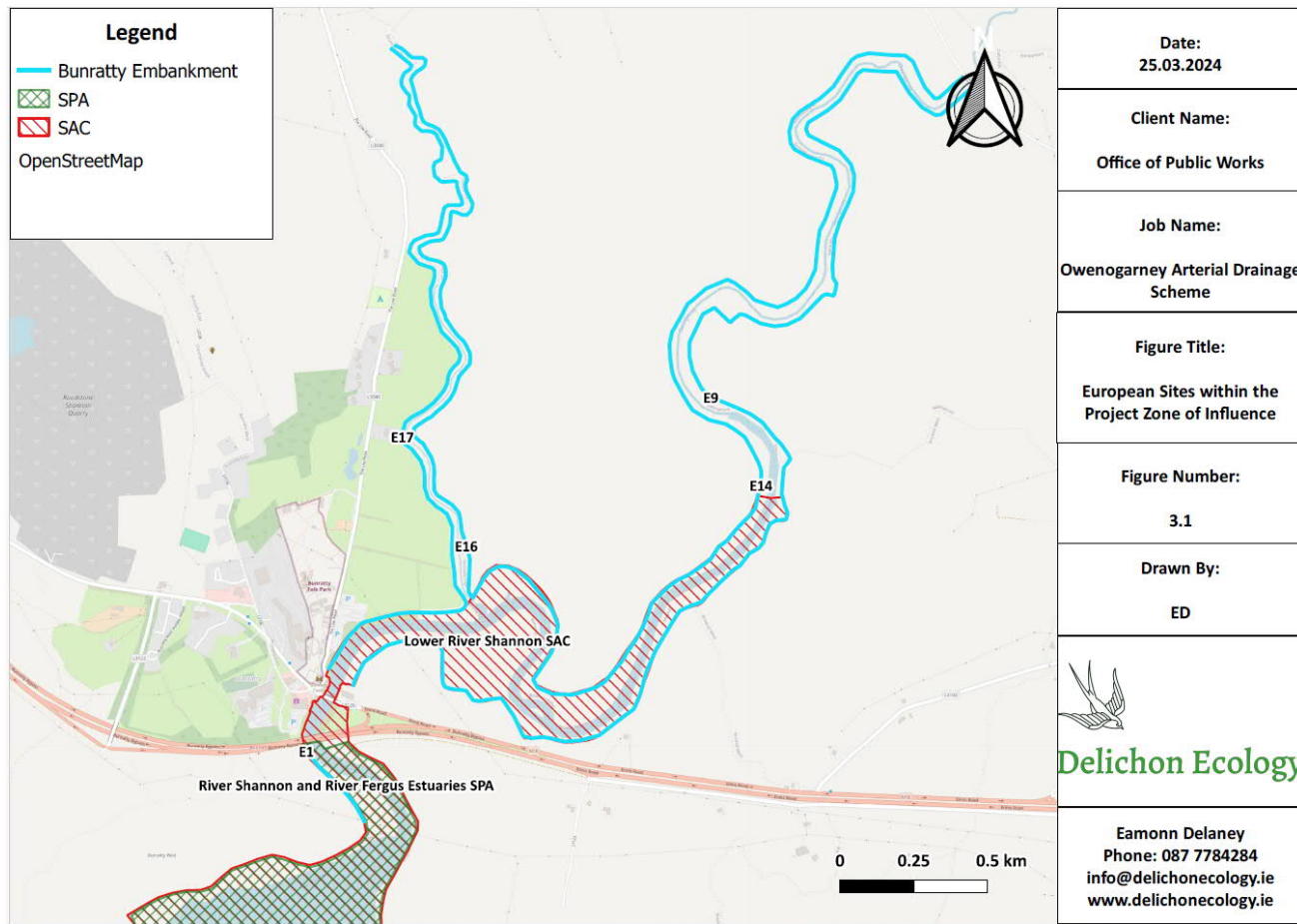


Figure 3-1: European Sites within the zone of influence of the proposed works



3.1.1 European Site Descriptions

Site descriptions for European Sites within the project ZOI are presented below.

3.1.1.1 Lower River Shannon SAC (Site Code: 002165)

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush (NPWS, 2013)¹.

3.1.1.2 River Shannon and River Fergus Estuaries SPA (Site Code: 004077)

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries (NPWS, 2015)².

3.1.2 Conservation Objectives of European Sites

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas designated as SAC and SPA. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

Favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing; and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- The conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;

¹ <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002165.pdf>

² <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004077.pdf>



- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The integrity of a European site (referred to in Article 6.3 of the EU Habitats Directive) is determined based on the conservation objectives and of the site. The Qualifying Interests (QI) and Special Conservation Interests (SCI) are obtained through a review of the most recently published (web-published or otherwise) Conservation Objective supporting documents and Site-Specific Conservation Objectives documents (where available) for the European site.

3.1.2.1 Conservation Objectives of European Sites within the proposed development's Zone of Influence

The Qualifying habitats and species of Interest for those European Sites within the project ZOI are listed in Table 3-1. Further details on Conservation Objectives for these European Sites are provided below.

Lower River Shannon SAC

The Site-Specific Conservation Objectives for the Lower River Shannon SAC are provided in the Conservation Objectives document available on the NPWS website, as follows;

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf

River Shannon and River Fergus Estuaries SPA

The Site-Specific conservation objectives for River Shannon and River Fergus Estuaries SPA are provided in the Conservation Objectives document available on the NPWS website, as follows;

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf



4 EXISTING ENVIRONMENT

4.1 Features of Ecological Interest within the Study Area

4.1.1 Habitats

The study area is located on the riparian fringes and embankment areas of the Cloverhill_010 stream and the Owenogarney River, upstream of Bunratty (See Figure 1.1), with smaller localised areas of works around a small stretch of embankment (ca 150m) and a sluice immediately downstream of Bunratty to the west / south-west of the Owenogarney watercourse (See Figure 1.2).

Site walkover surveys of the proposed works areas were undertaken on March 21st and March 29th 2024. The habitats within the survey area and environs comprise grazed or maintained improved agricultural grassland (GA1) on the embankment footprint and primarily, on the dry side of the embankment. The wet side of the embankment, i.e. the areas of ground adjoining the Cloverhill_010 stream comprise wet grassland that has developed on areas that are periodically flooded or inundated. The wet side of the embankment fringing the Owenogarney River supports extensive reed and large sedge swamp (FS1) and wet grassland habitats with fringing areas of reed and large sedge swamp and localised areas of lower saltmarsh (CM2) at the lower / downstream areas of the river.

The Cloverhill_010 stream is fringed by Embankment E17 to the west and embankment E16 to the east. Embankment E17 is adjoined by relatively open semi-improved agricultural grassland which supports localised abundances of common rush on poorer draining ground and intermittent hedgerow and treeline habitats along the field boundaries. The E17 embankment footprint and the dry side of the embankment support improved grassland that is seasonally grazed by livestock and rutted / poached locally. Plant species composition includes the normal suite of improved grassland grasses and forbs including perennial rye grass (*Lolium perenne*), creeping bent (*Agrostis stolonifera*), Yorkshire fog (*Holcus lanatus*), creeping buttercup (*Ranunculus repens*), nettle (*Urtica dioica*), broadleaved dock (*Rumex obtusifolius*) and white clover (*Trifolium repens*). The lower lying wetter side of the embankment supports inundation type wet grassland habitat, which is covered for some time by the Cloverhill Stream_010 during flood periods. Plant species composition includes creeping bent, creeping buttercup, floating sweet grass (*Glyceria fluitans*), common sedge (*Carex nigra*), meadowsweet (*Filipendula ulmaria*), curled dock (*Rumex crispus*) and occasional marsh marigold (*Caltha palustris*) and water forget-me-not (*Myosotis scorpioides*). The embankment footprint and environs support occasional and localised bramble (*Rubus fruticosus* agg.) scrub growth, some of which had been cut back prior to the field survey in addition to individual occurrences of hawthorn (*Crataegus monogyna*) and grey willow (*Salix cinerea*) shrubs and trees.

Embankment E16 is located along the eastern side of the Cloverhill_010 stream. The embankment varies slightly from E17 in that it is adjoined by a back drain (FW4) for the majority of its course, in addition to large sections of the embankment being fenced off from the adjoining pastoral lands. Near the northern extents of the embankment, the footprint supports rough and recently unmanaged improved grassland evidenced by the proliferation of rough tussocky grasses including cock's-foot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*) and false oat grass (*Arrhenatherum elatius*). The wet side of the embankment supports linear dry meadows and grassy verge grassland in transition to and in mosaic with scrub (WS1). The eastern edge or dry side of the embankment supports a wet grassland / improved grassland mosaic that in turn is adjoined by a water filled drainage channel



invariably fringed by bramble scrub, occasional grey willow and hawthorn and linear reed and large sedge swamp (FS1), comprising common reed (*Phragmites australis*). Instream and fringing aquatic species are localised and include jointed rush (*Juncus articulatus*), water horsetail (*Equisetum fluviatile*), common marsh bedstraw (*Galium palustre*), floating sweet grass, water forget-me-not and water cress (*Nasturtium officinale* agg.). Further south, the fenced off areas of the embankment support species poor dry meadows and grassy verge grassland (GS2), with some large areas of this habitat adjoining pronounced meanders of the river's trajectory. Continuing south, the embankment and adjoining lands vary between improved grassland habitats on areas that have not been fenced off from adjoining pastoral lands, in addition to rough improved grassland in transition to dry meadows and grassy verge grassland on areas that have more recently been fenced off. The wet side of the embankment supports wet grassland on the lower lip adjoining the Cloverhill_010 stream and corresponds to the inundation type wet grassland described for E16.

The main channel of the Owenogarney_010 watercourse is a large tidal river near its downstream reaches; i.e. areas upstream and downstream of Bunratty and the N18 road crossing. The river waterbody is slow moving and is adjoined by muddy / sandy riverbank substrate, the majority of which is lined by reed and large sedge swamp habitat. The cover of this habitat fringing the main channel of the river increases and decreases in accordance with the trajectory of the watercourses and the associated water velocity. The most extensive sections of this habitat are located at the most downstream sections of the study area and upstream of Bunratty village and at its confluence with the Cloverhill_010 stream. The Owenogarney_010 river is fringed to the north and west by Embankment E14 and to the south and east by Embankment E9. The lower stretches of both embankments are located on lower lying expansive terrain and are adjoined by improved, slightly wet agricultural grassland. Both embankments at this location are grazed and are adjoined by improved grassland along the dry side of the embankment. Both embankments are adjoined by back drains for the majority of their route.

The northernmost extent of Embankments E9 and E14 are located immediately downstream of D'Esterre's Bridge. The Owenogarney watercourse in this location is not tidal and is narrower and more sinuous when compared with the lower areas near Bunratty, but is fringed intermittently by reed and large sedge swamp, comprising common reed. The northernmost sections of both embankments support improved agricultural grassland used by livestock for grazing and transport purposes, resulting in localised rutting and poaching. The northernmost sections of E9 support discontinuous lines of crack willow, hawthorn and localised bramble. The footprint of embankments E9 and E14 and their adjoining dry sides support improved grassland as described and are adjoined by a drainage channel with fringing common reed, bramble scrub and occasional hawthorn. The main channel of the Owenogarney River supports a thin fringe of wet grassland at the base of the embankment, which in turn is adjoined by a strip of common reed dominated reed and large sedge swamp.

The lower reaches of the Owenogarney River, upstream and downstream of Bunratty are fringed by a mosaic of reed and large sedge swamp and upper saltmarsh vegetation. The upper saltmarsh areas comprise couch grass (*Elytrigia repens*), red fescue (*Festuca rubra*), creeping bent, yellow iris (*Iris pseudacorus*), common scurvygrass (*Cochlearia officinalis* agg.), sea milkwort (*Glaux maritima*), sea aster (*Aster tripolium*) saltmarsh grass (*Puccinellia maritima*) and localised common reed. These habitats occur in mosaic with and transition to wet grassland nearer the embankment edge. The wet



grassland areas support creeping bent, floating sweet grass, common sedge and locally frequent common rush.

Embankment E1 supports improved grassland as previously described, with localised areas of bramble growth and young gorse (*Ulex europaeus*) growth and ruderal regrowth following livestock poaching and rutting. The dry side of the embankment supports semi-improved and localised wet improved agricultural grassland with an adjoining back drain. Access to the proposed E1 works areas will be through an unmanaged pastoral field which is fringed by a maturing beech (*Fagus sylvatica*), ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and lime (*Tilia* sp.) treeline, with younger pubescent birch (*Betula pubescens*) and alder (*Alnus glutinosa*) trees fringing the roadway. The pastoral field supports dense tussocky grasses with localised areas of recently deposited construction waste and locally disturbed ground. Plant species composition includes cock's-foot, false oat grass (*Arrhenatherum elatius*), foxtail (*Alopecurus pratensis*), nettle, hogweed (*Heracleum sphondylium*), lord's and ladies (*Arum maculatum*), creeping buttercup, dandelion (*Taraxacum* agg.) and localised beds of bramble. The understory of the treeline supports locally abundant butterbur (*Petasites hybridus*) with cow parsley (*Anthriscus sylvestris*) and lesser celandine (*Ficaria verna*).

Invasive plant species listed on the Third Schedule of the Birds and Natural Habitats Regulations 2011 (as amended) were not identified within the proposed development site or its immediate environs during the site walkover surveys. The BSBI and NPWS hold records for vascular plant species protected under the Flora Protection Order 2022, triangular club rush (*Schoenoplectus triquetus*), from the study area environs; i.e. 2.5km upstream of Bunratty along the riparian area of the Owenogarney River east of embankment E9. This species was not identified within the proposed embankment and proposed sluice replacement works areas or along the access routes, haul routes and adjoining embankments. It should be noted that the triangular club rush is an estuarine species, associated with tidal mud and creeks, such as those associated with the fringes of the Owenogarney River. The embankment repair works along both the Owenogarney and Cloverhill watercourses will be retained to the embankment and the terrestrial / dry side of the embankment, removing the potential for direct or indirect disturbance or displacement of this species.

The lower reaches of the Owenogarney River correspond with tidal rivers, a large brackish watercourse with fluctuating salinity levels. The Owenogarney River is fringed locally by areas of upper saltmarsh (CM2) in mosaic with reed and large sedge swamp (FS1) and the channel margins reveal muddy substrate at low and falling tide. The estuarine, mudflat and saltmarsh habitats located on the lower reaches of the wet side of the embankment correspond to the following Annex I habitat classification, which are features of qualifying interest for the Lower River Shannon SAC:

- Estuaries Estuaries (1130)
- Saltmarsh (1310) Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) (1330)
- Mudflat Mudflats and sandflats not covered by sea water at low tide (1140)

The works access areas are primarily located on expansive improved grassland near and adjoining the embankment and sluice gate infrastructure.

Photos of the study area and environs are presented in Section 4.1.3 below. Habitat mapping of the proposed works footprint and adjoining areas are presented in Appendix B.



4.1.2 Fauna

No signs of otter breeding sites (couches) or ongoing usage was identified during the site walkover survey. This may reflect poor quality holting opportunities along the embankment corridor (typically open banks with widespread grazing / trampling by livestock) (Mason & Macdonald, 2009)³. Nonetheless, the adjoining watercourses areas provide suitable foraging and commuting activity for otter, and it is likely that otter use the fringes of the embankment areas for foraging, commuting or habitat refuge. Otter prints were identified along the northernmost fringes of the Cloverhill_010 stream, on an area of soft mud adjoining the main channel of the stream. In addition, otter footprints were identified on soft estuarine mud under the N18 road bridge, upstream of E1. Otter holts, lay-ups or couches were not identified along the proposed sluice replacement works area, the E1 embankment footprint or the surrounding areas.

Badger setts or latrines were not identified during the site walkover surveys within the embankment footprint or its immediate environs. It is thought that the embankment structures are too exposed and disturbed to support viable badger breeding sites. Nonetheless, badger foraging activity was noted (as evidenced by a badger footprint on mud) along the environs of embankment E14, downstream of D’Esterre’s bridge.

Avifauna identified within the embankment and adjoining habitats during the site walkover surveys are presented in Table 4.1 below. This represents a typical range of avian fauna associated with open expansive improved grassland and those adjoining riparian of the Owenogarney_010, Cloverhill_010 and estuarine areas of the Owenogarney watercourse.

Table 4-1: Avifauna within the study area and environs

Species ⁴	Comment
Meadow Pipit <i>Anthus pratensis</i>	Foraging along the embankment margins.
Mallard <i>Anas platyrhynchos</i>	Flushed from the Cloverhill_010 stream and Owenogarney main channel.
Teal <i>Anas crecca</i>	Flushed in small numbers from the Cloverhill_010 stream and Owenogarney main channel.
Snipe <i>Gallinago gallinago</i>	Flushed from the wet grassland habitat fringing and adjoining the embankments.
Cormorant <i>Phalacrocorax carbo</i>	Overflying the Owenogarney main river channel.
Reed Bunting <i>Emberiza schoeniclus</i>	Calling and holding territory along the reed and large sedge swamp fringing the Owenogarney_010 watercourse.
Robin <i>Erithacus rubecula</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Hooded Crow <i>Corvus corone</i>	Overflying the study area.

³ Mason, C. F., & Macdonald, S. M. (2009). Otters: ecology and conservation. Cambridge University Press.

⁴Conservation status assigned by ‘traffic light’ system of colour coding, in accordance with the Birds of Conservation Concern in Ireland (Gilbert et al., 2021). Gilbert G, Stanbury A and Lewis L (2021), “Birds of Conservation Concern in Ireland 2020 –2026”. Irish Birds 9: 523–544.

Red-listed species are of high conservation concern in Ireland, Amber-listed species are considered of medium conservation concern, while Green-listed species are not of conservation concern in Ireland at present.



Species ⁴	Comment
Stonechat <i>Saxicola torquatus</i>	Foraging and holding territory along the embankment margins.
Goldfinch <i>Carduelis carduelis</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Wren <i>Troglodytes troglodytes</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Blackbird <i>Turdus merula</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Coal Tit <i>Periparus ater</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Great Tit <i>Parus major</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Blue Tit <i>Cyanistes caeruleus</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Chaffinch <i>Fringilla coelebs</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Dunnock <i>Prunella modularis</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Rook <i>Corvus frugilegus</i>	Overflying the study area and foraging along the nearby linear woodland habitats.
Woodpigeon <i>Columba palumbus</i>	Overflying the study area and foraging along the nearby linear woodland habitats.
Skylark <i>Alauda arvensis</i>	Holding territory along adjoining pastoral lands.
Little Egret <i>Egretta garzetta</i>	Foraging within the Owenogarney main channel and overflying the Cloverhill_010 stream.
Song Thrush <i>Turdus philomelos</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Robin <i>Erithacus rubecula</i>	Foraging along the embankment margins and nearby linear woodland habitats.
Buzzard <i>Buteo buteo</i>	Calling, soaring – off site
Grey Heron <i>Ardea cinerea</i>	Foraging within the Owenogarney main channel.
Pied Wagtail <i>Motacilla alba yarrelli</i>	Foraging along the embankment margins.



4.1.3 Photos

Photos of the study area is presented below.



