Kilkee Flood Relief Scheme

Preliminary CEMP

12 July 2024

Project number: 2019s1431

Clare County Council

JBA Project Manager

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Revision History

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S3-P01 / 25.03.24	Draft Report	CCC
S3-P02 / 21.06.24	Updated comments	CCC
A3-C01 / 12.07.24	Final Report	CCC

Contract

This report relates to the Kilkee Flood Relief Scheme commissioned by Clare County Council, on behalf of the Office of Public Works. Conor O'Neill and Justin Nangle of JBA Consulting carried out this work.

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Purpose

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Abbreviations

CEMP	Construction Environmental Management Plan
CMP	Construction Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Company providing research and training in the construction industry
DoEHLG	Department of the Environment, Heritage and Local Government
ECoW	Ecological Clerk of Works
EC	European Communities
ECWMP	Environmental and Construction Waste Management Plan
EU	European Union
GIS	Geographical Information System
INNS	Invasive and Non-Native Species
NBDC	National Biodiversity Data Centre
NPWS	National Parks and Wildlife Services
NRA	National Roads Authority
pNHA	Proposed Natural Heritage Area
PSCS	Project Supervisor for the Construction Stage
SAC	Special Area of Conservation
SPA	Special Protection Area

1 Introduction

1.1 General

JBA Consulting was commissioned by Clare County Council to develop a preliminary Construction Environmental Management Plan (CEMP) in relation to the proposed Flood Relief Scheme (FRS) in Kilkee, Co. Clare (the 'proposed development'). The proposed development consists of a flood relief scheme to minimise the risks currently posed to people, the community, social amenity, environment, and landscape. The proposed planning permission relates only to the construction of fluvial flood defence assets. A separate coastal scheme is being considered for Kilkee. Any future coastal scheme proposals will form part of a separate planning application and EIAR and are therefore not included or considered in this project, nor EIAR.

1.2 Background

Kilkee has historically been subject to fluvial flooding and as such the town was part of the Office of Public Works (OPW) Catchment Flood Risk Management (CFRAM) study programme. The proposed development will act to protect vulnerable parts of Kilkee from fluvial flooding.

The proposed works will need to demonstrate that no significant impact on the integrity of the environment, habitats and species at the site is incurred, including no disturbance to or loss of the identified habitats and species, and that there will be no long-term impact on water quality.

This will include setting out and following construction phase best practice and mitigation measures. The CEMP proposes mitigation measures designed to protect the stipulated habitats and species associated with the proposed site.

The following reports, produced by JBA, have been submitted with this preliminary CEMP as part of the planning application:

- JBA, Environmental Impact Assessment Report (EIAR)
- JBA, Natura Impact Statement (NIS)

The above reports should be read in full to ascertain the ecological and environmental constraints that may be applicable to the construction works for this project.

1.3 Objective of the CEMP

The objective of this document is to inform all personnel (Main Contractor and sub-contractors) of their obligations with regards to environmental protection.

The CEMP seeks to:

- Provide a basis for implementing construction related mitigation measures to safeguard identified environmental issues;
- Comply with all relevant planning conditions, environmental legislation and statutory consents; and
- Promote best construction and environmental on-site practices for the duration of the works.

This CEMP defines the project-specific environmental measures that are to be put in place and procedures to be followed for the scope of construction works, both temporary and permanent, for the project. This plan and methodology seek to demonstrate how works on the project can be delivered in a logical, sensible and safe sequence with the incorporation of specific measures to mitigate the impact on people, property and the environment.

This should be viewed as a 'live' document, to be updated by the Main Contractor for implementation throughout the project in response to changing conditions on site.

This review of construction activities covers a description of:

- Duration and phasing;
- Site preparation;
- Construction methods;
- Materials source and transportation;

- Employment and accommodation;
- Dust, noise and traffic;
- Construction safety;
- Waste disposal; and
- Services Requirements.