Image 4-1: E17 near the Owenogarney watercourse looking north



Image 4-2: E17 improved grassland on embankment and fringes looking north



Image 4-3: E17 with recently cut bramble on embankment and adjoining expansive improved grassland



Image 4-4: E16 Northernmost fringes with rough improved grassland on the embankment footprint



Image 4-5: E16 Improved grassland and adjoining wet grassland near the southern extent



Image 4-6: E14 Expansive common reed fringing the Owenogarney river



Image 4-7: E14 Improved grassland on embankment footprint with fringing linear reed and large sedge swamp



Image 4-8: E14 Improved grassland on embankment footprint with fringing linear reed and large sedge swamp



Image 4-9: E9 – Poached / rutted GA1 on embankment footprint and fringing areas



Image 4-10: E9 – Poached / rutted GA1 on embankment footprint and fringing area



Image 4-11: E9 – improved grassland on embankment footprint fringed by wet grassland and reed and large sedge swamp



Image 4-12: E9 – Reed and large sedge swamp fringe of along the southern bounds of the Owenogarney River



Image 4-13: E9 Improved grassland and fringing upper saltmarsh / reed fringe upstream of Bunratty



Image 4-14: E14 Rutted embankment, reed fringe and improved grassland upstream of Bunratty





Image 4-15: E1 looking downstream of Bunratty road bridge



Image 4-16: E1 Owenogarney River adjoining E1 downstream of Bunratty





4-19: E1 Downstream sluice gate proposed for replacement	Image 4-18: E1 view of eroded river channel adjoining sluice
	
Image 4-19: Otter footprints under the N18 roadbridge, upstream of Embankment E1	Image 4-20: Badger footprints along the fringes of E14, downstream of D’Esterre Bridge

4.2 Geology, Hydrology and Hydrogeology

The Geological Survey of Ireland (GSI) online database was consulted for available edaphic, geological and hydrological information of the site and its environs. The underlying bedrock of the Owenogarney River and riparian area is underlain by Lower Limestone Shale, which supports sandstone, mudstone & thin limestone. The northern fringes of the survey areas, including much of E16 & E17 are located on the Ballysteen Formation comprising Dark muddy limestone, shale. The groundwater vulnerability of the area surrounding the proposed works is primarily classified as “Low” along the lower stretches of the Owenogarney River and riparian area, while the northern extent of the study area is classified as “Moderate”. There are no karst features within the study area or its immediate surrounds. Bedrock aquifer maps published on the GSI website provide a detailed classification of bedrock aquifer types and indicate the bedrock aquifer beneath the Owenogarney River and riparian area is described as PI Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones, while the surrounding area is classified as LI Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones.

The study site is located within the ‘Tulla-Newmarket on Fergus’ GroundWater Body (GWB) (IE_SH_G_229). This GroundWater Body’s Water Framework Directive (WFD) status was classified as ‘Good’ in 2016-2021 at meetings its objectives under the Water Framework Directive. This groundwater body risk is classified as ‘Not at Risk’ of meeting its objectives under the Water Framework Directive.

Groundwater and surfacewater interactions of this GroundWater Body is described as follows ‘Due to the shallow groundwater flow in this aquifer the groundwater and surface waters are closely linked. The streams crossing the aquifer are gaining although, since aquifer storage is low, significant summer baseflows to the rivers cannot be sustained in most areas. Groundwater also discharges to springs. Several ecosystems in the area are thought to be at least partially dependent on groundwater. For



example, Doon Lough (000337) is a large lake system with a variety of fringing habitats which include scrub, woodland, marsh, wet grassland and raised bog. Fin Lough (001010) Ballycar Lough (000015) are small to medium sized calcareous lakes fringed with good examples of fen, marsh, raised bog, heath and scrub habitats. Lough Gash Turlough (000051) does not always dry out, and is therefore of interest as an end-member example of turlough ecosystems. Water within the system comes from surface flow as well as groundwater. The Fergus Estuary is very large estuarine complex, consisting of swamps, salt marsh, wet marsh habitats and mudflats. The groundwater contribution from this GWB will be small compared with flux from the karstic Ennis and Kilkishen GWBs⁵.

⁵ <https://gsi.geodata.gov.ie/downloads/Groundwater/Reports/GWB/TullaNewmarketOnFergusGWB.pdf>



5 STAGE 1 - SCREENING FOR APPROPRIATE ASSESSMENT

This section provides the information required for the competent authority (OPW) to undertake a Screening for AA and determine in view of best scientific knowledge, whether the proposed works, individually or in combination with other plans and projects, is likely to have a significant effect on the European site. Specifically, it aims to:

Provide information on, and assess the potential for the proposed works to significantly impact on European sites; and

Determine whether the activities proposed, alone or in combination with other projects, are likely to have significant effects on European sites in view of their Conservation Objectives.

This screening assessment provides information to address the following elements:

1. Description of the plan or project, and local site or plan area characteristics. The description covers the full scope of the proposed plan or project (i.e. deconstruction phase and operational phase).
2. Description of the receiving environment setting of the proposed plan or project and its surrounds.
3. Identification of relevant European sites within the projects the potential zone of influence. A preliminary assessment to determine connectivity between the proposed works and receptors (i.e. European sites and/ or features for which the sites are designated). Where connectivity exists, the receptors in question are brought forward in the screening assessment process.
4. For receptors that exhibit potential connectivity to the proposed work a screening assessment is undertaken to establish whether the plan or project is likely to have a direct, indirect or cumulative effect on receptors based on a consideration of likely impacts (i.e. an assessment of significance of effect).
5. Screening statement with conclusions on whether or not an AA is necessary for the relevant Qualifying Feature of Interest.

Table 5-1 presents Screening Assessment Criteria considering the proposed works.

Table 5-1: Screening Assessment Criteria

Screening Assessment Criteria Screening Questions	Impacts
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Sites.	The Lower River Shannon SAC adjoins the southern extent of E16 & E17 and partially overlaps embankments E14 & E9 and adjoins / intersects E1 downstream of Bunratty. The River Shannon and River Fergus Estuaries SPA is located 250 metres downstream of E14 and E9, 760



Screening Assessment Criteria Screening Questions	Impacts
	<p>metres downstream of E16 & E17 and intersects E1 (and proposed sluice replacement works) downstream of Bunratty.</p> <p>Given this proximity and interconnectivity connectivity (and viable source-pathway-receptor dynamic) between the proposed works and these European Sites, there is the potential for impacts possibly contributing toward negative effects, through vectors such as the operation of machinery and personnel within and nearby these European Sites, in the absence of best practice measures during the works.</p>
Likely direct, indirect or secondary impacts of the project on the European Sites:	
<ul style="list-style-type: none"> • Size and Scale 	<p>The size and scale of the proposed works are localised when compared with the surrounding environment and the size of European Sites within the project Zone of Influence.</p>
<ul style="list-style-type: none"> • Land Take 	<p>Sections of the proposed works adjoin, overlap and are located upstream of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, representing potential direct and indirect connectivity to these European Sites. The proposed works are unlikely to require or contribute land-take within these European Sites as it is proposed to replace and upgrade existing built embankments, sluice gates and eroded flood protection infrastructure.</p>
<ul style="list-style-type: none"> • Distance from European Sites or Key Features of the Site 	<p>The proposed works partially adjoin, overlap and are partially located within the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, representing potential direct and indirect connectivity to these European Sites.</p>
<ul style="list-style-type: none"> • Resource Requirements 	<p>The proposed works will require the use of standard construction methods, including tracked machinery and hand-held tools, use of aggregates, imported soil and localised targeted use of precast and wet cement (for sluice replacement works along E1). The works will be localised and controlled to the works footprint.</p> <p>The uncontrolled release of these resources in significant quantities to the receiving and surrounding environment could impact in-situ and downstream habitats. Furthermore, the importation of topsoil could be a vector to introduce non-native invasive plant species to the works area, with consequent impacts to the receiving and downstream environment.</p>



Screening Assessment Criteria Screening Questions	Impacts
<ul style="list-style-type: none"> • Emissions 	<p>Depending on the time of construction, there may be dust and water borne (silt laden waters, wet cement, hydrocarbons) emissions as a result of the proposed works. There will be no operational phase emissions as a result of the proposed accommodation works.</p>
<ul style="list-style-type: none"> • Excavation Requirements 	<p>Localised excavations within the works footprint will be required during the project's construction phase. The majority of such excavations will be realised on existing embankment infrastructure. Localised excavations are required for the sluice replacement works at E1 but these will be retained to existing sluice and embankment infrastructure. There will be no excavation requirements within habitats of qualifying interest for the Lower River Shannon SAC or the River Shannon and River Fergus Estuaries SPA. There will be no excavation requirements during the project's operational phase.</p>
<ul style="list-style-type: none"> • Transport Requirements 	<p>Transport requirements as part of the proposed works will utilise the existing local access roads, access tracks and improved agricultural grasslands located on the dry side of the embankment. Transport of works machinery and personnel will take place on an as needed basis.</p>
<ul style="list-style-type: none"> • Duration of construction, operation and decommissioning 	<p>The proposed works will be completed over a 6 month period, most likely during summer / autumn to ensure optimal working conditions.</p>
<ul style="list-style-type: none"> • Cumulative impact with other plans and projects in the area 	<p>As part of the AA, in addition to the proposed works, other relevant projects and plans in the area must also be considered at this stage. These plans and projects are considered further in this respect in Table 5-2 below.</p>



Table 5-2: In-combination Effects associated with the proposed works

Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
<p>Clare County Development Plan 2023 – 2029</p>	<p>CDP15.3 It is an objective of Clare County Council:</p> <p>a) To afford the highest level of protection to all designated European sites in accordance with the relevant Directives and legislation on such matters;</p> <p>b) To require all planning applications for development that may have (or cannot rule out) likely significant effects on European Sites in view of the site’s Conservation Objectives, either in isolation or in combination with other plans or projects, to submit a Natura Impact Statement in accordance with the requirements of the EU Habitats Directive and the Planning and Development Act, 2000 (as amended); and</p> <p>c) To recognise and afford appropriate protection to any new or modified SPAs or SACs that are identified during the lifetime of this Development Plan through the planning application process bearing in mind proposals for development outside of a European site may also have an indirect effect.</p> <p>CDP15.4 It is an objective of Clare County Council:</p> <p>a) To implement Article 6(3) and where necessary 6(4) of the Habitats Directive and to ensure that Appropriate Assessment is carried out in relation to works, plans and projects likely to impact on European sites (SACs and SPAs), whether directly or indirectly or in combination with any other plan(s) or project(s); and</p> <p>b) To have regard to Appropriate Assessment of Plans and Projects in Ireland – Guidelines for Planning Authorities 2009 or any updated version.</p> <p>CDP15.8 It is an objective of Clare County Council:</p> <p>a) To ensure the protection and conservation of areas, sites, species and ecological networks/corridors of biodiversity value outside of designated sites</p>	<p>The draft Clare County Development Plan 2023-2029 provides objectives outlined for the protection of the natural environmental and its component European Sites.</p> <p>Objective 15.3b states that all planning applications for development that may have (or cannot rule out) likely significant effects on European sites in view of the site’s Conservation Objectives, either in isolation or in combination with other plans or projects should be accompanied by Natura Impact Statement in accordance with the requirements of the EU Habitats Directive and the Planning and Development Act, 2000 (as amended);</p> <p>The implementation of this plan and Objectives 15.3 and 15.4 will ensure that proposed projects and plans that may have an impact on a European Site be considered for Appropriate Assessment, prior to commencement.</p>



Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
	<p>throughout the County and to require an ecological assessment to accompany development proposals likely to impact on such areas or species;</p> <p>b) To ensure that available habitat mapping is taken into consideration in any ecological assessment undertaken;</p> <p>c) To complete the Habitat Mapping of the County (in accordance with A Guide to Habitats in Ireland – The Heritage Council 2000) in order to identify and record the natural habitats of the County at a detailed level and afford appropriate protection to areas of importance as required; and</p> <p>d) To implement and monitor the actions as set out in the Clare Biodiversity Action Plan and the National Biodiversity Action Plan.</p>	
<p>Draft River Basin Management Plan for Ireland 2022 – 2027</p>	<p>The Third Cycle Draft River Basin Management Plan 2022-2027 Consultation Report has been published. This report presents a summary of the issues raised in the submissions reviewed from the public consultation on the draft River Basin Management Plan for Ireland 2022-2027. The 3rd cycle of River Basin Management Plan (RBMP) for the period of 2022-2027 is currently being prepared by Department of Housing, Local Government and Heritage (DHLGH) in line with the EU Water Framework Directive (WFD) (2000/60/EC).</p> <p>Key issues raised as part of the consultation process within the ten most prominent themes are as follows.</p> <ul style="list-style-type: none"> - Water Quality / Pollution - Agricultural Practices - Public Engagement and Awareness - Local Authority - Level of ambition 	<p>The implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each water body. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of the RBMP and achievement or maintenance of environmental objectives which will be set for the receiving water bodies will have a positive impact on water dependent habitats and species within European Sites.</p>



Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
	<ul style="list-style-type: none"> - Sewage Pollution - Department / Agency - Co-ordination - Funding - Forestry - Peat - Shellfish waters / aquaculture - Other <p>Following review of the submissions, the DHLGH will commence a review and where necessary update the draft RBMP with a view to finalisation and publication in Q3/Q4 of 2022. The SEA and AA processes will continue in parallel until finalisation and will be completed prior to adoption of the 3rd cycle plan.</p>	
<p>Inland Fisheries Ireland Corporate Plan 2021 -2025</p>	<p>IFI's Corporate Plan details the Inland Fisheries Ireland's, Vision, Mission and Values across seven strategic objectives for the period 2021 to 2025. Under each of the seven objectives a series of actions required to achieve the objectives are described, with the intended outcomes outlined. The strategic objectives outline where Inland Fisheries Ireland will focus their efforts between 2021 and 2025.</p> <p>Inland Fisheries Ireland will secure stakeholder feedback on the implementation of the Strategy mid-2023.</p>	<p>The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive in-combination effects to European sites. The implementation of this corporate plan will have a positive impact for biodiversity of inland fisheries and ecosystems. It will not contribute to in-combination or cumulative negative impacts with the proposed development.</p>
<p>EPA Licenced Facilities</p>	<p>Section 4 Discharges WP 082 - Craggaunowen Project, Company secretary, Shannon Castle Banquets & Heritage, Bunratty Castle and Folk Park, Bunratty</p> <p>Section 4 Discharges W0037 Tradaree Point E.T.P. Licensed Industry</p>	<p>EPA licenced facilities are subject to conditions and parameters associated with licencing requirements, restricting the release of polluted or contaminated materials to the receiving or</p>



Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
	<p>Section 4 Discharges WP 173 - Roadstone Wood Ltd, Bunratty Co Clare</p> <p>Section 4 Discharges WP 124a - Tim Crowe, Ministers Cross, Sixmilebridge</p>	<p>surrounding environment. Therefore, these facilities will not contribute towards significant negative effects to European Sites.</p>
<p>Latoon Creek Bridge Repair (178004)</p>	<p>To carry out the following development: Latoon Creek Bridge (Ref CL-R458-003.00) carries the R458 Regional Road over Latoon Creek on the Ardsollus River (Rine River) north of Newmarket-on-Fergus. The existing bridge deck has been assessed as sub-standard for traffic loading and is in need of replacement. The proposed works will consist of the following: a) Structural repairs to the existing substructure including bridge piers and abutments. B) Application of protective coatings to the existing substructure including bridge piers and abutments. C) Removal of the existing bridge parapet railings, footpaths and road surfacing including road markings. D) Demolition and disposal of the existing bridge deck including precast concrete beams and reinforced concrete deck slab. E) Preparation of existing bridge piers and abutments for receiving the new bridge deck. F) Construction of the new bridge deck comprising precast concrete bridge beams and reinforced concrete bridge deck/cantilevers/parapet beams including bearings and expansion joints. G) Construction of new parapet railings , road safety barrier, footpaths and road surfacing including road markings. H) Tie in of new bridge deck to existing road levels north and south of the existing bridge. I) All of the above works shall be carried out during a road closure. In accordance with the habitats Directive, Appropriate Assessment Screening has been carried out on the project</p>	<p>A Screening for AA report was prepared for this development and provided the following findings:</p> <p>The Screening report for Appropriate Assessment, based on the best available scientific information, shows that the project, including site investigations and construction works pose no likely significant risk of effects on Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA.</p> <p>It is considered that the proposed project does not require progression to second stage Appropriate Assessment.</p> <p>Based on this conclusion, we submit that the competent authority can determine that an appropriate assessment is not required, as it can be excluded, on the basis of objective scientific information, that the proposed project, individually or in combination with other plans or projects, will not have a significant effect on any European sites in light of their conservation objectives.</p>



Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
<p>Newmarket on Fergus wastewater treatment plant (221095)</p>	<p>Development at Newmarket-on-Fergus Wastewater Treatment Plant in the townland of Boheraroan, Newmarket-on-Fergus, County Clare and an associated rising main traversing the townlands of Ballyconneely, Ballynacragga, Boheraroan, Dromoland, Latoon North, Latoon South, Manusmore, Newmarket and Rathfolan, County Clare. The development will compromise proposed works within the existing Newmarket-on-Fergus Wastewater Treatment Plant, including: a. 1 No. 7.8m high storm storage tank with minimum storage capacity of 516m³, measuring approximately 11m diameter. Between 3.6m – 5.0m will be above ground level, the remainder will be buried below ground level b. New below-ground discharge pumping station with associated below-ground valve chambers and wet well c. New 4.1m high tertiary treatment system (including 2 No. tertiary filter units and flocculation tank with a volume of 8m³) d. 2 No. 2.7m high chemical storage tanks (each with a volume of 7.5m³) e. Electrical control kiosk (6.4m L x 5.2m W x 2.5m H) f. Standby generator g. Diversion of the flows from the existing final effluent pump chamber via 110m of 300mm external diameter sewer to the new discharge pumping station. The proposed development will also include: h. Construction of approximately 4.4km of 400mm diameter outfall rising main from the proposed pumping station to the proposed outfall diffuser within the River Rine i. An outfall diffuser with three diffuser heads of 225mm diameter located within the River Rine foreshore j. All ancillary works site development works including site preparation works, hardstanding, site clearance, ground levelling and site drainage as required to facilitate the development. This application is accompanied by a Natura Impact Statement (NIS).</p>	<p>The Natura Impact Statement prepared for this development provided the following conclusion:</p> <p>The mitigation measures detailed ... will ensure no adverse effects on the integrity of any European Sites in light of the Conservation Objectives.</p> <p>Based on the assessment of the proposed development alone and in combination with other projects and plans, including the implementation of mitigation measures, it can be concluded that no adverse effects on the integrity of any European sites will arise, in view of the site's conservation objectives.</p> <p>As such, the Consenting Authority is enabled to conclude that the proposed development shall not adversely affect the integrity of a European site, alone and in combination with other projects and plans (including the other elements of the project).</p>
<p>Newmarket on Fergus Polder</p>	<p>The proposed works required in the Newmarket on Fergus Polder have been split in 3 categories, which are listed below and detailed further in this document.</p>	<p>A Screening for Appropriate Assessment and Natura Impact Statement has been prepared for</p>



Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
<p>Embankment and sluice repair works</p>	<ul style="list-style-type: none"> - Embankment Refurbishment; - Sluice Repair; and - Erosion Protection. <p>It is proposed to locally raise the existing embankment crest level at several locations where it has fallen below its design level and provide resilience to high flood levels. Raising of embankments will be to a level of 4.9/5.1m OD Malin. Work will also involve restoring the embankment stability and cross section in areas where the width has reduced or weakened.</p> <p>Work will involve the importation of suitable Class 2 subsoil material and placing at any/all areas by means of mechanical excavator/s. To facilitate importation of material and refurbishment of embankments, haulage roads will be constructed in areas where none are currently present. Haulage roads will be constructed along the embankment back berm, immediately adjacent to the embankment toe and the backdrain. In certain locations where space is limited, local realignment of the backdrain network will be required.</p> <p>Subject to approval, it is intended to advance this project from Autumn 2023.</p>	<p>this project in Q3 2023. The NIS provided the following findings</p> <p>Best Practice Measures and Standard Operating Procedures for the proposed works have been identified to ensure that potential disturbance effects and potential pollutant sources are not released from the proposed works to the receiving environment. With the implementation of these measures there will be no risk of adverse effects on these Qualifying Features / Special Conservation Interests of European sites within this project's Zol. As the proposed works are located within the footprint of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, other key measures include the OPWs standard best practice environmental control measures which aim to restrict the works to the project footprint to avoid the removal or disturbance of non-target habitat outside of the works area.</p> <p>It has been concluded that the works individually or in combination with other plans and projects will not adversely affect the integrity of a European site, and there is no reasonable scientific doubt in relation to this conclusion.</p>



Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
<p>Manusmore Embankment Repair Works</p>	<p>The proposed work includes the Rock Armour of an existing E10 Embankment. The works will involve installing Geotextile along the base of the embankment and layering rock armour to re-establish the berm to protect the embankment. Approximately 60 m of Rock Armour is required.</p> <p>The site is located in the townland of Manusmore approximately 1.5km south-west of the R458. Access is via a local field gate entrance from the L7140. Works on site will typically be carried out during standard OPW hours re: 08:00 – 16:30. Embankment E10 is located next to the River Rine/ Latoon Creek, which is subject to tidal water. The flow and water levels in the channel will vary depending on recent rainfall patterns and time of year works are being undertaken. It is intended to carry out the works in Autumn 2023 onwards. Inland Fisheries will be contacted prior to any works commencing.</p>	<p>A Screening for Apprprate Assessment and Natura Impact Statement has been prepared for this project in Q3 2023. The NIS provided the following findings.</p> <p>Best Practice Measures and Standard Operating Procedures for the proposed have been identified to ensure that potential disturbance effects and potential pollutant sources are not released from the proposed works to the receiving environment. With the implementation of these measures there will be no risk of adverse effects on these Qualifying Features / Special Conservation Interests of European sites within this project's Zol. As the proposed works are located within the footprint of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, other key measures include the OPWs standard best practice environmental control measures which aim to restrict the works to the project footprint to avoid the removal or disturbance of non-target habitat outside of the works area.</p>
<p>Newmarket-on-Fergis WwTP and rising main upgrade</p>	<p>Newmarket-on-Fergus Wastewater Treatment Plant in the townland of Boheraroan, Newmarket-on-Fergus, Co. Clare and an associated rising main. The development will compromise proposed works within the existing Newmarket-on-Fergus Wastewater Treatment Plant, including: a. 1 No. 7.8m</p>	<p>A NIS was prepared for this development and considered potential adverse effects to European Sites within the project Zone of Influence and provided the following conclusions:</p>



Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
(Planning reference 221095)	high storm storage tank with minimum storage capacity. This planning application was accompanied by a Natura Impact Statement.	<p>The mitigation measures detail in Section 6 of this NIS will ensure no adverse effects on the integrity of any European sites in light of the site's conservation objectives.</p> <p>Based on the assessment of the proposed development alone and in combination with other projects and plans, including the implementation of mitigation measures, it can be concluded that no adverse effects on the integrity of any European sites will arise, in view of the site's conservation objectives.</p> <p>As such, the Consenting Authority is enabled to conclude that the proposed development shall not adversely affect the integrity of a European site, alone and in combination with other projects and plans (including the other elements of the Project).</p>
Local Planning Applications	A search of Clare County Council's online planning enquiry database ⁶ was undertaken to identify other projects and plans consented within the past five years that are proximal or within the proposed development area. A small number of applications for dwellings, dwelling extensions, upgrades and extensions to the nearby Bunratty Castle and adjoining facilities with granted	Adherence to the policies and objectives of the Clare County Development Plan 2017-2023 ensure that local planning applications and subsequent grant of planning comply with the core strategy of proper planning and sustainability

⁶



Programmes, Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Potential for In-combination Effects
	planning permission were noted. These small-scale projects are not likely to cause likely significant effects to European sites when considered in combination with the current proposal under examination, either during the construction or operational phase. There is therefore no potential for significant in-combination effects of these developments with proposed development.	and with the requirements of relevant EU Directives and environmental considerations, there is no potential for adverse in-combination effects on European Sites.



5.1.1 Conclusion of Cumulative Impact Assessment

Provided adherence to the overarching policies and objectives of the plans and programmes and best practice and mitigation measures are implemented for individual projects, there is no potential for the mentioned plans and projects to have a cumulative impact to European sites, in combination with the proposed works.

Screening Assessment Criteria is further assessed in Table 5-3 below.

Table 5-3: Screening Assessment Criteria

Screening Assessment Criteria	
Screening Questions	
Describe any likely changes to the site arising as a result of the following	
Reduction of Habitat	<p>The proposed embankment works are located upstream of, adjoin, overlap and are partially located within the Lower River Shannon SAC, while the proposed sluice replacement and embankment protection works partially overlap the River Shannon and River Fergus Estuaries SPA. This represents potential direct and indirect connectivity to these European Sites. The proposed embankment repair works footprint or adjoining habitats do not support habitats of Qualifying Interest for the Lower River Shannon SAC. The proposed sluice replacement works and adjoining rock armour works (at E1) could lead to the temporary indirect disturbance of riverbank and tidal mudflat works during the project construction phase. As a result, reduction to habitats of qualifying interest for European Sites through direct impacts, such as temporary disturbance is possible as part of the sluice replacement and embankment repair works at E1.</p> <p>In addition, given the proximity of the proposed works to habitats of qualifying interest for the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, there is the risk of indirect effects following the release of waterborne pollutants (sediments, hydrocarbons etc.) into the Owenogarney River which in turn could be transmitted to the Lower River Shannon SAC in the absence of adequate best practice construction measures.</p>
Disturbance to Key Species	<p>Given the proposed works proximity and intersection / overlap with the boundary of the River Shannon and River Fergus Estuaries SPA, there is the potential for direct and indirect disturbance to feeding, foraging and roosting avifaunal species associated with this SPA. However, the works footprint and environs do not support optimal foraging or feeding habitats for SCI species associated with the River Shannon and River Fergus Estuaries SPA and as such small numbers of species such as Teal may use the upstream areas of the Owenogarney River and its associated back channels.</p>



Screening Assessment Criteria Screening Questions	
	There is the potential for disturbance effects to occur utilising the nearby estuarine areas. It should however be noted that the proposed works are localised and targeted to existing embankment and sluice gate infrastructure.
Habitat or Species Fragmentation	The proposed embankment works are located upstream of, adjoin, overlap and are partially located within the Lower River Shannon SAC, while the proposed sluice replacement and embankment protection works partially overlap the River Shannon and River Fergus Estuaries SPA. However, the proposed works footprint and the locations for ancillary works do not support habitats of qualifying interest for which this European Site has been designated. The proposed works require the replacement / upgrade of an existing embankment and sluice gate infrastructure and therefore will not contribute habitat fragmentation to this European Site. The proposed works may however contribute towards species fragmentation, should construction works contribute to disturbance or displacement effects to foraging, feeding or commuting faunal species associated with River Shannon and River Fergus Estuaries SPA and the Lower River Shannon SAC.
Reduction in Species Diversity	The proposed works may contribute some disturbance and displacement effects associated with the proposed construction works. However such effects are not likely to result in the reduction of species diversity to European Sites within the project Zone of Influence.
Changes in Key Indicators of Conservation Value	There is the remote potential for the proposed project to contribute localised disturbance of habitats and species within the footprint and immediate environs of the proposed embankment refurbishment and sluice replacement repair works. However, it should be noted that the embankment repair works, and associated access routes will be completed on areas of improved and semi-improved grassland, which are not habitats of qualifying interest for European Sites within the project Zone of Influence. Proposed sluice replacement works will take place on existing embankment and sluice gate infrastructure.
Climate Change	The proposed works will not result in significant negative effects contributing to climate change that could in turn affect the conservation objectives of those European Sites within the project ZOI. The proposed works are localised and will not contribute significant emissions of additional greenhouse gases to the receiving and surrounding environment.
Describe any likely impacts on the European Sites as a whole in terms of Interference with key relationships that define	The proposed works may have the remote potential to provide contributory effects to European sites within the project Zone of Influence. This is due to the location of the proposed works upstream, adjoining and partially overlapping the Lower River



Screening Assessment Criteria	
Screening Questions	
the structure and function of the site;	Shannon SAC and the River Shannon and River Fergus Estuaries SPA.
Provide Indicators of Significance as a result of the identification of effects set out above in terms of;	
Loss	<p>As the proposed works are partially located within the bounds of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, there is the potential for direct and indirect loss of habitats within these European Sites. This is only possible for works associated with E1 and the downstream stretches of E9 and E14. However it should be noted the habitats within the proposed works footprint primarily comprise improved agricultural grassland, infill ground / access tracks that are locally poached and trampled from ongoing cattle grazing.</p> <p>Furthermore, there is the potential for indirect habitat loss or deterioration of the adjacent areas of these European sites from the effects of run-off or discharge into the aquatic environment through impacts such as increased siltation, nutrient release and/or contamination, particularly during the project construction phase.</p>
Fragmentation	<p>The proposed works are partially located within the bounds of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, there is the potential for direct and indirect loss of habitats within these European Sites. However, the proposed works footprint and the locations for ancillary works do not support habitats of qualifying interest for which these European Site have been designated. The proposed works require the refurbishment of existing embankment and replacement of 1 no. sluice gate infrastructure. Therefore the proposed works will not contribute fragmentation to habitats of qualifying interest to this European Site. The proposed works may however contribute towards species temporary fragmentation of foraging suitable habitat, should construction works contribute to disturbance or displacement effects to foraging, feeding or commuting faunal species associated with River Shannon and River Fergus Estuaries SPA and the Lower River Shannon SAC.</p>
Disruption	<p>The proposed sluice replacement and embankment protection works associated with E1 may result in localised disruption and disturbance of lands within the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. However, the proposed works are small scale in nature, targeted to existing sluice and embankment infrastructure and will be completed on habitats that do not correspond with habitats of qualifying interest for the Lower River Shannon SAC or key wetland habitats for the River Shannon and River Fergus Estuaries SPA.</p>
Disturbance	



Screening Assessment Criteria Screening Questions	
	There is the potential for indirect habitat loss or disruption of downstream European sites from the effects of run-off or discharge into the aquatic environment through impacts such as increased siltation, nutrient release and/or contamination, particularly during the project construction phase.
Changes to Key Elements of the Site	<p>Changes to key elements of European Sites within the project Zone of Influence are highly unlikely. However, it is considered that the proposed works may contribute towards localised effects to the receiving and surrounding environment, such as disturbance of foraging species, disturbance of adjoining, non-target habitats and the release of unattenuated aqueous emissions to downstream and adjoining areas of European Sites within the project Zone of Influence that may support habitats and species of Qualifying Interest. The proposed sluice replacement and embankment protection works associated with E1 may result in localised disruption and disturbance of lands within the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. However, the proposed works are small scale in nature, targeted to existing sluice and embankment infrastructure and will be completed on habitats that do not correspond with habitats of qualifying interest for the Lower River Shannon SAC or key wetland habitats for the River Shannon and River Fergus Estuaries SPA.</p> <p>In addition construction phase elements of the project (in particular potential overland flow of construction stage pollutants to the receiving environment or spread of invasive plant species) may have the remote potential to contribute towards negative effects that may interfere with the structure and function of European sites within the project Zol.</p>
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts are not known	It is considered that the works have the remote potential to provide contributory effects to European sites within the project Zone of Influence. Such impacts may include disturbance and fragmentation of habitats and species of qualifying interest associated with nearby European Sites or indirect deterioration / disturbance of nearby water dependent habitats and species of European Sites within the project Zone of Influence.

An Impact Assessment of Features of Qualifying Interest for those European Sites within the project Zone of Influence is presented in Table 5-4 below.



Table 5-4: Impact Assessment of Features of Qualifying Interest within the project Zone of Influence.

Features of Qualifying Interest	Likely Distribution ⁷ / Suitability of proposed works footprint to support Features of Qualifying Interest	Within the proposed works Zol	Potential Impact Source	Description of Pathway	Potential Effect to Receptors
Lower River Shannon SAC (002165)					
1029 Freshwater Pearl Mussel <i>Margaritifera margaritifera</i> 1095 Sea Lamprey <i>Petromyzon marinus</i> 1096 Brook Lamprey <i>Lampetra planeri</i> 1099 River Lamprey <i>Lampetra fluviatilis</i> 1106 Atlantic Salmon <i>Salmo salar</i> (only in fresh water) 1110 Sandbanks which are slightly covered by sea water all the time 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1150 *Coastal lagoons	The following features of interest potentially intersect, adjoin or overlap with the works area associated with Sluice replacement and embankment protection works at E1: 1140 Mudflats and sandflats not covered by seawater at low tide 1310 <i>Salicornia</i> and other annuals colonizing mud and sand 1330 Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>)	The following features of qualifying interest are located within or are potentially located within the project zone of influence. 1095 Sea Lamprey <i>Petromyzon marinus</i> 1096 Brook Lamprey <i>Lampetra planeri</i> 1099 River Lamprey <i>Lampetra fluviatilis</i> 1106 Atlantic Salmon <i>Salmo salar</i> (only in fresh water) 1130 Estuaries	Use of excavators and other machinery. Use of hydrocarbons, aggregates and wet cement. Introduction and transmission of invasive plant species. Transmission of silt laden water from the works area to the surrounding area and downstream.	Air Noise Visual Overland flow (hydrological) underlying drainage channels providing connectivity to the Fergus Estuary.	Direct and indirect disturbance of habitats and species within the SAC. Potential for indirect disturbance through run-off of potential pollutant sources to nearby / proximal areas of the SAC supporting habitats corresponding with these Annex

⁷ Distribution analysis is informed from a site walkover survey of the proposed works area and, in addition to distribution data presented in the Conservation Objectives supporting documents for these European Sites.



Features of Qualifying Interest	Likely Distribution ⁷ / Suitability of proposed works footprint to support Features of Qualifying Interest	Within the proposed works Zol	Potential Impact Source	Description of Pathway	Potential Effect to Receptors
1160 Large shallow inlets and bays 1170 Reefs 1220 Perennial vegetation of stony banks 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 1310 Salicornia and other annuals colonizing mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1349 Bottlenose Dolphin Tursiops truncatus 1355 Otter Lutra lutra 1410 Mediterranean salt meadows (Juncetalia maritimi) 3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	1410 Mediterranean salt meadows (Juncetalia maritimi) These following features of qualifying interest are not located within the proposed works footprint. However, some of these features occur or utilise areas adjoining or fringing the proposed works; primarily the Owenogarney River and its associated riparian area. These features of interest as follows: 1095 Sea Lamprey Petromyzon marinus 1096 Brook Lamprey Lampetra planeri 1099 River Lamprey Lampetra fluviatilis	1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonizing mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1355 Otter Lutra lutra 1410 Mediterranean salt meadows (Juncetalia maritimi)			1 qualifying habitats and downstream habitats supporting species of qualifying interest. Direct and indirect disturbance of foraging and feeding otter along the Owenogarney and Cloverhill watercourses during the project's construction phase.



Features of Qualifying Interest	Likely Distribution ⁷ / Suitability of proposed works footprint to support Features of Qualifying Interest	Within the proposed works Zol	Potential Impact Source	Description of Pathway	Potential Effect to Receptors
6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) 91E0 *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	1106 Atlantic Salmon Salmo salar (only in fresh water) 1130 Estuaries 1310 Salicornia and other annuals colonizing mud and sand 1355 Otter Lutra lutra				
River Shannon and River Fergus Estuaries SPA (004077)					
A017 Cormorant Phalacrocorax carbo breeding + wintering A038 Whooper Swan Cygnus cygnus wintering A046 Light-bellied Brent Goose Branta bernicla hrota wintering A048 Shelduck Tadorna tadorna wintering A050 Wigeon Anas penelope wintering	Works associated with E1; i.e. sluice replacement and embankment repair will adjoin and partially overlap this SPA. All other works are located upstream of this SPA boundary. The following SCI species for this SPA may utilise the adjoining and surrounding	All SCI species associated with this SPA may potentially be located within the project Zol particularly the adjoining and downstream estuarine and saltmarsh areas of the Owenogarney estuary.	Use of excavators and other machinery. Use of hydrocarbons, aggregates and wet cement. Introduction and transmission of invasive plant species. Transmission of silt laden water from the works area to the	Air Noise Visual Overland flow (hydrological) underlying drainage channels providing	Run-off of potential pollutant sources to adjoining watercourses with subsequent deterioration to downstream water dependent SCI species utilising the Fergus and



Features of Qualifying Interest	Likely Distribution ⁷ / Suitability of proposed works footprint to support Features of Qualifying Interest	Within the proposed works Zol	Potential Impact Source	Description of Pathway	Potential Effect to Receptors
A052 Teal <i>Anas crecca</i> wintering A054 Pintail <i>Anas acuta</i> wintering A056 Shoveler <i>Anas clypeata</i> wintering A062 Scaup <i>Aythya marila</i> wintering A137 Ringed Plover Charadrius hiaticula wintering A140 Golden Plover <i>Pluvialis apricaria</i> wintering A141 Grey Plover <i>Pluvialis squatarola</i> wintering A142 Lapwing <i>Vanellus vanellus</i> wintering A143 Knot <i>Calidris canutus</i> wintering A149 Dunlin <i>Calidris alpina</i> wintering A156 Black-tailed Godwit <i>Limosa limosa</i> wintering	parts of the Owenogarney watercourse and adjoining wetland and pastoral areas. A017 Cormorant <i>Phalacrocorax carbo</i> A038 Whooper Swan <i>Cygnus cygnus</i> A050 Wigeon <i>Anas penelope</i> A052 Teal <i>Anas crecca</i> A140 Golden Plover <i>Pluvialis apricaria</i> A142 Lapwing <i>Vanellus vanellus</i> A160 Curlew <i>Numenius arquata</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i>		surrounding area and downstream.	connectivity to the Fergus Estuary.	Shannon Estuaries. Direct and indirect (ex-situ) disturbance of foraging and feeding avifauna during the project's construction phase.



Features of Qualifying Interest	Likely Distribution ⁷ / Suitability of proposed works footprint to support Features of Qualifying Interest	Within the proposed works Zol	Potential Impact Source	Description of Pathway	Potential Effect to Receptors
A157 Bar-tailed Godwit <i>Limosa lapponica</i> wintering A160 Curlew <i>Numenius arquata</i> wintering A162 Redshank <i>Tringa totanus</i> wintering A164 Greenshank <i>Tringa nebularia</i> wintering A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> wintering A999 Wetlands					

Following the analysis presented in Table 5-4 above, it is considered that certain features of qualifying Interest for the Lower River Shannon SAC should be considered for further analysis, given the proposed works areas, in particular those associated with E1 and proposed sluice replacement and embankment protection works which adjoin and potentially overlap these features of qualifying interest. In addition, the proposed works support direct and indirect connectivity to River Shannon and River Fergus Estuaries SPA and as a consequence may contribute direct and indirect downstream impacts to the Special Conservation Interest species of this SPA.

The features of Interest for the Lower River Shannon SAC that warrant further consideration due to their potential occurrence with the works zone of influence are as follows:

- 1095 Sea Lamprey *Petromyzon marinus*



- 1096 Brook Lamprey *Lampetra planeri*
- 1099 River Lamprey *Lampetra fluviatilis*
- 1106 Atlantic Salmon *Salmo salar* (only in fresh water)
- 1130 Estuaries
- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1310 *Salicornia* and other annuals colonizing mud and sand
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- 1355 Otter *Lutra lutra*
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

The following terrestrial species and habitats of qualifying interest for the Lower River Shannon SAC are located outside of the proposed development footprint and associated zone of influence. They include either terrestrial species / habitats located on separate catchments or watercourses within the SAC;

- 1029 Freshwater Pearl Mussel *Margaritifera margaritifera*;
- 3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation;
- 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*); and
- 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

There is no connectivity between the proposed works and these terrestrial habitats and species as they occur within the Lower River Shannon SAC and therefore this is no risk of impact and consequent effect.

The following coastal and lower estuarine Annex I habitats are located toward the westernmost and downstream sections of the Lower River Shannon SAC;

- 1110 Sandbanks which are slightly covered by sea water all the time;
- 1160 Large shallow inlets and bays;
- 1170 Reefs;
- 1220 Perennial vegetation of stony banks; and
- 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts.

Similarly, the priority Annex I habitat *Coastal lagoons (1150) is located in the downstream / westernmost sections of the Lower River Shannon SAC. The nearest location for this habitat occurs at Shannon Airport lagoon, >7km west of the proposed works. There is no direct connectivity between the proposed



works and this area. These estuarine, mudflats and brackish habitats are accustomed to routine fluctuations in sediment levels following or during ongoing tidal cycles and the release of particulate matter or sediments during the proposed works will not effect these habitats. Given the location and nature of the proposed works and the remote connectivity to these habitats, there is no potential for likely significant effects.