Proposed environmental measures that will be installed on site during construction are included in this CEMP. This document will be updated to include any additional conditions proposed by the relevant local authority as a result of their review of the CEMP.

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

In the event of an accident or emergency on site during the construction period, the CEMP will be reviewed, and procedures amended if necessary. All personnel and sub-contractors will be made aware of the CEMP during the toolbox talks. The site manager or his environmental manager will be responsible for maintaining and updating the approved document.

The Main Contractor will be required to produce a site-specific CMP (Construction Management Plan), which will ensure that their construction activities are planned and will meet the environmental requirements outlined in this CEMP (Construction Environment Management Plan). The procedures agreed in this CEMP will be audited regularly throughout the construction phase to ensure compliance.

2 Legislation and Guidance

Relevant legislation and best practice guidance that have been considered includes but is not limited to the following:

2.1 National and International Legislation

- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) which brings into effect the EU Water Framework Directive (2000/60/EC);
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009;
- Local Government (Water Pollution) Acts 1977-1990;

2.2 Environment Liability Regulations

The Regulations supplement existing National and European Legislation to achieve the prevention and remediation of environmental damage. Environmental damage under the Environmental Liability Regulations 2008 means:

- Water damage that has significant adverse effects on water status under the Water Framework Directive (2000/60/EC);
- Land damage that creates a significant risk to human health as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms; and
- Damage to protected species and natural habitats.

The Regulations represent an overarching piece of legislation that can be used in concert with all the Agency's existing powers but will only be used in the appropriate circumstances when environmental damage has occurred as a result of an incident.

2.3 Best Management Guidelines

The following Guidelines will be used, as a minimum, by the contractor to prepare their Method Statements and Environmental Management Plan:

- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters. Inland Fisheries Ireland, (IFI, 2016);
- Inland Fisheries Ireland - Planning for Watercourses in the Urban Environment. A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning (IFI, 2020)
- Fishery guidelines for Local Authority works. Department of Marine and Natural Resources 1998;
- CIRIA – Guideline Document C532 – Control of Water Pollution from Construction Sites;
- CIRIA – Guideline Document C642 – Development and Flood Risk – Guidance for the Construction Industry;
- CIRIA Guidance C515: 'Control of groundwater for temporary works' (Somerville *et al*., 1986);
- CIRIA Guidance C741: *Environmental good practice on site guide* (Charles & Edwards, 2015);
- CIRIA Guidance C750D: 'Groundwater control: design and practice' (Preene *et al.*, 2016);
- CIRIA - Control of water pollution from construction sites - guide to good practice (SP156);
- CIRIA - C648 Control of water pollution from linear construction projects & Site Guide C649;
- NetRegs Guidance for Pollution Prevention for works and maintenance in or near water (NetRegs, 2017);
- Environment Agency Pollution Prevention Guidelines for construction and demolition sites (EA, 2012).
- NRA (2005) Guidelines for the crossing of watercourses during the construction of National Road Schemes

3 Proposed Development

3.1 Site location

Kilkee is adjacent to Moore Bay on the west coast of County Clare. The Victoria Stream and the Atlantic Stream are the two main watercourses that flow through the town of Kilkee and are the two main watercourses considered in the Flood Relief Scheme. Both streams flow from southeast to northwest, with the Victoria Stream located to the south of the town and the Atlantic Stream located to the north of the town. The two streams have a number of tributaries and drainage channels which contribute to the flow through the area. Both watercourses are tidal, with Kilkee susceptible to both coastal and fluvial flood risk. The proposed development is focused solely on fluvial flood risk shown in Figure 3.1 and 3.2 below.