5.2 Screening for AA Conclusion

This screening for AA identifies and assesses likely significant effects which are likely to occur as a result of the proposed embankment refurbishment, sluice replacement and erosion protection works. The screening identified two European sites within the potential source – pathway – receptor zone of influence of the proposed works; i.e. the Lower River Shannon SAC (002165) and the River Shannon and River Fergus Estuaries SPA (004077).

The proposed works have the potential to provide contributory effects to European sites within the project Zone of Influence. Such impacts may include direct and indirect disturbance to habitats and species of Qualifying Interest for European Sites within the project zone of influence. In addition, the proposed works have the potential to contribute indirect impacts to water dependent habitats and species within the adjoining and downstream areas of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA.

Therefore, it cannot be concluded, that the proposed project, individually or in combination with other plans or projects, will not have a significant effect on a European site, without the implementation of best practice measures. Therefore Stage 2 Appropriate Assessment is required.

A Natura Impact Statement (NIS) has been prepared in Section 6, to provide scientific examination of the project to enable completion of an AA by the competent authority. The NIS will examine potential effects to European Sites screened in as part of this Screening for Appropriate Assessment; Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA.



6 STAGE 2 – NATURA IMPACT STATEMENT

This section of the report provides the necessary information to inform AA to be completed by the competent authority, OPW. This NIS provides the relevant scientific information to enable the competent authority in carrying out its AA to determine whether or not the proposed works would adversely affect the integrity of European sites.

The NIS assesses whether or not the proposed works would adversely affect the integrity of European Sites within the project Zol, for which effects could not be excluded during the Screening for AA (see Section 5 for details). The European Sites are as follows:

- Lower River Shannon SAC (Site Code: 002165); and
- River Shannon and River Fergus Estuaries SPA (Site Code: 004077).

6.1 Impact Assessment

The impact assessment presented in the following sections outlines potential impacts and effects in the absence of mitigation measures being implemented.

6.1.1 Characterising Impacts

The methodology for the assessment of impacts is derived from the Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites (EC, 2021). When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented include the following:

- Direct loss: reduction of habitat coverage as a result of its physical destruction (e.g. due to its removal or to the deposition of construction materials or sediments); loss of breeding, foraging, resting areas for species.
- Degradation: deterioration of habitat quality, leading to a reduced abundance of characteristic species or an altered community structure (species composition). This can be caused by changes in abiotic conditions (e.g. water levels or an increase in suspended sediments, pollutants or dust deposition); deterioration of breeding, foraging, resting areas for species.
- Disturbance: a change in existing environmental conditions (e.g. increased noise or light pollution, a greater frequentation of people and vehicles). Disturbance may cause, inter alia, the displacement of species individuals, changes in species behaviour, or the risk of morbidity or mortality.
- Fragmentation: leading to an alteration of distribution patches of relevant habitats and species, e.g. through the creation physical or ecological barriers in areas that are physically or functionally connected, or splitting them into smaller more isolated units.
- Other indirect effects: indirect change to the quality of the environment (resulting for example from a change in availability of nutrients and light, or an increase in the vulnerability of the site to other new threats such as invasive alien species, human and animal penetration).

Impacts that could potentially occur through the implementation of the project can be categorised under a number of impact categories as outlined in the EC 2021 document as follows:

- Area of the habitat or habitat of the species permanently lost (e.g. by clearing of vegetation or removal of suitable breeding/nesting sites) assessed against the habitat area on the site, at regional, national and biogeographical level (percentage of habitat area lost) and against the target set in the site-specific conservation objective (which may include a target for restoration);



- Area of the habitat or habitat of the species affected (e.g. by pollution, noise, deterioration of other ecological conditions) assessed against percentage of the habitat area on the site, at regional, national and biogeographical level (percentage of habitat area affected) and against the target set in the site-specific conservation objective (which may include a target for restoration);

Size of resident and migratory species populations affected, assessed against the local, regional, national and international populations (percentage of population affected) and against the target set in the site-specific conservation objective (which may include a target for an increase in population size within the site);

Scale of impact (e.g. by pollution, noise, deterioration of other ecological conditions) on the quality of the habitat or habitat of the species or the survival of species affected, in view of their ecological requirements in the site as defined in the site-specific conservation objective (which may include a target for restoration).

Meaning of 'Adversely Affect the Integrity of the Site'

The concept of the 'integrity of the site' is explained in the EU publication Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, as follows;

'It is clear from the context and from the purpose of the directive that the 'integrity of the site' relates to the site's conservation objectives. For example, it is possible that a plan or project will adversely affect the integrity of a site only in a visual sense or only habitat types or species other than those listed in Annex I or Annex II. In such cases, the effects do not amount to an adverse effect for purposes of Article 6(3), provided that the coherence of the network is not affected. On the other hand, the expression 'integrity of the site' shows that focus is here on the specific site. Thus, it is not allowed to destroy a site or part of it on the basis that the conservation status of the habitat types and species it hosts will anyway remain favourable within the European territory of the Member State.

As regards the connotation or meaning of 'integrity', this can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation. The 'integrity of the site' has been usefully defined as 'the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified'.

A site can be described as having a high degree of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required. When looking at the 'integrity of the site', it is therefore important to take into account a range of factors, including the possibility of effects manifesting themselves in the short, medium and long-term.

The integrity of the site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site's conservation objectives.

6.1.2 Potential for Direct Impacts

Direct impacts refer to habitat loss or fragmentation arising from land-take requirements for development purposes. The proposed embankment repair works are located upstream of and adjoin the Lower River Shannon SAC. However the majority of the proposed works footprint and its immediate environs do not support habitats of Qualifying Interest for this European Site. The proposed sluice replacement and embankment protection along E1 adjoin and partially overlap the Lower River Shannon SAC and the River



Shannon and River Fergus Estuaries SPA, downstream of Bunratty. The works at E1 could result in the direct loss or disturbance to these European Sites. However the majority of the proposed works footprint and its immediate environs do not support habitats of Qualifying Interest for this European Site.

6.1.3 Potential for Indirect Impacts

Indirect impacts refer to those which can arise through proximal or remote connectivity, for example by means of a watercourse, via overland flow of surfacewater, via groundwater, via air (e.g. dust) or via other emissions from a project site (e.g. noise and light). Indirect and secondary impacts do not have a straight-line route between cause and effect. It is potentially more challenging to ensure that all the possible indirect impacts of the project – in combination with other plans and projects - have been established. These can arise, for example, when a development alters the hydrology of a catchment area, which in turn affects the movement of groundwater to a site and the qualifying interests that rely on the maintenance of water levels. Deterioration in water quality can occur as an indirect consequence of development, which in turn changes the aquatic environment and reduces its capacity to support certain plants and animals. The introduction of invasive species can also be defined as an indirect impact. Disturbance to fauna can arise directly through the loss of habitat (e.g. displacement of foraging or commuting mammals and avifauna) or indirectly through noise, vibration and increased activity associated with construction activities or the operational processes of a proposed development.

6.1.4 Possible source-pathway-receptor and zone of influence

Potential effects associated with the proposed development to the Qualifying Habitats and Species of European Sites within the project Zone of Influence are described in Table 6-1 as follows:

Table 6-1: Source – Pathway and Zone of Influence for the proposed project

Source of Potential Effect	Description of Pathway	Potential Zone of Influence of the Effect
Construction Phase		
Noise, vibration; Human presence; and Movements of vehicles associated with construction activities.	Terrestrial - contact (direct contact with construction personnel or machinery during site works), air (through its ability to transmit noise effects), visibility (on site presence of construction personnel)	The Zone of Influence varies by the affected habitat and reliant species. This can be assessed within 500m of the proposed development footprint for wintering birds (see Madsen, 1985; Smit & Visser, 1993; and Rees et al., 2005). However, distance can be significantly lower (e.g. 150 m for otter underground sites (NRA, 2006), or higher for other species.
Earthworks / stripping of overburden (e.g. Digging); Over-pumping of silt laden waters	Hydrological pathways; i.e. overland flow, drainage channels and watercourses which provide connectivity between the proposed embankment and sluice gate infrastructure and the nearby areas of the Lower River	The Zone of Influence of the potential effects associated with this source is related with the nature of the potential contaminant (e.g. silt, hydrocarbons). The worst case Zone of Influence is considered to



Source of Potential Effect	Description of Pathway	Potential Zone of Influence of the Effect
<p>Stockpiling of construction materials (sand, aggregates etc.)</p> <p>Use of contaminants (e.g. hydrocarbons, wet cement, lubricants).</p>	<p>Shannon SAC and the River Shannon and River Fergus Estuaries SPA.</p> <p>Surface water runoff; and</p> <p>Accidental spills.</p>	<p>be the whole length of the aquatic pathway (i.e. from the proposed development site to the adjoining areas of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA).</p>
Operational Phase		
<p>Movement of People and vehicles associated within maintenance works;</p> <p>Maintenance of the embankment and sluice</p>	<p>Terrestrial - contact (direct contact with operational personnel or machinery during site works), air (through its ability to transmit noise effects), visibility (on site presence of construction personnel)</p>	<p>Such effects are not likely to be significant due to the nature and scale of the operational works and the intermittent, temporary and short duration of any potential maintenance works.</p>
<p>Use of contaminants (e.g. hydrocarbons, lubricants).</p>	<p>Hydrological pathways; i.e. overland flow, drainage channels and watercourses which provide connectivity between the proposed embankment and sluice gate infrastructure and the nearby areas of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA.</p>	<p>The Zone of Influence of the potential effects associated with this source is related with the nature of the potential contaminant (e.g. silt, hydrocarbons). The worst case Zone of Influence is considered to be the whole length of the aquatic pathway (i.e. from the proposed development site to the in-situ areas of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA).</p>



6.1.5 Potential Impacts from the Proposed Development to the Features of Qualifying Interest of European Sites within the Project Zone of Influence

Potential impacts sources, pathways and consequent effects associated with the proposed works to those features of Qualifying Interest of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are considered in greater detail in Table 6.2 below.



Table 6-2 Impact Assessment on Features of Qualifying Interest for European Sites

Attribute/Measure/Target	Potential Impact of Proposed works
Lower River Shannon SAC	
1095 Sea Lamprey <i>Petromyzon marinus</i>	
<ul style="list-style-type: none"> - Distribution: extent of anadromy - % of river accessible - Greater than 75% of main stem length of rivers accessible from estuary 	<p>The majority of the proposed works (those along E9, E14, E16 and E17) will be restricted to the existing embankment network and adjoining pastoral lands. It is also proposed to replace one Sluice structure downstream of Bunratty on embankment E1 and secure rock armour to avoid further erosion of riverbank and riparian habitat. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support suitable habitat for this species, an anadromous species using terrestrial and marine watercourses. The wet /estuarine side of the embankments comprise improved grassland and wet grassland with mosaics of reed and large sedge swamp and upper saltmarsh occurring within the estuarine tidal regime inundation areas along the downstream areas of the Owenogarney River.</p> <p>The proposed works, particularly the sluice replacement and erosion protection works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p> <p>In addition, there are no instream works proposed within the Cloverhill Stream or the upstream freshwater sections of the Owenogarney River. Therefore, the proposed works will not impact the distribution and accessibility for this species or impact the availability of juvenile habitat, which is located with freshwater catchments, upstream of the works area.</p>
<ul style="list-style-type: none"> - Population structure of juveniles - Number of age/size groups - At least three age/size groups present 	
<ul style="list-style-type: none"> - Juvenile density in fine sediment - Juveniles/m² Juvenile density at least 1/m² 	
<ul style="list-style-type: none"> - Extent and distribution of spawning habitat - m² and occurrence No decline in extent and distribution of spawning bed 	
<ul style="list-style-type: none"> - Availability of juvenile habitat - Number of positive sites in 3rd order channels (and greater), downstream of spawning areas - More than 50% of sample sites positive 	
1096 Brook Lamprey <i>Lampetra planeri</i>	
<ul style="list-style-type: none"> - Distribution - % of river accessible - Access to all water courses down to first order streams 	<p>The majority of the proposed works (those along E9, E14, E16 and E17) will be restricted to the existing embankment network and adjoining pastoral lands. It is also proposed to replace one Sluice structure downstream of Bunratty on embankment E1 and secure rock armour to avoid further erosion of</p>



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - Population structure of juveniles - Number of age/size groups - At least three age/size groups of brook/river lamprey present 	<p>riverbank and riparian habitat. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support suitable habitat for this species, an anadromous species using terrestrial and marine watercourses. The wet /estuarine side of the embankments comprise improved grassland and wet grassland with mosaics of reed and large sedge swamp and upper saltmarsh occurring within the estuarine tidal regime inundation areas along the downstream areas of the Owenogarney River.</p> <p>The proposed works, particularly the sluice replacement and erosion protection works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p> <p>In addition, there are no instream works proposed within the Cloverhill Stream or the upstream freshwater sections of the Owenogarney River. Therefore, the proposed works will not impact the distribution and accessibility for this species or impact the availability of juvenile habitat, which is located with freshwater catchments, upstream of the works area.</p>
<ul style="list-style-type: none"> - Juvenile density in fine sediment - Juveniles/m² - Mean catchment juvenile density of brook/river lamprey at least 2/m² 	
<ul style="list-style-type: none"> - Extent and distribution of spawning habitat - m² and occurrence - No decline in extent and distribution of spawning beds 	
<ul style="list-style-type: none"> - Availability of juvenile habitat - Number of positive sites in 2nd order channels (and greater), downstream of spawning areas - More than 50% of sample sites positive 	
1099 River Lamprey <i>Lampetra fluviatilis</i>	
<ul style="list-style-type: none"> - Distribution - % of river accessible - Access to all water courses down to first order streams 	<p>The majority of the proposed works (those along E9, E14, E16 and E17) will be restricted to the existing embankment network and adjoining pastoral lands. It is also proposed to replace one Sluice structure downstream of Bunratty on embankment E1 and secure rock armour to avoid further erosion of riverbank and riparian habitat. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support suitable habitat for this species, an anadromous species using terrestrial and marine watercourses. The wet /estuarine side of the embankments comprise improved grassland and wet grassland with mosaics of reed and large sedge swamp and upper saltmarsh occurring within the estuarine tidal regime inundation areas along the downstream areas of the Owenogarney River.</p>
<ul style="list-style-type: none"> - Population structure of juveniles - Number of age/size groups - At least three age/size groups of river/brook lamprey present 	
<ul style="list-style-type: none"> - Juvenile density in fine sediment - Juveniles/m² - Mean catchment juvenile density of river/brook lamprey at least 2/m² 	



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - Extent and distribution of spawning habitat - m² and occurrence - No decline in extent and distribution of spawning beds - Availability of juvenile habitat - Number of positive sites in 2nd order channels (and greater), downstream of spawning areas - More than 50% of sample sites positive 	<p>The proposed works, particularly the sluice replacement and erosion protection works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p> <p>In addition, there are no instream works proposed within the Cloverhill Stream or the upstream freshwater sections of the Owenogarney River. Therefore, the proposed works will not impact the distribution and accessibility for this species or impact the availability of juvenile habitat, which is located with freshwater catchments, upstream of the works area.</p>
<p>1106 Atlantic Salmon <i>Salmo salar</i> (only in fresh water)</p>	
<ul style="list-style-type: none"> - Distribution: extent of anadromy - % of river accessible - 100% of river channels down to second order accessible from estuary 	<p>The majority of the proposed works (those along E9, E14, E16 and E17) will be restricted to the existing embankment network and adjoining pastoral lands. It is also proposed to replace one Sluice structure downstream of Bunratty on embankment E1 and secure rock armour to avoid further erosion of riverbank and riparian habitat. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support suitable habitat for this species, an anadromous species using terrestrial and marine watercourses. The wet /estuarine side of the embankments comprise improved grassland and wet grassland with mosaics of reed and large sedge swamp and upper saltmarsh occurring within the estuarine tidal regime inundation areas along the downstream areas of the Owenogarney River.</p> <p>The proposed works, particularly the sluice replacement and erosion protection works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p>
<ul style="list-style-type: none"> - Adult spawning fish - Number Conservation Limit (CL) for each system consistently exceeded 	
<ul style="list-style-type: none"> - Salmon fry abundance - Number of fry/5 minutes electrofishing - Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling 	
<ul style="list-style-type: none"> - Out-migrating smolt abundance - Number - No significant decline 	
<ul style="list-style-type: none"> - Number and distribution of redds - Number and occurrence - No decline in number and distribution of spawning redds due to anthropogenic causes 	



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - Water quality - EPA Q value - At least Q4 at all sites sampled by EPA 	<p>In addition, there are no instream works proposed within the Cloverhill Stream or the upstream freshwater sections of the Owenogarney River. Therefore, the proposed works will not impact the distribution and accessibility for this species or impact the availability of juvenile habitat, which is located with freshwater catchments, upstream of the works area.</p>
<ul style="list-style-type: none"> - Habitat area - Hectares - The permanent habitat area is stable or increasing, subject to natural processes. 	<p>The proposed works will not impact the distribution and accessibility for this species during migration. Furthermore, the proposed works will not reduce the availability or quality of spawning habitat or water quality, which is located within freshwater catchments, upstream of the works area.</p>
<ul style="list-style-type: none"> - Community distribution - Hectares - Conserve the following community type in a natural condition: Subtidal sand to mixed sediment with <i>Nephtys</i> spp. community complex. 	<p>The proposed works will not impact the distribution and accessibility for this species during migration. Furthermore, the proposed works will not reduce the availability or quality of spawning habitat or water quality, which is located within freshwater catchments, upstream of the works area.</p>
<p>Estuaries (1130)</p>	
<ul style="list-style-type: none"> - Habitat area - Hectares - The permanent habitat area is stable or increasing, subject to natural processes. 	<p>The proposed embankment repair works will be restricted to the existing embankment network adjoining the Cloverhill and Owenogarney watercourses. In addition, localised works are required for sluice replacement along E1. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support this estuarine / transitional habitat. The wet /estuarine side of the embankments comprise improved grassland, wet grassland, reed and large sedge swamp and with upper saltmarsh occurring within the estuarine tidal regime inundation areas along the lower lying areas of the Owenogarney River.</p>
<ul style="list-style-type: none"> - Community distribution - Hectares - Conserve the following community types in a natural condition: Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Estuarine subtidal muddy sand to mixed sediment with gammarids community complex; Subtidal sand to mixed sediment with <i>Nucula nucleus</i> community complex; Subtidal sand to mixed sediment with <i>Nephtys</i> spp. community complex; Fucoid-dominated intertidal reef community complex; Faunal turf-dominated subtidal reef community; and Anemone-dominated subtidal reef community. 	<p>The proposed works, particularly the sluice replacement works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p> <p>Given the localised nature of the embankment works and their location on existing embankment infrastructure, solely on terrestrial environments and outside of the watercourse footprint, the proposed</p>



Attribute/Measure/Target	Potential Impact of Proposed works
	<p>works will not impact the habitat distribution, habitat area or community distribution of this Annex I habitat.</p> <p>The Sluice replacement works will require the temporary placement of an embankment and sheet piling around an existing Sluice, to allow for the sluice replacement works. These works may result in localised and temporary siltation of the nearby areas of the Owenogarney watercourse. However this will be located within an estuarine environment which experiences ongoing fluctuations of mobilised silt laden water during or following tidal cycles.</p> <p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.</p>
1140 Mudflats and sandflats not covered by seawater at low tide	
<ul style="list-style-type: none"> - Habitat area - Hectares - The permanent habitat area is stable or increasing, subject to natural processes. 	<p>The proposed embankment repair works will be restricted to the existing embankment network adjoining the Cloverhill and Owenogarney watercourses. In addition, localised works are required for sluice replacement along E1. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support this estuarine / transitional habitat. The wet /estuarine side of the embankments comprise improved grassland, wet grassland, reed and large sedge swamp and with upper saltmarsh occurring within the estuarine tidal regime inundation areas along the lower lying areas of the Owenogarney River.</p>
<ul style="list-style-type: none"> - Habitat area was estimated using OSi data as 8,808ha. - Community distribution - Hectares - Conserve the following community types in a natural condition: Intertidal sand with <i>Scolecipis squamata</i> and <i>Pontocrates</i> spp. community; and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex. 	<p>The proposed works, particularly the sluice replacement works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine</p>



Attribute/Measure/Target	Potential Impact of Proposed works
	<p>environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p> <p>Given the localised nature of the embankment works and their location on existing embankment infrastructure, solely on terrestrial environments and outside of the watercourse footprint, the proposed works will not impact the habitat distribution, habitat area or community distribution of this Annex I habitat.</p> <p>The Sluice replacement works will require the temporary placement of an embankment and sheet piling around an existing Sluice, to allow for the sluice replacement works. These works may result in localised and temporary siltation of the nearby areas of the Owenogarney watercourse. However this will be located within an estuarine environment which experiences ongoing fluctuations of mobilised silt laden water during or following tidal cycles.</p> <p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.</p>
<p>1310 Salicornia and other annuals colonizing mud and sand</p> <ul style="list-style-type: none"> - Habitat area - Hectares - Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 6.774ha; Barrigone, Aughinish- 10.288ha; Beagh- 0.517ha; Bunratty- 26.939ha; Shepperton, Fergus Estuary- 37.925ha; Inishdea, Owenshere- 18.127ha; Killadysert, Inishcorker 2.604ha; Knock- 0.576ha; Querin 3.726ha; Rinevillia Bay- 11.883ha 	<p>The proposed embankment repair works will be restricted to the existing embankment network adjoining the Cloverhill and Owenogarney watercourses. In addition, localised works are required for sluice replacement along E1. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support this estuarine / transitional habitat. The wet /estuarine side of the embankments comprise improved grassland, wet grassland, reed and large sedge swamp and with upper saltmarsh occurring within the estuarine tidal regime inundation areas along the lower lying areas of the Owenogarney River.</p> <p>The proposed works, particularly the sluice replacement works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair</p>



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - Habitat distribution - Occurrence - No decline or change in habitat distribution, subject to natural processes 	<p>works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p>
<ul style="list-style-type: none"> - Physical structure: sediment supply - Presence/ absence of physical barriers - Maintain natural circulation of sediments and organic matter, without any physical obstructions 	<p>Given the localised nature of the embankment works and their location on existing embankment infrastructure, solely on terrestrial environments and outside of the watercourse footprint, the proposed works will not impact the habitat distribution, habitat area, physical structure or vegetation structure of this Annex I habitat.</p>
<ul style="list-style-type: none"> - Physical structure: creeks and pans - Occurrence - Maintain creek and pan structure, subject to natural processes, including erosion and succession 	<p>The Sluice replacement works will require the temporary placement of sheet piling around an existing Sluice, to allow for the sluice replacement works. These works may result in localised and temporary siltation of the nearby areas of the Owenogarney watercourse. However this will be located within an estuarine environment which experiences ongoing fluctuations of mobilised silt laden water during or following tidal cycles.</p>
<ul style="list-style-type: none"> - Physical structure: flooding regime - Hectares flooded; frequency - Maintain natural tidal regime 	<p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.</p>
<p>1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)</p>	
<ul style="list-style-type: none"> - Vegetation - structure: zonation - Occurrence Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession 	<p>The proposed embankment repair works will be restricted to the existing embankment network adjoining the Cloverhill and Owenogarney watercourses. In addition, localised works are required for sluice replacement along E1. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support this estuarine / transitional habitat. The wet /estuarine side of the embankments comprise improved grassland, wet grassland, reed and large sedge swamp and with upper saltmarsh occurring within the estuarine tidal regime inundation areas along the lower lying areas of the Owenogarney River.</p>



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - Vegetation structure: vegetation height - Centimetres - Maintain structural variation within sward 	<p>The proposed works, particularly the sluice replacement works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p> <p>Given the localised nature of the embankment works and their location on existing embankment infrastructure, solely on terrestrial environments and outside of the watercourse footprint, the proposed works will not impact the habitat distribution, habitat area, physical structure or vegetation structure of this Annex I habitat.</p> <p>The Sluice replacement works will require the temporary placement of an embankment and sheet piling around an existing Sluice, to allow for the sluice replacement works. These works may result in localised and temporary siltation of the nearby areas of the Owenogarney watercourse. However this will be located within an estuarine environment which experiences ongoing fluctuations of mobilised silt laden water during or following tidal cycles.</p> <p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.</p>
<ul style="list-style-type: none"> - Vegetation structure: vegetation cover - Percentage cover at a representative sample of monitoring stops - Maintain more than 90% of the saltmarsh area vegetated 	
<ul style="list-style-type: none"> - Vegetation composition: typical species and sub-communities - Percentage cover at a representative sample of monitoring stops - Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009) 	
<ul style="list-style-type: none"> - Vegetation structure: negative indicator species <i>Spartina anglica</i> - Hectares - No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1% 	<p>The proposed works are located along an existing estuarine embankment, which primarily supports improved grassland. The proposed works seek to refurbish and repair existing embankment and sluice gate infrastructure. These works will not involve habitat removal or replacement, rather the consolidation of existing infrastructure. The proposed works may contribute towards localised</p>
<p>1355 Otter <i>Lutra lutra</i></p>	
<ul style="list-style-type: none"> - Distribution - Percentage positive survey sites 	<p>The proposed works are located along an existing estuarine embankment, which primarily supports improved grassland. The proposed works seek to refurbish and repair existing embankment and sluice gate infrastructure. These works will not involve habitat removal or replacement, rather the consolidation of existing infrastructure. The proposed works may contribute towards localised</p>



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - No significant decline 	<p>disturbance of otter foraging and commuting within the nearby estuarine sections of the Lower River Shannon SAC which may have a localised, temporary impact on otter distribution.</p>
<ul style="list-style-type: none"> - Extent of terrestrial habitat - Hectares - No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along river banks/ around ponds 	<p>The proposed works are located along existing estuarine embankments, which primarily supports improved grassland and fringing areas of wet grassland, in addition to reed and large sedge swamp and upper saltmarsh along the estuarine areas of the Owenogarney watercourse. The proposed works seek to refurbish and repair existing embankment and sluice gate infrastructure. Therefore there will be no decline or permanent loss of terrestrial otter habitat within the Lower River Shannon SAC.</p>
<ul style="list-style-type: none"> - Extent of marine habitat - Hectares - No significant decline. Area mapped and calculated as 4,461.6ha 	<p>The proposed works are located along an existing estuarine embankment, which primarily supports improved grassland and fringing areas of wet grassland, in addition to reed and large sedge swamp and upper saltmarsh along the estuarine areas of the Owenogarney watercourse. The proposed works seek to repair embankment infrastructure, most of which is located along terrestrial sections of the Owenogarney and Cloverhill watercourses. Sluice replacement and embankment protection works are required within a transitional / estuarine section of the Owenogarney watercourse, downstream of Bunratty. Such works will result in the localised and temporary disturbance of embankment infrastructure during the construction period, but will be reinstated in full following completion. There will be no decline, loss or disturbance of otter marine habitat within the Lower River Shannon SAC as a result of the proposed works.</p>
<ul style="list-style-type: none"> - Extent of freshwater (river) habitat - Kilometres - No significant decline. Length mapped and calculated as 500.1km 	<p>The proposed works are located along an existing riparian and estuarine embankment. There will be no works within the freshwater sections of the Cloverhill or Owenogarney watercourses. There will be no decline, loss or disturbance of otter freshwater habitat within the Lower River Shannon SAC as a result of the proposed works.</p>
<ul style="list-style-type: none"> - Extent of freshwater (lake/lagoon) habitat - Hectares - No significant decline. - Area mapped and calculated as 125.6ha 	<p>The Sluice replacement works will require the temporary placement of an embankment and sheet piling around an existing Sluice, to allow for the sluice replacement works. These works may result in localised and temporary siltation of the nearby areas of the Owenogarney watercourse. However this will be located within an estuarine environment which experiences ongoing fluctuations of mobilised silt laden water during or following tidal cycles.</p> <p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while</p>



Attribute/Measure/Target	Potential Impact of Proposed works
	the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.
<ul style="list-style-type: none"> - Couching sites and holts - Number - No significant decline 	No signs of otter breeding sites (couches) or ongoing usage was identified within the proposed works area during the site walkover survey. This may reflect poor quality holting opportunities along the embankment corridor (typically open banks with widespread grazing / trampling by livestock) (Mason & Macdonald, 2009). Therefore the proposed works are not likely to result in the decline of otter breeding sites.
<ul style="list-style-type: none"> - Fish biomass available - Kilograms - No significant decline 	The proposed works are primarily located along an existing riverine and estuarine embankment, which primarily supports improved grassland with wet grassland, reed and large sedge swamp and upper saltmarsh located at the base of the of the wet side of the embankment. The proposed works seek to refurbish and repair existing embankment and sluice gate infrastructure. These works will not involve habitat removal or replacement, rather the consolidation of existing infrastructure. The proposed works, particularly the sluice replacement works may result in the localised release of sediments to the surrounding environment. However, the nearby saltmarsh and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter. Such impacts and consequent are not likely to result in the decline of available fish biomass within the Lower River Shannon SAC with consequent impacts to otter.
<ul style="list-style-type: none"> - Barriers to connectivity - Number - No significant increase. 	The proposed works are located along an existing riparian and estuarine embankment, which primarily supports improved grassland. The proposed works seek to refurbish and repair existing embankment and sluice gate infrastructure. These works will not involve habitat removal or replacement, rather the consolidation of existing infrastructure. The proposed works may contribute towards localised disturbance of otter foraging and commuting along the Cloverhill and Owenogarney watercourses which may have a localised, temporary impact on otter movements adjacent to the proposed works areas. It should however be noted that the proposed works are localised and targeted to existing infrastructure therefore reducing potential disturbance impact magnitude.
1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	
<ul style="list-style-type: none"> - Habitat area - Hectares 	The proposed embankment repair works will be restricted to the existing embankment network adjoining the Cloverhill and Owenogarney watercourses. In addition, localised works are required for



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - Area increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 4.193ha; Barrigone, Aughinish- 2.407ha; Bunratty- 0.865ha; Inishdea, Owenshere- 11.609ha; Killadysert, Inishcorker- 0.705ha; Knock- 0.143ha, Querin- 0.008ha; Rinevilla Bay- 2.449ha. 	<p>sluice replacement along E1. The works areas and associated access routes and their immediate environs primarily support improved grassland, verge grassland and drainage channels (See Appendix B) and do not support this estuarine / transitional habitat. The wet /estuarine side of the embankments comprise improved grassland, wet grassland, reed and large sedge swamp and with upper saltmarsh occurring within the estuarine tidal regime inundation areas along the lower lying areas of the Owenogarney River.</p>
<ul style="list-style-type: none"> - Habitat distribution - Occurrence - No decline, or change in habitat distribution, subject to natural processes. 	<p>The proposed works, particularly the sluice replacement works may result in the localised release of sediments or deleterious substances (hydrocarbons, silt laden water etc.) associated with the repair works to the surrounding environment. However, the receiving tidal watercourse and estuarine habitats and their associated species are accustomed to the routine fluctuations in sediment levels following or during ongoing tidal cycles. Any such release of sediments will be readily assimilated into this estuarine environment and its component habitats which are formed through ongoing accretion and erosion of sediment and particulate matter.</p>
<ul style="list-style-type: none"> - Physical structure: sediment supply - Presence/absence of physical barriers - Maintain natural circulation of sediments and organic matter, without any physical obstructions 	<p>Given the localised nature of the embankment works and their location on existing embankment infrastructure, solely on terrestrial environments and outside of the watercourse footprint, the proposed works will not impact the habitat distribution, habitat area, physical structure or vegetation structure of this Annex I habitat.</p>
<ul style="list-style-type: none"> - Physical structure: creeks and pans - Occurrence - Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession 	<p>The Sluice replacement works will require the temporary placement of an embankment and sheet piling around an existing Sluice, to allow for the sluice replacement works. These works may result in localised and temporary siltation of the nearby areas of the Owenogarney watercourse. However this will be located within an estuarine environment which experiences ongoing fluctuations of mobilised silt laden water during or following tidal cycles.</p>
<ul style="list-style-type: none"> - Physical structure: flooding regime - Hectares flooded; frequency - Maintain natural tidal regime 	<p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.</p>
<ul style="list-style-type: none"> - Vegetation structure: zonation - Occurrence - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession 	<p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.</p>
<ul style="list-style-type: none"> - Vegetation structure: vegetation height - Centimetres - Maintain structural variation within sward 	<p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.</p>
<ul style="list-style-type: none"> - Vegetation structure: vegetation cover - Percentage cover at a representative sample of monitoring stops 	<p>To arrest the ongoing erosion of riparian / bankside habitat adjoining embankment E1, rock armour will be installed. This will involve the placement of a line of 1 to 2t rocks at the toe of the embankment where erosion has taken place. Rock and boulders used will be of local provenance, corresponding to the underlying geology of the study area. This may result in the temporary disturbance of this habitat while the rock armour is being secured. However, the placement of the rock armour in this location will arrest ongoing erosion of in-situ habitat within the adjoining areas of the Owenogarney River and its component estuarine habitats.</p>



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - Maintain more than 90% of area outside creeks vegetated 	
<ul style="list-style-type: none"> - Vegetation composition: typical species - Percentage cover - Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009) 	
<ul style="list-style-type: none"> - Vegetation structure: negative indicator species - <i>Spartina anglica</i> - Hectares - No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1% 	
River Shannon and River Fergus Estuaries SPA	
A017 Cormorant <i>Phalacrocorax carbo</i>	
<ul style="list-style-type: none"> - Breeding population abundance: apparently occupied nests (AONs) - Number - No significant decline 	<p>The nearby estuarine areas of the River Shannon and River Fergus Estuaries SPA do not support suitable breeding habitat for Cormorant. Cormorant breeding colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs but they can also nest in trees (Walsh et al., 1995). The adjoining tidal rivers and estuarine areas fringing the proposed embankment and sluice gate works comprise expansive mudflats, spreading spartina beds with areas of saltmarsh fringing the area's terrestrial habitats. To that end, the proposed works are not located in proximity to and are unlikely to impact, directly or indirectly breeding requirements for Cormorant.</p>
<ul style="list-style-type: none"> - Productivity rate - Mean number - No significant decline 	
<ul style="list-style-type: none"> - Distribution: breeding colonies - Number; location; area (hectares) - No significant decline 	
<ul style="list-style-type: none"> - Prey biomass available - Kilogrammes - No significant decline 	
<ul style="list-style-type: none"> - Barriers to connectivity - Number; location; shape; area (hectares) - No significant increase 	
<ul style="list-style-type: none"> - Disturbance at the breeding site 	



Attribute/Measure/Target	Potential Impact of Proposed works
<ul style="list-style-type: none"> - Level of impact - Human activities should occur at levels that do not adversely affect the breeding cormorant population 	
<ul style="list-style-type: none"> - Population trend - Percentage change - Long term population trend stable or increasing 	
<ul style="list-style-type: none"> - Distribution - Range, timing and intensity of use of areas - There should be no significant decrease in the range, timing or intensity of use of areas by cormorant other than that occurring from natural patterns of variation 	
All other SCI species for the River Shannon and River Fergus Estuaries SPA	
<ul style="list-style-type: none"> - Population trend - Percentage change - Long term population trend stable or increasing 	<p>The embankment repair works along E9, E14, E16 and E17 are not located within the bounds of the River Shannon and River Fergus Estuaries SPA and therefore these works will not contribute direct impacts and associated effects to the SCI species associated with this SPA. The findings of the site walkover surveys indicate that the lower stretches of the Owenogarney River supports smaller numbers (1-4 birds) of Teal and Redshank feeding on the exposed muddy banks fringing the Owenogarney River, upstream of Bunratty and with occasional occurrences of 2-3 Teal using the Cloverhill Stream. The proposed embankment repair works will be located along an existing riparian embankment outside of the SPA boundary, which primarily supports improved grassland and will not be located within the footprint of the Owenogarney or Cloverhill watercourses. The proposed sluice replacement and embankment protection works will not involve habitat removal or replacement, rather the consolidation of existing infrastructure. There will be no removal or replacement of over-wintering avifaunal habitat for the River Shannon and River Fergus Estuaries SPA. Furthermore, the proposed works will be scheduled outside of the over-wintering bird season and will avoid direct, indirect or ex-situ disturbance to over-wintering avifaunal species utilising this SPA and those areas located upstream.</p>
<ul style="list-style-type: none"> - Distribution - Range, timing and intensity of use of areas - There should be no significant decrease in the range, timing or intensity of use of areas by these SCI species other than that occurring from natural patterns of variation 	

The assessment completed in Table 6.2 demonstrates that the proposed sluice replacement and embankment protection works have the potential to result in localised and temporary siltation of the nearby areas of the Owenogarney watercourse. However this will be located within an estuarine environment which



experiences ongoing fluctuations of mobilised silt laden water during or following tidal cycles. The works may also contribute to localised habitat disturbance and temporary, localised displacement and disturbance of mobile species.



6.2 Best Practice Design & Mitigation Measures

The best practice design and mitigation measures outlined below will be implemented to ensure that any impacts on the receiving environment and habitats and species of qualifying interest within the project zone of influence, will be avoided during the project's construction phase. They will also ensure that all potential pollutant sources will be retained to the works footprint and will not enter the surrounding environment and those European Sites within the project Zone of Influence.

All works carried out during this project will be undertaken in accordance with OPW's Environmental Management Protocols & Standard Operating Procedures. (Refer to "OPW Environmental Guidance: Drainage Maintenance & Construction 2019"). Environmental Drainage Maintenance (EDM) Guidelines will be followed at all times. Furthermore, the proposed works practices will follow those measures and sequencing outlined in Section 1.1.

Mitigation refers to measures taken to avoid or reduce negative impacts and effects (CIEEM, 2018)⁸.

The evaluation of likely significant impacts of the proposed development includes recommendations for specific measures to avoid and reduce any negative impacts of a project (i.e. mitigation measures). These measures are considered necessary to minimise environmental impacts associated with the proposed development. Avoiding and/or minimising negative impacts is best achieved through consideration of potential impacts of the proposed project from the initial stages.

To minimise environmental impacts, it is important in the first instance that the following general principles are taken on board:

- Implementation of good OPW work practices on site, in accordance with works methods outlined in Section 1.1.
- Working in accordance with relevant legislation, including that relating to invasive species.
- Operatives should ensure adequate site supervision and security.
- Operatives should be briefed to ensure that environmental issues are taken into consideration and that guidelines and codes of practice are followed.

6.2.1 Site Compound

The proposed works will be served by 2 no site compounds / welfare units. One of these compounds will be located upstream / north of Bunratty while the other will serve the proposed sluice replacement works, south of Bunratty. Site compounds will be located at least 50m from all drainage channels or watercourses.

The following elements and designations shall be contained within the construction works compound locations:-

- Diesel generator;
- Temporary site office – Portakabin or similar;
- Employee Parking;
- Portaloo' type toilet facilities with suitable welfare and washing facilities. This will be positioned in the construction works compound. Any wastewaters generated from the construction works compound shall be discharged to self-contained storage tanks and shall be removed via a licenced

⁸ CIEEM (2018). The Guidelines for Ecological Impact Assessment in the UK and Ireland



- contractor to a suitable wastewater disposal facility. No wastewaters generated within the works compound shall discharge to surface watercourses or to ground;
- Bunded re-fuelling area. It is not proposed to store any fuel, oils or chemicals within the construction works compound area or any other area within the site. Where re-fuelling of plant or machinery is required, fuel will be delivered to site via a standard commercial fuel vehicle or a mobile fuel browser. Re-fuelling shall only be undertaken within the designated bunded refuelling area;
 - Potable water supply to site office and welfare facilities.
 - A water tanker to supply water used for other purposes;
 - Designated areas for gravel, subsoil, topsoil and sand stockpiling; and
 - Contractor lock-up facility.

6.2.2 Timing of Works

The embankment repair works will be completed from late spring / early summer and are anticipated to take 16 weeks to complete. The sluice replacement and embankment protection works will also be completed from late spring / early summer and will take 6 weeks to complete. The scheduling of the proposed works between June and September will allow sluice replacement works within the SPA to be scheduled outside of the over-wintering bird season, where populations of over-wintering avifauna and SCI species of the River Shannon and River Fergus Estuaries SPA may utilise the nearby and adjoining areas of this SPA. Where works are required to commence during the over-wintering season, these will be carried out outside of the SPA bounds and on the dry side / terrestrial side of the embankment, near the northern extent of the study area. This will avoid and reduce potential ex-situ disturbance effects to over-wintering avifauna potentially utilising areas outside of the SPA bounds.