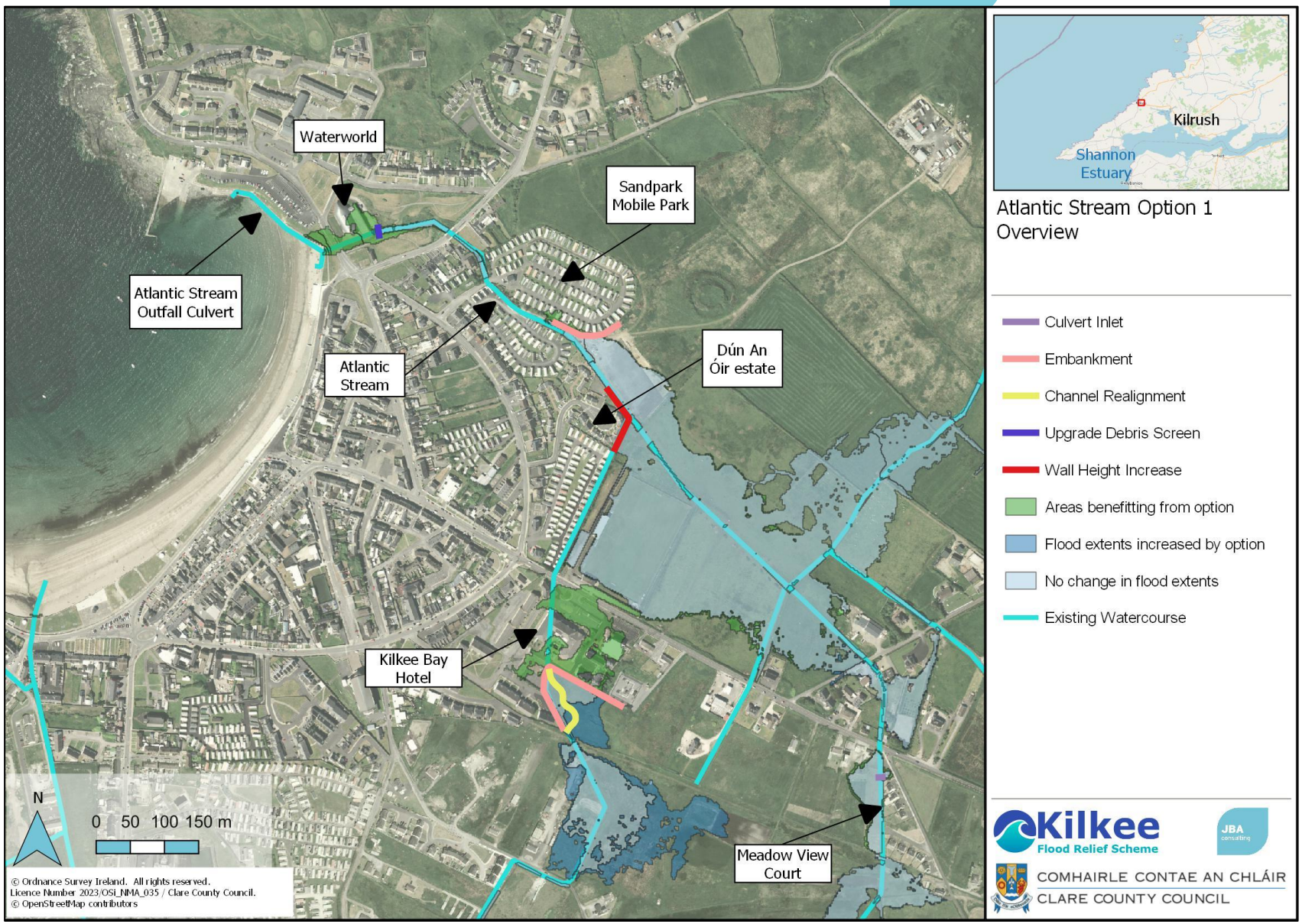

Figure 3.1: Site Location - Atlantic Stream overview

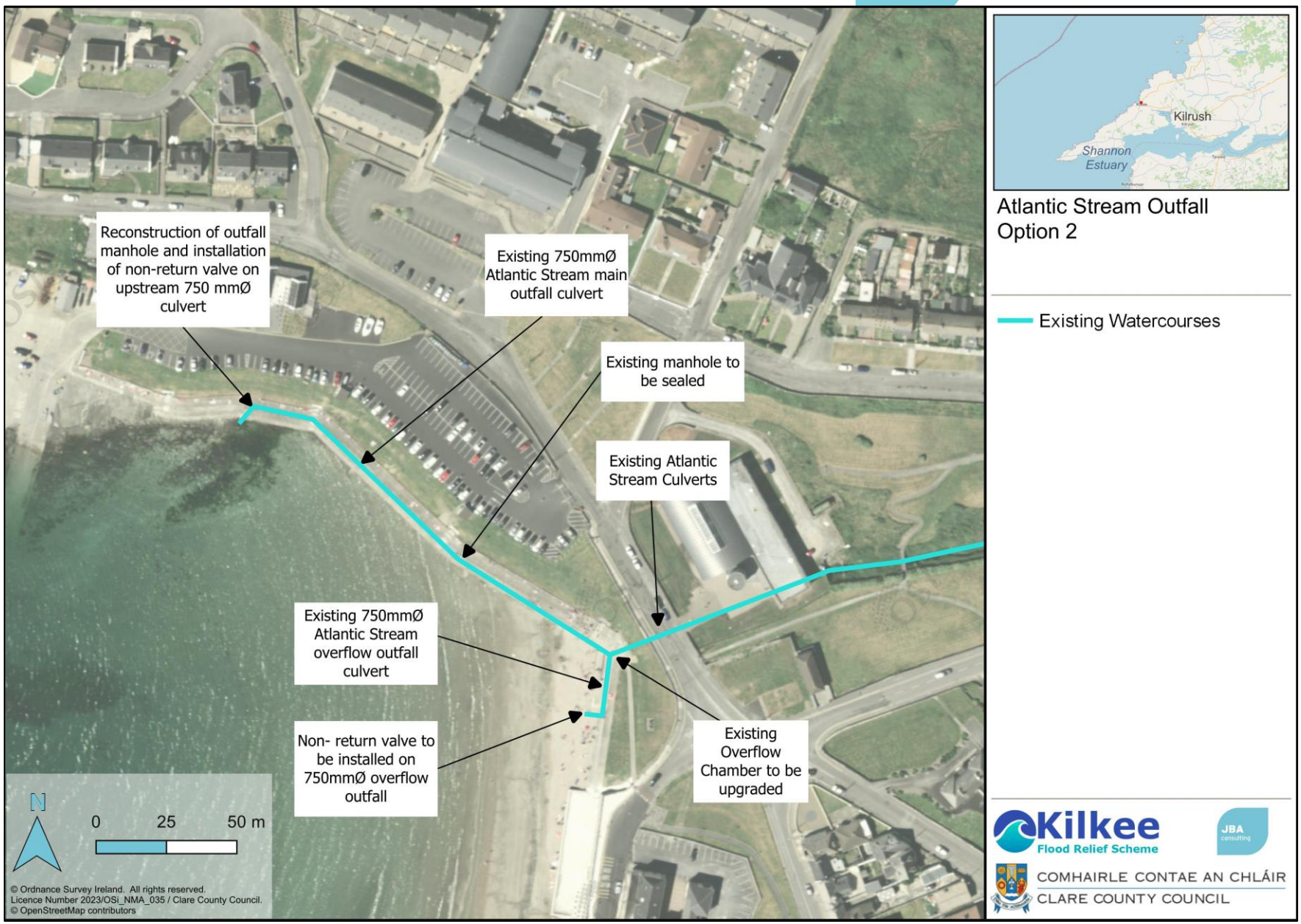