6.2.3 Proposed Works Monitoring

The OPW will appoint an Environmental Officer from a member of their own ground staff or technical staff to oversee the appropriate implementation of the following mitigation measures. The OPW Environmental Guidance (Brew and Gilligan, 2019)⁹ will be strictly adhered to during these works. Ground staff and technical staff will set out all management works protocols in advance of their commencement and will maintain ongoing correspondence with landowners. They will ensure the successful implementation of all mitigation measures included in this NIS and will have the authority to stop works or temporarily halt or delay ongoing works where further consideration or on-site improvements of management measures may be necessary.

6.2.3.1 Ecological Clerk of Works

The works will be supervised and monitored by suitably qualified ecologist(s) to carry out the role as Ecological Clerk of Works (ECoW). The duration of frequency of monitoring will be informed by the nature, scale and locations of the proposed works. Monitoring frequency and duration will be greatest at project set up and at certain works practices such as the sluice replacement along E1, downstream of Bunratty village. The ECoW will be on site for the duration of the works and will monitor all works practices. The ECoW will be fully appraised of all of the mitigation measures included in this NIS, and the reasons why they are to be applied. The appointed ECoW will be a member of the Chartered Institute of Ecology and Environmental

⁹ Brew, T., Gilligan, N. (2019) Environmental Guidance: Drainage Maintenance and Construction. Series of Ecological Assessments on Arterial Drainage Maintenance No 13. Environment Section. Office of Public Works, Trim, Co. Meath, Ireland;



Management (CIEEM) and will have at least 5 years experience. The appointed Ecologist will have the authority to stop works or temporarily halt or delay ongoing works where further consideration or on-site improvements of mitigation may be necessary.

The ECoW will report to the Environmental Officer. The ECoW(s) appointed to the works will have commensurate experience working in aquatic, semi-aquatic and terrestrial habitats and ecosystems. The role and responsibilities of the ECoW will be stated in the Risk Assessment Method Statement (RAMS) prepared by the contractor and agreed in advance.

The ECoW will monitor all works practices, with targeted efforts where works are completed near or immediately beside the Owenogarney River. The ECoW will also consider disturbance effects to sensitive receptors such as otter and avifauna using the Owenogarney and Cloverhill watercourses and will inform works scheduling and practices accordingly.

The ECoW will be fully appraised of all of the mitigation measures included in this NIS and the reasons why they are to be applied.

6.2.4 Management of Machinery and associated Materials

The OPW will prepare and securely store all potential pollutants within the site compound.

- All refuelling operations and mechanical repairs should be carried out at least 50m from the nearest aquatic zone on a dry, elevated site. Where this is not possible, on-site refuelling will be undertaken with every precaution taken to avoid spillage including the use, where practicable of bunding, drip trays and absorbent materials.
- Spent oil must be collected and retained for correct off-site disposal.
- Where possible, biodegradable oil should be used as a substitute for mineral oil.
- A spill kit including absorbent material and floating booms will be on site with mechanical equipment at all times. The operators should be familiar with its use.
- Under no circumstances will chemicals, fuels or machine oils be discharged into an aquatic zone.
- Construction plant and equipment shall only be parked over-night within the construction works compound area. Construction plant and equipment shall be checked daily for any visual signs of oil or fuel leakage, as well as wear and tear.
- Waste oils, empty oil containers and other hazardous wastes will be disposed of in accordance with the requirements of the Waste Management Act, 1996.

6.2.5 Movement of Machinery onto and Within Sites

These measures are prescribed to reduce and remove the risk of disturbance to habitats adjoining the works area.

- The proposed works areas will be access using existing local access roads and access tracks, most of which will be located on existing local access roads, farm access tracks and areas of improved agricultural grassland.
- Works will be concentrated on existing built embankment infrastructure and 1 no. sluice gate. Habitats adjoining the downstream face of the sluice gate is fringed by poor draining, slightly waterlogged ground comprising brackish and upper saltmarsh habitat and mudflat. These areas may be subject to rutting during the sluice gate works. Therefore access to and from the works area within wet or partially waterlogged areas will be achieved using bog mats. The correct surface treatment should be utilised where possible to minimise damage to ground and its constituent habitat. It is



considered that the EPDM (Ethylene Propylene Diene Monomer) bog mats are likely to provide the best level of protection by reduction.

- Every reasonable effort must be made to ensure that machinery does not cause rutting or become lodged.
- Where it is necessary to cross drains or wet areas, the most suitable area for crossing must be assessed. Where it is not possible or practicable to use existing crossing structures, crossing efforts will be completed using bog boards (heavy duty timber boards).
- Any dislodged soil is to be salvaged and reinstated with a digger. This will quickly re-establish and stabilise disturbed areas.

6.2.6 Protection of Soil, Surface Waters and Groundwater During Construction Stage

The following measures will be implemented to protect surface and groundwater during the project construction phase:

- All liquids, solids and powder containers will be clearly labelled and stored in sealable containers;
- All liquid and hazardous material will be stored in a designated and temporarily bunded area with appropriate signage. The temporary bunded area shall be located within the designated storage area located in the southern area of the site;
- There will be no discharge to groundwater or surface water during the construction phase. All wastewater from the construction facilities will be stored before removal off site for disposal and treatment;
- Spill kits will be provided in areas where liquids are stored and refuelling area;
- OPW personnel will be responsible for ensuring the regular maintenance of construction plant and equipment, to prevent leaks;
- Spill kits will be available to deal with accidental spillages;
- A regular review of weather forecasts for heavy rainfall will be required and the contractor will be required to prepare a contingency plan for before and after such events;
- Any compressors or generators used for connecting operations will be fitted with drip trays to collect any potential fuel and oil spills;
- Washing of tools or machinery with wet concrete will take place off-site at an appropriate dedicated wash facility that will pose no threat to surface waters;
- Overburden material shall only be stockpiled within a designated construction works compound area, and at least 50m metres from a watercourse. Separate stockpiles will be designated for different materials. Topsoil stockpiles will be double lined with silt fencing; and
- Building materials (sand, aggregates etc) shall only be stockpiled within site compound and laid out to minimise exposure to wind.
- A mobile silt trap or similar equivalent specialist water treatment system will be available on-site for emergencies in order to treat sediment polluted waters from any works process should that occur.

6.2.7 Dust Control

To ensure mitigation of the effects of dust nuisance, a series of measures will be implemented. These are outlined below.

- Overburden material shall only be stockpiled within a designated construction works compound area. Separate stockpiles will be designated for different materials;



- All stockpiles on site will be covered with a waterproof cover to prevent mobilisation of the stockpile material. Stockpiled soils and aggregates will not be located within 50m of the drainage channels or other viable hydrological vectors within the proposed development site or its surrounding environs.
- Building materials (sand, etc) shall only be stockpiled within site compound and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- No concrete production will take place on-site due to the sensitivity of the watercourses in the vicinity of the site. Concrete required for the sluice replacement works will be supplied to the site using ready mix lorries. No washing down of lorries or any other construction vehicles shall take place on-site;
- Where required, concrete will be carefully placed into shuttered structures by the use of a hydraulic pump to minimise the risk of concrete spillages. The ends of pump hoses will be secured during concreting to prevent the discharge hose accidentally depositing concrete away from the pour site;
- The delivery point for concrete will be within the bunded designated area. This will prevent potential concrete spillage from truck mixers contaminating the ground and leaching out into the groundwater. Compressors or generators used for connecting operations will be fitted with drip trays to collect fuel and oil spills that might otherwise contaminate the groundwater and lead to pollution of the watercourses;
- Concrete delivery vehicles will be precluded from washing out at or in the environs of the site, or at such location as would result in a discharge to surface waters.

6.2.8 Invasive Species

- All topsoil and grass seed introduced to site will be certified free of invasive alien plant species. Topsoil will be procured from a licenced supplier, source site will be tested and assessed for presence of invasives prior to importing and using within the works area;
- Prior to arrival on site, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic);
- Ensure all operatives are familiar with all relevant non-native invasive species. A full list and details can be found on the Inland Fisheries Ireland website <http://www.fisheriesireland.ie/Invasive-Species/invasive-species.html#help-us>.
- Any aggregate imported to site will be subject to assessment, in order to identify any invasive alien species present. All aggregates imported to site will be certified and supplied by approved quarries. Subject to the identification of invasive alien species present at any of the sites, machinery will be cleaned between infested sites (including footwear and tools).
- Relevant guidelines on aquatic based biosecurity measures can be accessed from the Inland Fisheries Ireland website <http://www.fisheriesireland.ie/Invasive-Species/invasive-species.html#help-us>
- All construction staff to refer to OPW Environmental Guidance: Drainage Maintenance and construction 2019 re: EP'S 18A and 18B.

6.2.9 Other Legislation

- The works activities shall be carried out in such a manner as to prevent nuisance or pollution of any type, such as water, noise, odour, dust, visual, light, etc.
- The requirements of the Planning Acts, Public Health Acts, Fisheries Acts, Wildlife Acts, etc must be fully complied with.



6.2.10 OPW Standard Operating Procedures

In addition to the above best practice measures, the proposed works will be completed in accordance with the measures outlined in the 'OPW Environmental Guidance: Drainage Maintenance & Construction 2019'.

The mitigation measures are again presented in Table 6-3 and linked to the features of qualifying interest of European Sites within the project zone of influence.



Table 6-3 Mitigation measures to reduce or avoid adverse effects on features of qualifying interest for European Sites within the project Zone of Influence

Potential Impact Source	Features of Qualifying Interest within the Project Zone of Influence	Character of Potential Effect	Mitigation Measures	Residual Effect
Release of particulate matter and aggregates (from open or mounded soil, subsoil and aggregates) during the embankment and sluice replacement works	<p>Aquatic species and water dependent species of qualifying interest:</p> <p>1095 Sea Lamprey <i>Petromyzon marinus</i></p> <p>1096 Brook Lamprey <i>Lampetra planeri</i></p> <p>1099 River Lamprey <i>Lampetra fluviatilis</i></p> <p>1106 Atlantic Salmon <i>Salmo salar</i> (only in fresh water)</p> <p>1355 Otter <i>Lutra lutra</i></p> <p>1140 Mudflats and sandflats not covered by seawater at low tide</p> <p>1310 Salicornia and other annuals colonizing mud and sand</p>	The release of particulate matter and soils and aggregates have the potential to degrade water quality in downstream receiving aquatic environments.	<p>Proposed works practices – works nature and scale Section 1.1.1</p> <p>Site Compound – Section 6.2.1</p> <p>Proposed Works Monitoring – Section 6.2.3</p> <p>Protection of Soil, Surface Waters and Groundwater during construction – Section 6.2.6</p> <p>Dust Control – Section 6.2.7</p>	Imperceptible



Potential Impact Source	Features of Qualifying Interest within the Project Zone of Influence	Character of Potential Effect	Mitigation Measures	Residual Effect
	1330 Atlantic salt meadows (Glauco-Puccinellietalia maritima)			
	1410 Mediterranean salt meadows (Juncetalia maritimi)			
Release of other construction contaminants – hydrocarbons, wet cement and lubricants	<p>Aquatic and water dependent features of qualifying interest:</p> <p>1095 Sea Lamprey <i>Petromyzon marinus</i></p> <p>1096 Brook Lamprey <i>Lampetra planeri</i></p> <p>1099 River Lamprey <i>Lampetra fluviatilis</i></p> <p>1106 Atlantic Salmon <i>Salmo salar</i> (only in fresh water)</p> <p>1355 Otter <i>Lutra lutra</i></p> <p>1140 Mudflats and sandflats not covered by seawater at low tide</p> <p>1310 Salicornia and other annuals colonizing mud and sand</p>	<p>The release of such contaminants through overland flow run-off has the potential to degrade water quality in downstream receiving aquatic environments, resulting in indirect effects to reliant and symbiont habitats and species.</p>	<p>Proposed works practices – works nature and scale Section 1.1.1</p> <p>Site Compound – Section 6.2.1</p> <p>Proposed Works Monitoring – Section 6.2.3</p> <p>Protection of Soil, Surface Waters and Groundwater during construction – Section 6.2.6</p> <p>Dust Control – Section 6.2.7</p>	Imperceptible



Potential Impact Source	Features of Qualifying Interest within the Project Zone of Influence	Character of Potential Effect	Mitigation Measures	Residual Effect
	1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi)			
Rutting / removal of riparian habitat with construction machinery	1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonizing mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1355 Otter Lutra lutra	Direct and indirect disturbance of in-situ habitat. Disturbance of foraging habitat for otter.	Proposed works practices – works nature and scale Section 1.1.1 Proposed Works Monitoring – Section 6.2.3 Movement of machinery onto and within sites	Imperceptible
Spread of Invasive Species	All features of qualifying interest will be impacted indirectly through the spread of invasive plant species	Direct disturbance, habitat replacement and loss, degradation of in-situ and adjoining habitat.	Proposed works practices – works nature and scale Section 1.1.1 Proposed works monitoring – Section 6.2.3 Invasive Species – Section 6.2.8 OPW Standard Operating Procedures – Section 6.2.10	Imperceptible



Potential Impact Source	Features of Qualifying Interest within the Project Zone of Influence	Character of Potential Effect	Mitigation Measures	Residual Effect
Disturbance of SCI species and mobile QI species	1355 Otter <i>Lutra lutra</i> A017 Cormorant <i>Phalacrocorax carbo</i> wintering A038 Whooper Swan <i>Cygnus cygnus</i> wintering A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> wintering A048 Shelduck <i>Tadorna tadorna</i> wintering A050 Wigeon <i>Anas penelope</i> wintering A052 Teal <i>Anas crecca</i> wintering A054 Pintail <i>Anas acuta</i> wintering A056 Shoveler <i>Anas clypeata</i> wintering A062 Scaup <i>Aythya marila</i> wintering A137 Ringed Plover <i>Charadrius hiaticula</i> wintering A140 Golden Plover <i>Pluvialis apricaria</i> wintering A141 Grey Plover <i>Pluvialis squatarola</i> wintering A142 Lapwing <i>Vanellus vanellus</i> wintering	Direct and indirect disturbance / displacement of foraging and roosting SCI species for the River Shannon and River Fergus Estuaries. Disturbance of foraging otter.	Proposed works practices – works nature and scale Section 1.1 Timing of the works – Section 6.2.2 Proposed works monitoring - Section 6.2.3 OPW Standard Operating Procedures – Section 6.2.10	Imperceptible



Potential Impact Source	Features of Qualifying Interest within the Project Zone of Influence	Character of Potential Effect	Mitigation Measures	Residual Effect
	A143 Knot <i>Calidris canutus</i> wintering A149 Dunlin <i>Calidris alpina</i> wintering A156 Black-tailed Godwit <i>Limosa limosa</i> wintering A157 Bar-tailed Godwit <i>Limosa lapponica</i> wintering A160 Curlew <i>Numenius arquata</i> wintering A162 Redshank <i>Tringa totanus</i> wintering A164 Greenshank <i>Tringa nebularia</i> wintering A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> wintering A999 Wetlands			



6.2.11 Implementation of Mitigation Measures

The Mitigation Measures (Project Design measures, Management Plans, Environmental Emergency Procedures and Best Practice Measures) will be implemented by the Site Manager during the construction stage and the OPW's appointed Environmental Officer. Implementation of the Mitigation Measures, will be implemented under the proposed works plan and the OPW's Standard Operating Procedures.

All protection measures have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. As such there is a very high degree of confidence in their likely success.

Implementation of the mitigation measures will be the responsibility of OPW and their appointed contractors. The supervision of the works will be carried out by ground staff and technical staff with experience in carrying out works on sensitive watercourses and will have 'stop works' authority.

6.2.12 Degree of confidence in the likely success of the mitigation measure

All protection measures have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. As such there is a very high degree of confidence in their likely success.

6.2.13 How any mitigation failure will be addressed

The Mitigation measures prepared specifically for this project have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and Best Practice. The Mitigation Measures are considered to be robust and proven measures which will avoid adverse effects to European Sites.

On this basis, it can be confidently concluded that failures in the mitigation measures and their prescribed outcomes will be avoided.

The best practice measures and mitigation measures presented in this NIS will ensure potentially adverse effects are identified in a timely manner and appropriate remedial action is taken immediately. The ground staff and technical staff with experience in carrying out works on sensitive habitats will have 'stop works' authority. Where required, they will temporarily stop works should mitigation measures not be complied with or following an unforeseen environmental event. Works will not be allowed to re-commence until the issue is resolved.

6.3 Residual Effects

Provided that the recommended mitigation measures set out in Section 6.2 are implemented in full, it is not expected that significant impacts will result to the qualifying features identified for appraisal in this NIS and thus it is not expected that the proposed works will have an adverse impact on the integrity of European Sites.

The NIS has examined and analysed in the light of the best scientific knowledge with respect to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, the potential impact sources and pathways, how these could impact on the site's conservation objectives and whether the predicated impacts would adversely affect the integrity of the said European sites. There is no other European site at risk of effects from the proposed development.



It has been objectively concluded, following an examination, analysis and evaluation of the relevant information, including the nature of the predicted impact from the proposed development, that the proposed development will not adversely affect (either directly or indirectly) the integrity of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, either alone or in combination with other plans or projects. Potential residual effects are considered to be imperceptible following the implementation of mitigation measures. There is no reasonable scientific doubt in relation to this conclusion.



7 NIS Conclusion

This Natura Impact Statement has been prepared to provide sufficient objective scientific information in support of the proposed development, in order to allow an Appropriate Assessment determination in the context of Article 6(3) of the Habitats Directive. The report has been prepared in order to evaluate the significance of potential effects on European sites from the proposed works, alone and in-combination with other developments.

The AA Screening (see Section 5) found that it could not be excluded, on the basis of objective scientific information that the proposed works, individually or in combination with other plans or projects, would not have a potential contributory effect on a European site without the implementation of best practice measures and standard operating procedures being implemented. Therefore, a NIS (presented in Section 6) was undertaken to ascertain whether the proposed works would have an adverse effect on the integrity of European sites within the project Zol.

Other relevant projects and plans within the project zone of influence that may give rise to in-combination effects was considered in Section 5 and Table 5.2. This assessment found that the proposed works would not give rise to in-combination or cumulative effects to European Sites.

Best Practice Design and Mitigation Measures and Standard Operating Procedures for the proposed works (as outlined within Section 6.2) have been identified to ensure that potential disturbance effects and potential pollutant sources are not released from the proposed works to the receiving environment. With the implementation of these measures there will be no risk of adverse effects on these Qualifying Features / Special Conservation Interests of European sites within this project's Zol. As the proposed sluice replacement element of the works are partially located within the footprint of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, other key measures include the OPWs standard best practice environmental control measures and the use of an ECoW which aim to restrict the works to the project footprint to avoid the removal or disturbance of non-target habitat outside of the works area.

There are no significant effects identified which would adversely affect the Special Conservation Interests or conservation objectives of the various SPAs under consideration with regard to the densities, range or conservation status of the waterbird species and their supporting wetland habitats.

There are no significant effects identified which would adversely affect the Qualifying Interests or conservation objectives of the various SACs under consideration with regard to the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC (2000) defines integrity as the 'coherence of the sites ecological structure and function, across its whole area, or the habitats, complex of habitats and/or population of species for which the site is classified'. It is clear that, given the application of prescribed protective measures for the avoidance of impacts and the implementation of the required mitigation measures, the proposed development will not give rise to adverse effects on the integrity of any of the identified European sites evaluated herein.



It has been concluded that the works individually or in combination with other plans and projects will not adversely affect the integrity of a European site, and there is no reasonable scientific doubt in relation to this conclusion.