Figure 3.2: Atlantic Stream outfall

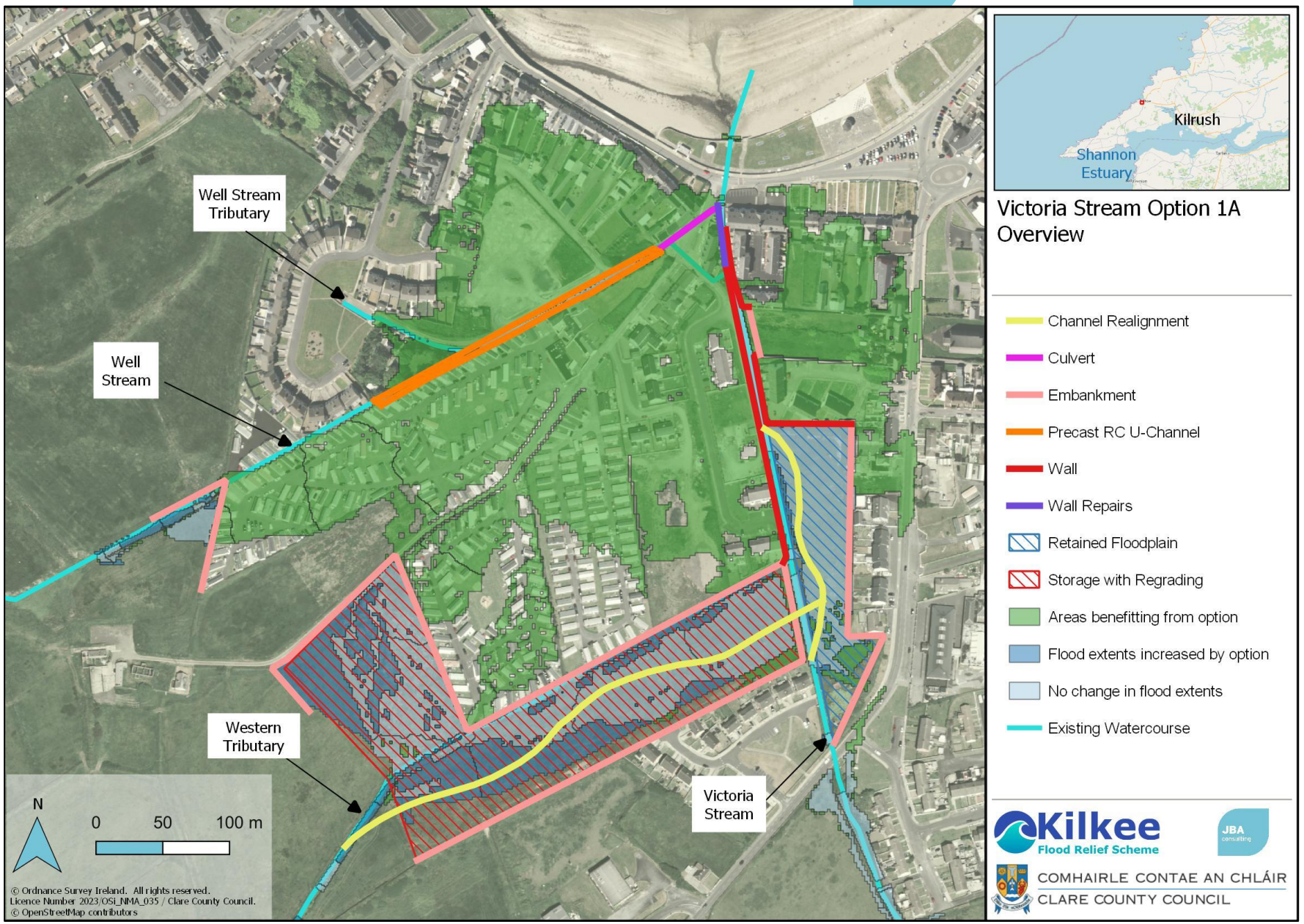

Figure 3.3: Site Location - Victoria Stream overview

3.2 Project Description

The proposed development will include the following measures.