APPENDIX A – PROPOSED WORKS METHOD STATEMENT

Scheme:	Owenogarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare

1 OUTLINE OF PROPOSED WORKS

This Method Statement refers to proposed works on the OPW’s Owenogarney Arterial Drainage Scheme. The work involves localized refurbishment along existing embankments E14, E16, E17 and E9 due to settlement and localised rutting. The refurbishment works are needed as the crest level of the embankment which has been comprised and represents a flood risk to Bunratty village. The repairs will be done using imported material which has been stored locally.

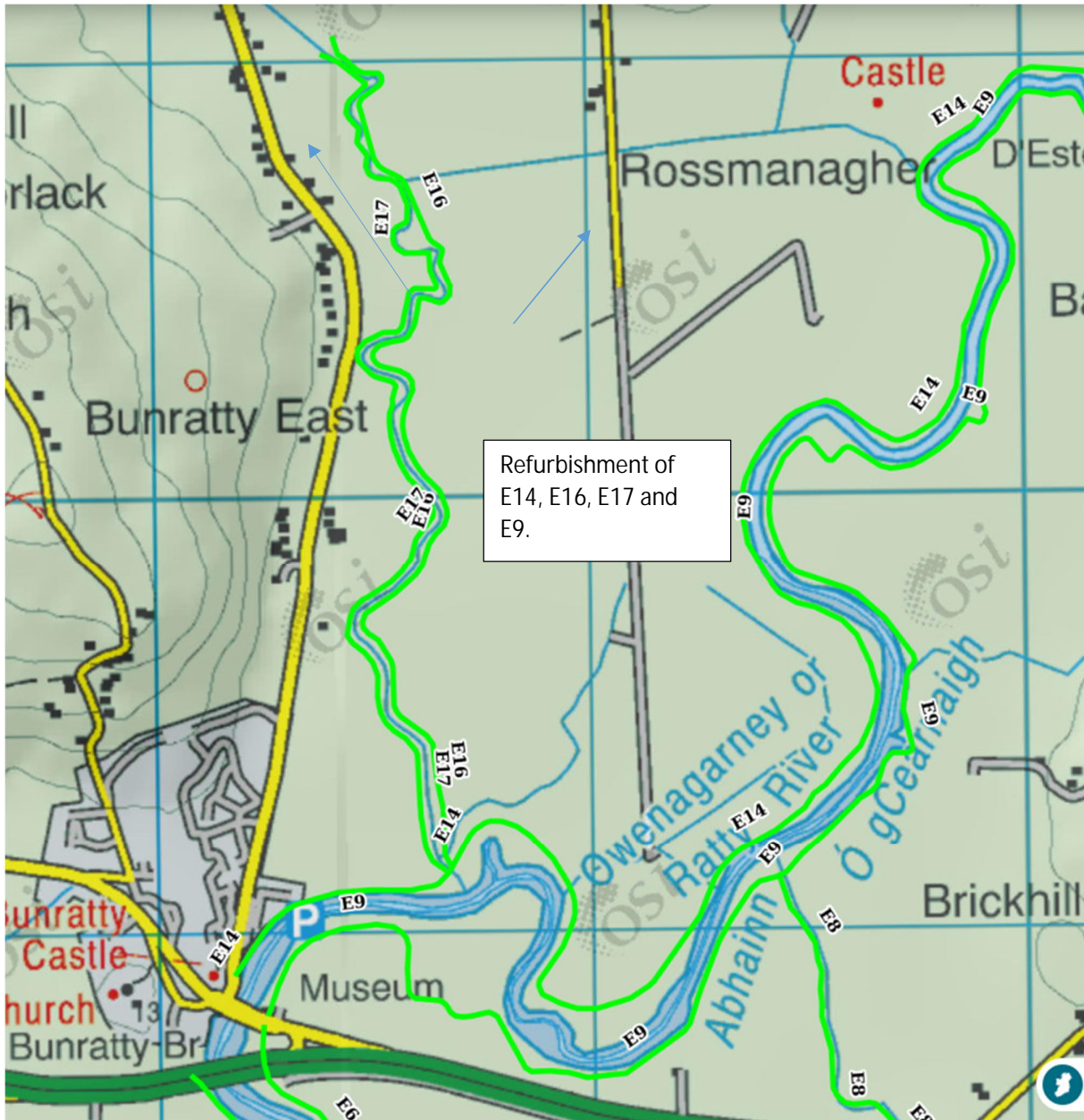
No in-channel works are required and no material or habitat shall be removed from the channel-side face of the embankment. All works shall be confined to the crest, rear-face and rear berm of the embankment for this reason.

Works on site will typically be carried out during standard OPW hours re: 08:00 – 16:30. Please Note: This method statement should be read in parallel with the completed OPW Project Risk Assessment Form and works shall be undertaken in accordance with OPW Environmental Procedures.

Scheme:	Owenagarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare

Site Location

Figure 1: Location Map (Green Line denotes embankment)



METHOD STATEMENT



Scheme:	Owenogarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare

2 RESPONSIBILITY FOR CONTROL ON SITE		
Project Foreman:	Ned Fahy	Phone: 061 227139
Site Supervisor:	Mike Kelleher	Phone: 061 227139
Safety Representative:	Mike Kelleher	Phone: 061 227139
Safety Officer:	Evan Keyes	Phone: 061 227139
Site Engineer:	David Cleary	Phone: 087 7187958

3 EQUIPMENT REQUIRED				
Major Plant	Quantity	Description	OPW	Hired
	2	14T Hydraulic Excavator	✓	
	2	Tracked 10t dumpers	✓	
Small Plant/Tools	Quantity	Description	OPW	Hired
Other Essential Equipment	Life Rings/Buoys			

4 MATERIALS REQUIRED		
Quantity	Description	Notes
T.B.C	Class 2 Soil Material	Material stored adjacent to E14 Ch500.

Scheme:	Owenogarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare

5 HEALTH & SAFETY
<p>All site operatives must read, and sign, the specific OPW Project Risk Assessment & Safety Plan relating to this project.</p> <p>The Foreman will advise of any other relevant Health & Safety issues or procedures which must be followed during the construction works.</p> <p>All works carried out on this project and site are to be carried out in accordance with the relevant OPW Risk Assessments and Safety Procedures. A copy of these documents will be available in the Site Office. All operatives are to ensure they are familiar with all of these procedures prior to commencing works.</p> <p>Mechanical plant used on site during these works is restricted to plant approved in advance by OPW Mechanical Engineering staff and may vary depending on requirements.</p> <p>Should any member of staff observe a Health and Safety issue during the course of this construction project, they must immediately inform their supervisor of their concern.</p>
<p>5.1 Establishment of Health & Safety Controls</p> <p>The site will be prepared initially to ensure the security and safety of the site. This will include preparation of the access route, installation of fencing, gates, safety barriers & environmental barriers, where required.</p> <p>A small site compound containing a steel container and eating facilities will be used to service works. Designated areas within the Site Compound will be established for welfare facilities, materials storage, vehicle parking and plant storage. See figure 5 for details.</p> <p>All health and safety controls identified in the OPW Project Risk Assessment & Safety Plan shall be established BEFORE any construction works commence. This will include signage, fencing, access/egress route, secure access ladders, barriers etc.</p> <p>All operatives, and visitors to site, are required to wear appropriate PPE at all times.</p> <p>Visitors to site shall inform the Site Foreman/Supervisor of their presence. Operatives working on the site shall escort any visitors to the Site Foreman/Supervisor immediately upon observing a visitor to the site. The Foreman will deliver a site induction to any visitors upon their arrival to site.</p> <p>Good housekeeping procedures on the site shall be followed at all times. Materials will be stored tidily in a designated area, as instructed by the Site Foreman.</p> <p>All potential hazards should be identified and where possible removed or appropriate mitigation measures put in place. All work to be carried out in accordance with appropriate safe working practices.</p>
<p>5.2 Safety Procedures & Risk Assessments</p> <p>The following Safety Procedures and Risk Assessments, not exclusively, shall be examined and adhered to in the planning and execution of the works.</p>

Scheme:	Owenogarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare

Risk Assessments

RA29 Working Adjacent to or in Water

RA6 Excavation

RA14 Mobile Plant

RA7 Excavator 360°

RA15 Noise

Safety Procedures

- SP09 Personal Protective Equipment (PPE)
- SP32 Working Adjacent to Water

5.3 Working Adjacent to Water

The OPW “Working in or Adjacent to Water” Risk Assessment and SP32 “Working Adjacent to Water” Safety Procedure must be followed by all operatives.

5.4 Working alongside Utilities

An examination of the GIS-Demo ESB layer network indicates that there are overhead assets in the vicinity of the works area.

A safe system of work shall be adopted at all times in relation to works taking place in the vicinity of overhead and underground power lines should they be observed to be present at this site location.

ESB Networks Code of Practice Avoiding Danger from Overhead Lines and HSA Code of Practice Avoiding Danger from Underground Services documents relating to these hazards shall be consulted prior to works being carried out. Copies of these documents are available in the Site Office. Any controls and mitigation measures identified in these documents shall be put in place and adhered to by all operatives.

5.5 Lifting Operations

Any lifting operations required during this project must be conducted with due regard to the OPW Risk Assessment procedure.

The weights of all objects to be lifted shall be ascertained prior to lifting and all lifting appliances shall be recorded with their assigned Safe Working Load.

Lifting operations shall be undertaken in the presence of a trained slinger/signaller, with the driver of the lifting appliance having also completed slinger/signaller training.

All operatives who will be working in the vicinity of lifting operations will be informed of the lifting plan prior to any works commencing.

Ground conditions shall be assessed prior to lifting operations to ensure the lifting appliance has a suitable bearing. If there is a doubt over the ground conditions, timber matting shall be used underneath the lifting appliance.

Scheme:	Owenogarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare

6 ENVIRONMENTAL PROTECTION & MITIGATION
<p>All works carried out during this project will be undertaken in accordance with OPW’s Environmental Management Protocols & Standard Operating Procedures. (Refer to “OPW Environmental Guidance: Drainage Maintenance & Construction 2019”). Environmental Drainage Maintenance (EDM) Guidelines will be followed at all times.</p> <p>Disturbance of the habitat along the channel side of the embankment will be kept to a minimum. It is noted that embankment repair works have to be undertaken during periods of favourable weather due to ground conditions.</p>
<p>6.1 Specific Environmental Management Procedures & Controls</p> <p>Fuelling of machines will be carried out in accordance with OPW Protocols, machines will be kept away from the channel, not less than 50m and fuelled at a safe location with all machines provided with spill kits. The jeep delivering fuel is certified in accordance with regulations and double banded. No fuels to be stored on site only in approved vented fuel store with spill trays incorporated.</p>
<p>6.2 Invasive Species</p> <p>During the site inspection the presence of invasives plant species was not observed.</p> <p>In the event that any invasive species are encountered on site during the project, the OPW Environment will be contacted immediately to advice on the procedures to be followed.</p>
<p>6.3 Biosecurity</p> <p>All staff to refer to OPW Environmental Guidance: Drainage Maintenance and construction 2019 re: EP’S 18A and 18B.</p>

7 METHOD OF WORKS
<p>7.1 Site Management</p> <p>Prior to works beginning, a site compound shall be established with designated areas for:</p> <ul style="list-style-type: none"> ▪ Welfare Facilities ▪ Vehicle Parking ▪ Plant Storage ▪ Equipment Storage ▪ Materials Storage <p>The site compound will be set back not less than 50m from the river channel.</p>
<p>7.2 Site Preparation</p> <p>The works area shall be fenced off to provide safety and security, if required.</p> <p>Livestock fencing shall be installed given the location of the works within agricultural land, if required.</p> <p>No works shall begin before the site works area is fully fenced off and secure.</p>

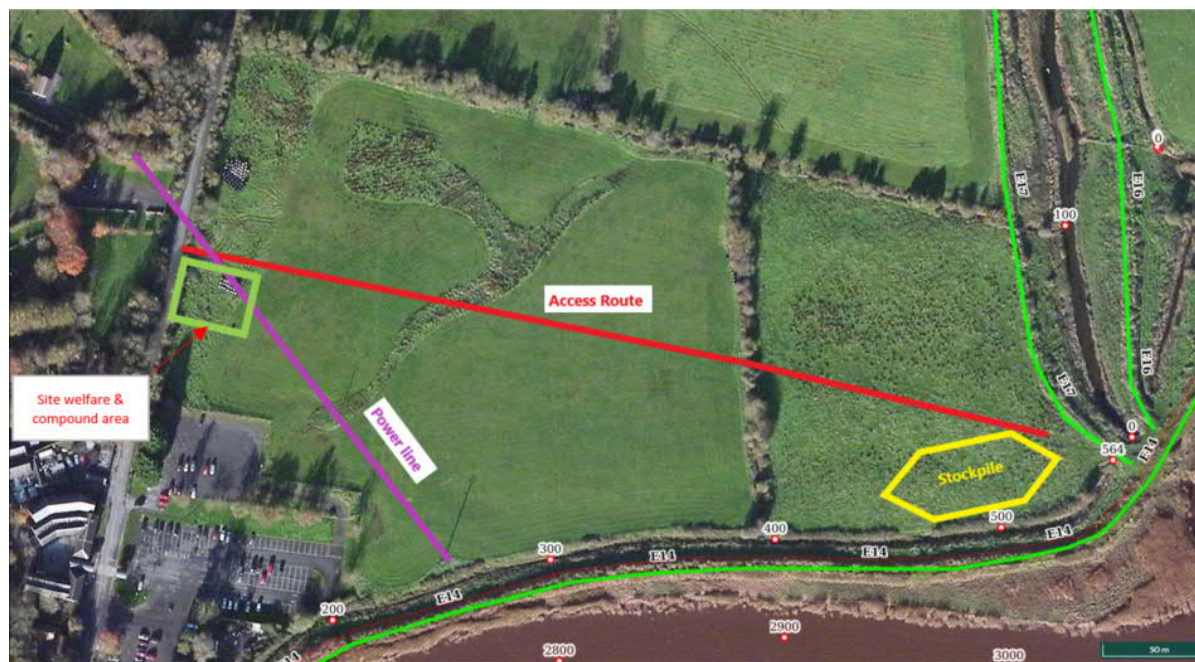
Scheme:	Owenogarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare

7.3 Works Plan

The works duration will be in the region of 16 weeks. It is likely that the works will not be completed in one complete block and there may be a number of visits.

The Foreman, Site Supervisor and excavator operators shall walk the site in advance of any works proceeding to assess ground conditions, determine suitability of the area for the placement of machinery, location of any services, such as overhead/underground power-lines or if there is a requirement for the use of bog mats. From the most recent site inspection it is not envisaged that bog mats will be required for this site. There was also no evidence of underground services or overhead power lines observed in the vicinity of the works area.

On all occasions, the excavator operator must be satisfied with the ground conditions upon which he intends to work from. Discussion must take place between the excavator operator and the operatives working in the vicinity of the plant. Operatives must not enter the danger zone of the excavator unnecessarily. Excavator operator is to liaise with the appointed slinger/signaller at all times.



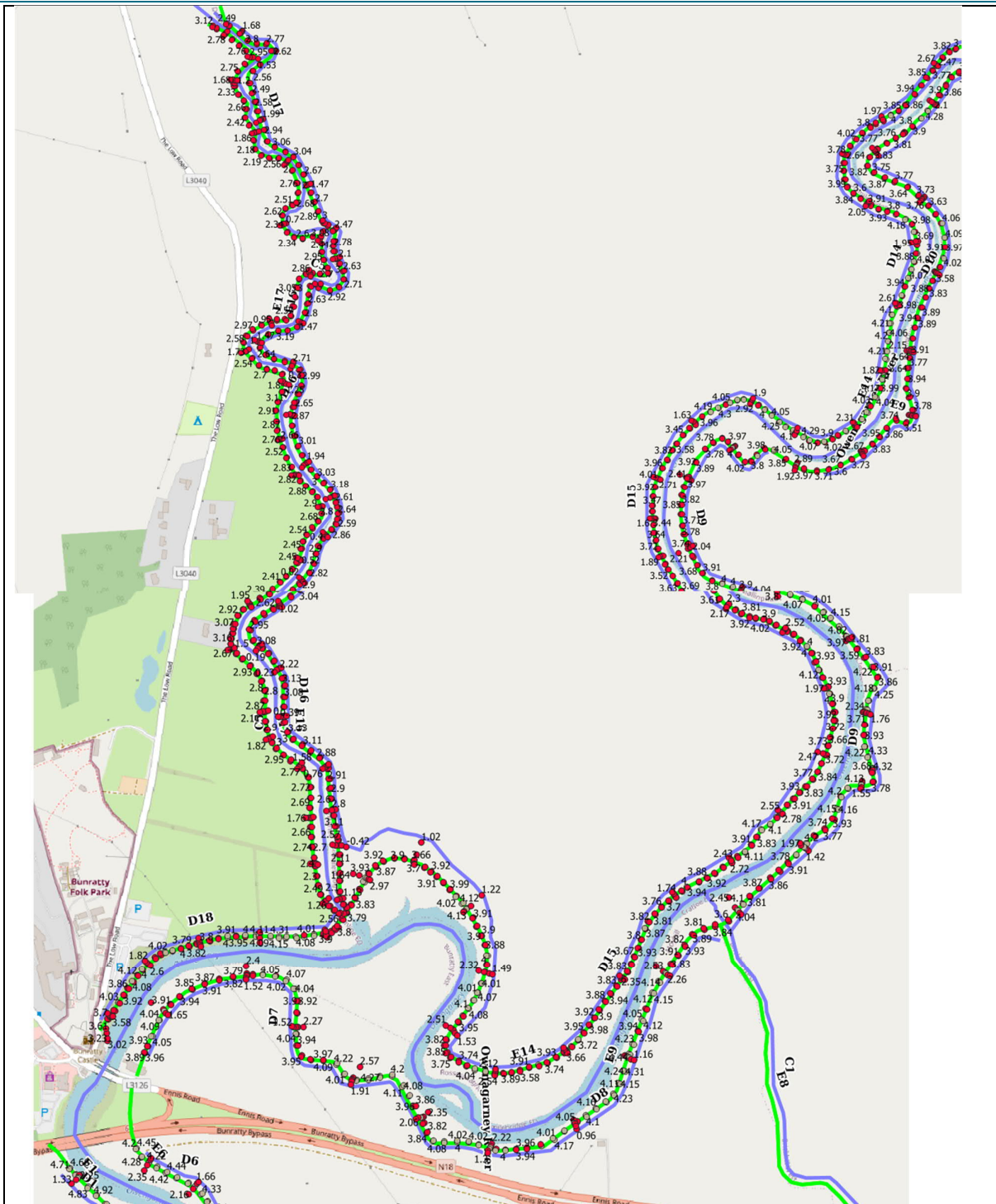
7.4 Embankment Refurbishment Methodology

The embankment will be repaired in localised sections. The topsoil/vegetation layer will be with the excavator and set aside for reuse. Topsoil will be stockpiled in a designated area on the landward side of the defence.

An excavator will operate from the crest of the embankment and will spread the material evenly over the location being refurbished. The material will be tracked in with the excavator to ensure the seal and required level of consolidation is achieved. Topsoil will then be replaced and seed will be applied to ensure soil stabilisation and prevent erosion.

Ground conditions at the site will be continually assessed to ensure suitable load bearing for mechanical excavators. Ground conditions will vary and will require reassessment throughout the works/after periods of bad weather. Bog mats will be used if necessary.

Scheme:	Owenogarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare



Design levels of Embankments are 4.0m, survey levels shown were recorded in 2022. Further information on the conditions of the embankments can be found on the relevant Shannon Estuary Asset Inspection Report for E9, E14, E16 and E17.