3.2.1 Atlantic Stream

Kilkee Bay Hotel:

- Construction of c. 200m long embankment c. 1.3-1.6m high.
- Diversion of c. 110m of open channel into centre of floodplain.
- Installation of new headwall and 600mmØ inlet culvert under embankment to link with existing culvert.

Dún an Óir estate:

- Increase the height of the existing boundary wall by c.300mm over c.103m length.

Sandpark mobile park:

- Construction of c.110m long embankment c.700mm high.

Waterworld:

- Replacement of existing debris screen at upstream culvert headwall with new one.

Meadow View Court:

- Construction of 2no. 2100mmØ inlet manholes with grated covers on existing 1200mmØ culvert.

3.2.2 Atlantic Stream Outfall

- An upgrade to the existing overflow chamber with raised cover (c. 2.7m long x 2m wide x 400mm high) with flap valves.
- The reconstruction of outfall manhole and installation of non-return valve on upstream 750mmØ culvert.
- The installation of non-return valve to the existing 750mmØ overflow outfall culvert.
- The sealing the existing cover of manhole downstream of overflow chamber on main outfall culvert at existing ground level (c. 2m long x 0.8m wide x 400mm high RC slab and new sealed lid).

The proposed works include reconstruction of the overflow manhole with a new pressure-releasing chamber cover to allow surcharged flows to be dissipated in a controlled fashion and allow flood waters to run down the promenade terracing and onto the beach. Non-return valves are proposed to the existing main outfall and overflow outfall culverts. The manhole on the main outfall culvert alignment downstream of the upgraded overflow manhole is to be sealed at its existing ground level.

3.2.3 Victoria Stream

Well Stream:

- Construction of c. 146m long embankment c. 1.1m high upstream of Cunningham's Holiday Park with inclusion of new headwall and 1050mmØ inlet culvert to existing culvert downstream.
- Installation of precast reinforced concrete u-channel along the existing Well Stream alignment c. 240m long and c. 1.6m above the adjacent road level.
- Installation of overflow on the Well Stream Tributary and non-return valve on the Well Stream u-channel left bank wall to maintain connectivity during normal flows and enable overflow to the carrier drain system during flood events.
- Decommissioning of existing Well Stream box culvert and circular overflow culverts at Crescent Place. Installation of new RC box culvert (c. 1.6m wide x 900mm high) c. 55m long under Crescent Place.
- Resurfacing and regrading of Well Road (c. 300m long x 5.5m wide x 300mm high).

Victoria Court:

- Reconstruction of the boundary wall from 20 Victoria Court to the boundary of 21 Victoria Court, a section approx. 36m long.

Victoria Stream:

- Local repointing and thickening of existing left bank wall behind Crescent Place properties. Replacement of c. 3m section of wall to facilitate Well Stream RC box culvert installation at Crescent Place.
- Construction of c. 280m long embankment behind Carrigaholt Road c. 1.2-1.4m high above ground level.
- Construction of new flood defence wall c. 230m long, along filled-in left hand bank from Victoria Park to Crescent Place c. 1.2-1.8m high above ground level.
- Diversion of c. 170m of open channel to centre of floodplain. Existing open channel to be filled in.
- Reconstruction of Victoria Crescent boundary wall c. 130m long.
- Construction of c. 37m long embankment c. 800mm high north of Victoria Crescent.

Western Tributary:

- Construction of embankment c. 980m long and c. 1.3-1.8m high around Western Tributary floodplain.
- Diversion of c.400m of open channel to centre of floodplain and filling in of existing channel.
- Regrading of floodplain in field north of Cluain na Mara estate by c. 700mm max.
- Regrading of floodplain in field west of Cunningham's Holiday Park (north of existing alignment of filled-in Western Tributary) by raising to 6.70mOD for the northern two-thirds section and lowering to 6.40mOD for the southern third section.
- Installation of 900mmØ culvert under Western Tributary embankment to link to diverted Victoria Stream alignment. Inclusion of headwalls on inlet and outlet of culvert.