Scheme:	Owenogarney Arterial Drainage Scheme
Project:	Embankment Refurbishment – OPW E14, E16, E17 and E9
Site Location:	Bunratty, Co. Clare

8 COMPLETION OF WORKS
<p>Following the completion of the construction works, the surrounding area shall be reinstated to a condition similar to, or better than the pre-works situation.</p> <p>Boundaries shall be re-established to the landowner’s satisfaction.</p> <p>A photographic survey of the completed works shall be carried out by the Site Foreman.</p> <p>A final inspection of the completed works shall be carried out by the Site Foreman and OPW Engineer to ensure satisfaction with the quality of the works and allow sign-off on OPW Project Risk Assessment / Safety Plan.</p> <p>Landowner to be asked to fill out Landowner Satisfaction Form where relevant</p>

9 SCHEDULE OF RELEVANT DOCUMENTS

- OPW Forms:
- Incident Report Form
 - Contractors Rules
 - Project Risk Assessment

- Statutory Forms if reqd:
- AF3
 - AF4
 - GA2
 - GA3

- Shannon Estuary Asset Inspection Report:
- Owenogarney O-E14
 - Owenogarney O-E16
 - Owenogarney O-E17

Project/Site	Embankment repairs – E14, E16, E17 & E9. Owenogarney CDS.	
Checked By	Ned Fahy	Foreman
Approved By	James Fitzgerald	Engineer(s)
Read & Communicated By		Supervisor

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

1 OUTLINE OF PROPOSED WORKS	
	<p>This Method Statement refers to proposed works on the OPW’s Bunratty Rineanna Arterial Drainage Scheme—the proposed work replacement of sluice SL1 and placement of rock armour along a section of the embankment E1. The works will involve sheet piling the front (creek area) and rear of SL1 to provide a safe workplace. Remove a section of the Embankment, Excavate down to the old headwall removing it and forming a new foundation with steel and concrete. Installing a precast headwall. Installing a uPVC Pipe and uPVC door on the new headwall. Excavating the remainder of the old pipe and installing new PVC pipe. Forming a new foundation and rear headwall. Replacing the material around the pipe. Installing Geotextile around the front headwall and placing rock armour. Backfilling the excavated material. Reforming the Embankment. Placing grass seed. The rock armour installation will involve the placement of a line of 1 to 2t rock at the toe of the embankment where erosion has taken place.</p> <p>The site is located in the townland of Bunratty West, approximately 150m south of the N18. Access is from the N18 and via a haul road adjacent the embankment.</p> <p>Works on site will typically be carried out during standard OPW hours re: 08:00 – 16:30. Sluice 1 Embankment E1 is located adjacent the Owenogarney River, which is subject to tidal water. The flow and water levels in the channel will vary depending on recent rainfall patterns and time of year works are being undertaken. It is intended to carry out the works in Summer 2024 onwards.</p> <p>Please Note: This method statement should be read in parallel with the completed OPW Project Risk Assessment Form and all relevant project documentation.</p> <p>If any issue within this method statement or during the progression of the works needs clarification, the appropriate supervisor should be contacted immediately.</p>

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

Site Location

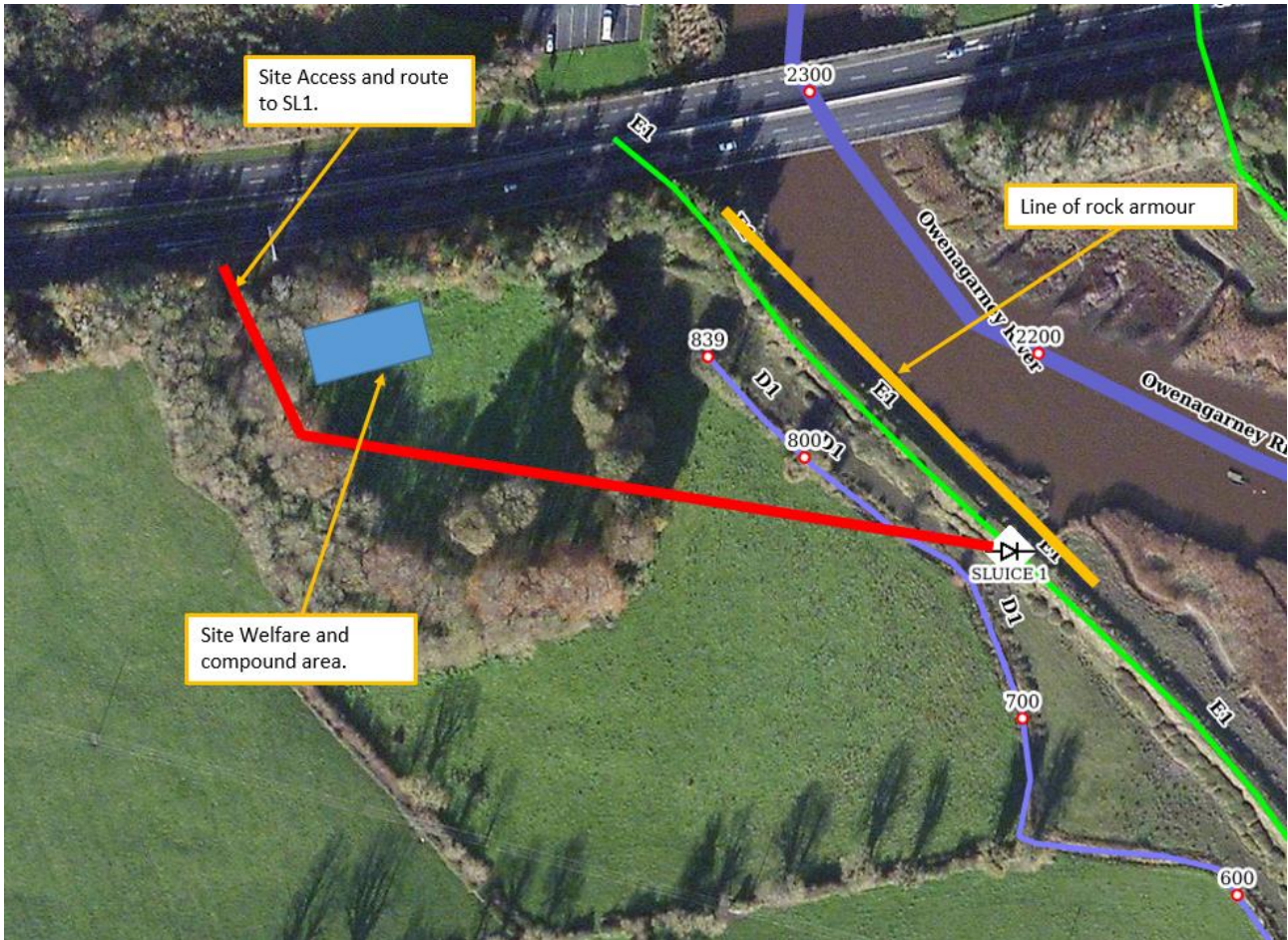
Sluice 1 Embankment E1 Bunratty West, Co. Clare (52.6937, -8.8115).



Location Map from Google Maps Aerial Imagery

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

Proposed Site Layout



Proposed site layout & site access

2 RESPONSIBILITY FOR CONTROL ON SITE		
Project Foreman:	Ned Fahy	Phone: 087 4192093
Site Supervisor:	Mike Kelleher	Phone: 087 4192093
Safety Representative:	Mike Kelleher	Phone: 087 4192093
Safety Officer:	Evan Keyes	Phone: 061 227139
Site Engineer:	James Fitzgerald	Phone: 087 1693460

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

3 EQUIPMENT REQUIRED				
	Quantity	Description	OPW	Hired
Major Plant	1	25T Hydraulic Excavator (Long Reach)	✓	
	1	Artic Truck & Low-loader	✓	
	1	Tractor & Trailer	✓	
	1	Site/Track Dumper	✓	
	1	14T Excavator	✓	
	2	6" Pumps		✓
	Quantity	Description	OPW	Hired
Small Plant/Tools	2	Drills	✓	
		Peri Shutters	✓	
		Hand Tools		✓
Other Essential Equipment	Life Rings/Buoys Lifting Chains / Slings			

4 MATERIALS REQUIRED		
Quantity	Description	Notes
T.B.C	Rock Armour	As per the Design Drawing
T.B.C	Geogrid	As per the Design Drawing
1	Precast Headwall	
T.B.C	3" down	As needed
T.B.C	Concrete	As per the Design Drawing
T.B.C	Steel	As per the Design Drawing
6	uPVC Pipe 800mm x 6m	
T.B.C	Timbers	Shuttering

5 HEALTH & SAFETY
<p>All site operatives must read, and sign, the specific OPW Project Risk Assessment & Safety Plan relating to this project.</p> <p>The Foreman will advise of any other relevant Health & Safety issues or procedures which must be followed during the construction works.</p>

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

All works carried out on this project and site are to be carried out in accordance with the relevant OPW Risk Assessments and Safety Procedures. A copy of these documents will be available in the Site Office. All operatives are to ensure they are familiar with all of these procedures prior to commencing works.

Mechanical plant used on site during these works is restricted to plant approved in advance by OPW Mechanical Engineering staff and may vary depending on requirements.

Should any member of staff observe a Health and Safety issue during the course of this construction project, they must immediately inform their supervisor of their concern.

5.1 Establishment of Health & Safety Controls

The site will be prepared initially to ensure the security and safety of the site. This will include preparation of the access route, installation of fencing, gates, safety barriers & environmental barriers, where required.

A small site compound containing a steel container and eating facilities will be used to service works. Designated areas within the Site Compound will be established for welfare facilities, materials storage, vehicle parking and plant storage.

All health and safety controls identified in the OPW Project Risk Assessment & Safety Plan shall be established **BEFORE** any construction works commence. This will include signage, fencing, access/egress route, secure access ladders, barriers etc.

All operatives, and visitors to site, are required to wear appropriate PPE at all times. All OPW employees must comply with existing Covid-19 regulations and requirements.

Visitors to site shall inform the Site Foreman/Supervisor of their presence. Operatives working on the site shall escort any visitors to the Site Foreman/Supervisor immediately upon observing a visitor to the site. The site supervisor will deliver a site induction to any visitors upon their arrival to site.

Good housekeeping procedures on the site shall be followed at all times. Materials will be stored tidily in a designated area, as instructed by the Site Foreman.

All potential hazards should be identified and where possible removed or appropriate mitigation measures put in place. All work to be carried out in accordance with appropriate safe working practices.

5.2 Safety Procedures & Risk Assessments

The following Safety Procedures and Risk Assessments, not exclusively, shall be examined and adhered to in the planning and execution of the works.

Risk Assessments

RA19 Portable Power Tools	RA 57 Coronavirus (Covid 19)
RA35 Lifting Operations	RA15 Noise

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

<p>RA38 Ladder</p> <p>RA28 Working at Heights</p> <p>RA29 Working Adjacent to or in Water</p> <p>RA7 Excavator 360°</p> <p>RA9 Fuel Bowser Operations</p> <p><u>Safety Procedures</u></p> <ul style="list-style-type: none"> ▪ SP09 Personal Protective Equipment (PPE) ▪ SP10 Lifting Equipment - Lifting Gear ▪ SP11 Electricity ▪ SP14 Biological Agents ▪ SP21 Working at Heights ▪ SP32 Working Adjacent to Water ▪ <p>COVID-19 Compliance Warden TBT</p> <p>COVID-19 Onsite Warden Checklist.</p>	<p>RA32 Fencing Operations</p> <p>RA23 Tractor Operations</p> <p>RA14 Site Dumper</p> <p>RA13 Low-loader Operations</p> <p>RA6 Excavation</p>
<p>5.3 Working Adjacent to Water</p> <p>The OPW “Working in or Adjacent to Water” Risk Assessment and SP32 “Working Adjacent to Water” Safety Procedure must be followed by all operatives. Guardrails shall be erected to secure banks above water.</p> <p>Life-rings shall be erected at intervals not exceeding 50m along the proposed works areas.</p> <p>Weather forecasts shall be consulted to ensure no potential large rainfall events are due to occur.</p>	
<p>5.4 Working alongside Utilities</p> <p>An examination of the GIS-Demo ESB layer network indicates that there does not appear to be overhead or underground assets in the vicinity of the works area.</p> <p>A safe system of work shall be adopted at all times in relation to works taking place in the vicinity of overhead and underground power lines should they be observed to be present at this site location.</p> <p>ESB Networks Code of Practice Avoiding Danger from Overhead Lines and HSA Code of Practice Avoiding Danger from Underground Services documents relating to these hazards shall be consulted prior to works being carried out. Copies of these documents are available in the Site Office. Any controls and mitigation measures identified in these documents shall be put in place and adhered to by all operatives.</p> <p>A ground survey (CAT & Genny) by a competent operative will be carried out before any excavation takes place.</p>	
<p>5.5 Lifting Operations</p> <p>Any lifting operations required during this project must be conducted with due regard to the OPW Risk Assessment procedure.</p>	

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

The weights of all objects to be lifted shall be ascertained prior to lifting and all lifting appliances shall be recorded with their assigned Safe Working Load.

Lifting operations shall be undertaken in the presence of a trained slinger/signaller, with the driver of the lifting appliance having also completed slinger/signaller training.

All operatives who will be working in the vicinity of lifting operations will be informed of the lifting plan prior to any works commencing.

Ground conditions shall be assessed prior to lifting operations to ensure the lifting appliance has a suitable bearing. If there is a doubt over the ground conditions, timber matting shall be used underneath the lifting appliance.

5.6 Personal Protective Equipment

In addition to the standard PPE, operatives shall be provided with the following equipment for this project:

- Safety Goggles
- Ear Defenders
- Gloves
- Life Jacket (if water deep or fast moving – to be assessed by John Murray)

6 ENVIRONMENTAL PROTECTION & MITIGATION

All works carried out during this project will be undertaken in accordance with OPW’s Environmental Management Protocols & Standard Operating Procedures. (Refer to “OPW Environmental Guidance: Drainage Maintenance & Construction 2019”). Environmental Drainage Maintenance (EDM) Guidelines will be followed at all times. It should be noted the works are being carried out within or adjacent to a protected area re: SAC,SPA,NHA.

Existing GIS habitat mapping will be analysed in advance of works to identify and flag any known sensitive areas. This information will be made available and briefed to the site team in advance of works.

6.1 Specific Environmental Management Procedures & Controls

Fuelling of machines will be carried out in accordance with OPW Protocols, machines will be kept away from the channel, not less than 50m and fuelled at a safe location with all machines provided with spill kits. The jeep delivering fuel is certified and double banded. No fuels to be stored on site only in approved vented fuel store with spill trays incorporated.

6.2 Invasive Species

During the site inspection, the presence of invasive species was not observed. The site works area will be rechecked for invasive species before any works commence. Existing GIS maps will also be analysed and all pertinent information will be included in the project file.

In the event that any invasive species are encountered on site during the project, the OPW Environment Section will be contacted immediately to advise on the procedures to be followed’. The OPW SOP for the management of invasive species will be adhered to and all procedures carried out will be recorded in the

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

Safety File. Care shall be taken to protect against the current Crayfish Plague using appropriate disinfection measures before entering site.

6.3 Biosecurity

All staff to refer to OPW Environmental Guidance: Drainage Maintenance and construction 2019 re: EP’S 18A and 18B.

7 METHOD OF WORKS

7.1 Site Management

Prior to works beginning, a site compound shall be established with designated areas for:

- Welfare Facilities
- Vehicle Parking
- Plant Storage
- Equipment Storage
- Materials Storage

The site compound (See Site Layout) will be set back not less than 50m from the working channel.

7.2 Site Preparation

The works area shall be fenced off to provide safety and security, if required.

Livestock fencing shall be installed given the location of the works within agricultural land, if required.

No works shall begin before the site works area is fully fenced off and secure.

7.3 Works Plan

The Foreman, Site Supervisor and excavator operators shall walk the site in advance of any works proceeding to assess ground conditions, determine the suitability of the area for the placement of machinery, location of any services, such as overhead/underground power lines etc. There was also no evidence of underground services or overhead power lines observed in the vicinity of the works area. Also, Refer to maps attached to PRA/M.S.

The typical duration of Sluice works will be in the region of 6 weeks (37 - 40 man weeks). This will depend on site location, existing ground conditions and accessibility.

On all occasions, the excavator operator must be satisfied with the ground conditions upon which he intends to work.

When the excavator operator decides to position the excavator adjacent to the excavations, he must ensure the bank is stable, wide enough and has sufficient bearing capacity to accommodate the machine.

Discussion must take place between the excavator operator and the operatives working in the vicinity of the plant Operatives must not enter the danger zone of the excavator unnecessarily. The excavator operator is to liaise with the appointed slinger/signaller at all times.

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

7.4 De-watering of Works Area/Excavations

The works area will be dewater after the sheet piles are in place.

7.5 Demolition of Existing Structure

Removal of the old sluice head wall and pipe.

7.6 Construction of Sluice – Methodology

Construction will be undertaken in accordance with the following design drawing.

7.6.1 Setting up work site.

There is an existing entranceway and gates off the main N18. Install Haul road, compound and turning pad using geogrid and 3” down material compacted every 200mm.

7.6.2 Install Sheet Piles

Install sheet piles into this berm until the berm meets the Embankment. The process will be repeated for the rear of the Sluice, use bog mats for plant placement if ground is too soft for access.

7.6.3 Removal of the Embankment

The Long Reach excavator will then remove a section of the Embankment down to ground level. The material will be transported away to a storage area.

7.6.4 Removal of the old Sluice Head wall

The excavator will remove and dispose of the old head wall and door.

7.6.5 Install of New headwalls, Pipe and Sluice door

The excavator will excavate down to the new foundation level.

The team will install shuttering and steel as per the drawings.

Pour a concrete foundation. Strike the shuttering.

Install the precast headwall.

Install a length of UPVC pipe 800mm x 6m. Cast in situ a concrete wall to tie the Pipe and headwall together.

Install the Sluice door on the precast headwall.

Install shuttering to create a wall behind the precast headwall.

Excavate the remaining old pipe.

Excavate a new foundation for the rear headwall.

Install shuttering and steel. Pour concrete. Strike shuttering.

Install The remaining PVC piping. Form a shuttering around the pipe. Install steel and pour concrete.

Strike and repeat for the wing walls. Start covering the pipe with the excavated material.

7.6.6 Installing Rock Armour at Sluice

A layer of Terram to be installed around the front headwall. Large rocks will be placed over this. This will protect the head wall from erosion.

7.6.7 Replacement of the Embankment

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
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The Material will be transported back from the storage area. The Excavator will place it and compact it in layers until the Embankment is reformed. Grass seed should be applied.

7.6.8 Remove the Sheet piles
 Extract the sheet piles and remove the imported material. The berm will then be return to its natural state.

7.6.9 Reinstatement
 On completion of works the turning pad and compound to be removed, the surrounding area shall be reinstated to a condition similar to, or better than the pre-works situation. All construction waste will be removed and disposed of offsite.

7.7 Placement of Embankment Rock Armour
 A layer of rock armour is required at the toe of embankment E1, Ch 1200 to 1350m. The rock armour will be stored at the site laydown area and transferred to the embankment when required. A layer of Terram is to be installed along the toe of the embankment. Large rocks will be placed over this to protect the embankment from further erosion.

8 COMPLETION OF WORKS

Boundaries shall be re-established to the landowner’s satisfaction.

A photographic survey of the completed works shall be carried out by the Site Foreman.

Records of any utility diversions and their locations shall be maintained and filed appropriately.

A final inspection of the completed works shall be carried out by the Site Foreman and OPW Engineer to ensure satisfaction with the quality of the works and allow sign-off on OPW Project Risk Assessment / Safety Plan.

Landowner to be asked to fill out Landowner Satisfaction Form while adhering to Covid-19 Protocol.

9 SCHEDULE OF APPENDICES / DOCUMENTS ATTACHED

- | | |
|--------------------------------------|----------------------|
| <u>Main Documentation:</u> | <u>OPW Forms:</u> |
| – Site Location Maps | Incident Report Form |
| – Contractors Rules | |
| – | |
| <u>Statutory Forms:</u> | |
| – TBT Covid-19 Site Safety Induction | |
| – AF3 | - AF4 |
| – GA2 | - GA3 |

METHOD STATEMENT

Scheme:	Bunratty Rineanna Arterial Drainage Scheme
Project:	Sluice Replacement SL1 D1/E1
Site Location:	Bunratty West, Co. Clare (52.6937, -8.8113) (Lat, Long)

Project/Site	Bunratty West, Bunratty, Co. Clare SL1 D1/E1 Replacement	
Checked By	Ned Fahy	<i>Foreman</i>
Approved By	James Fitzgerald	<i>Engineer(s)</i>
Read & Communicated By		<i>Supervisor</i>



APPENDIX B – HABITAT MAPPING