3.3 Receiving Environment

A preliminary ecological walkover survey was conducted by JBA ecologists to assess the presence of protected or other notable species. Kilkee is adjacent to Moore Bay on the west coast of County Clare.

No protected floral or faunal species were found within the site boundary. However, the survey found evidence of Badgers and Common Frog in and along the stream on-site. The stream was also found to support fish (Stickleback and/or Minnow). The stream has potential to improve with the removal of rubbish, which would help to maintain notable flow.

Lesser black-backed Gull was recorded on the site, a species placed on the Breeding and Wintering Amber list of Birds of Conservation Concern in Ireland. Much of the site would be suitable for hosting wintering bird species.

3.4 Invasive non-native species

Invasive non-native species (INNS) have been recorded in the area including Japanese knotweed, Three-cornered Garlic, Crocosmia sp. and Sycamore. Japanese Knotweed in Kilkee is being actively managed by Clare Co Council.

There is potential for working machinery to get contaminated with fragments of invasive non-native species and spread it elsewhere within the site or outside of the site. Excavation and movement of spoil has the potential to spread INNS across the area; any spoil removed from site has the potential to introduce INNS along the roads and at the receiving environment.

3.4.1 Watercourses in the Vicinity of the Proposed Site

The site is within the Water Framework Directive (WFD) Shannon Estuary North catchment, Doonah_SC_010 sub-catchment and KILKEE_LOWER_010 river sub-basin. The Victoria Stream and the Atlantic Stream are the two main watercourses in the sub-basin.

The Kilrush groundwater body (IE_SH_G_123) underlies the site, and has been characterised as Good status for 2016-2021, and is Not at Risk.

The Atlantic Stream is located on the northern side of Kilkee. The river flows for 2.4km before discharging into Kilkee Bay and is heavily urbanised throughout much of the scheme area. Historically the watercourse has been extensively straightened and deepened, resulting in a steep manmade channel with poor hydromorphology and drainage channel-like characteristics.

The Victoria Stream rises south of Kilkee, and flows for approximately 1.9 km before draining into Kilkee Bay. The Victoria Stream is heavily urbanised throughout much of the study area. As with the Atlantic Stream, historically the watercourse has been extensively straightened and deepened with a steep (near vertical) trapezoidal channel and bank full heights (from top of the water to top of the bank) of up to 1.8m. Low seasonal water levels have been observed in the river, with only slight flows present. The channel is on average approx. 1.5m wide and 0.1-0.2m water deep, with a profile comprising very slow-flowing glide and pool.

Two tributaries to the Victoria Stream are within the study area and relevant to the proposed development; the Western Tributary, and the Well Stream. The Well Stream tributary is highly channelised for the majority of its length, and is culverted along Crescent Place, before it joins with the Victoria Stream.

4 Roles and Responsibilities

The Main Contractor is responsible for ensuring that all employees and sub-contractors follow the requirements of the CEMP. The Contractor will be required to provide training and supervision to ensure that the requirements are adhered to.

It is anticipated that the main environmental responsibilities for the key staff will be as set out below.

4.1.1 Site Manager

The Site Manager will be required to:

- Prepare the site-specific CMP; this will include the key elements as outlined in this CEMP.
- Be responsible for ensuring that adequate equipment, adequate control measures and adequate resources are made available to meet the requirements of the CEMP;
- Manage the preparation of method statements and will be responsible for implementing these on-site;
- Retain all training records; and
- Retain all records on the quantities of material that leaves the site for disposal, and all disposal records.

4.1.2 Ecological Clerk of Works (ECoW)

- Ensure that all mitigation measures used to protect the environment are in place and are maintained during the work
- Undertaking and reporting on regular monitoring and site audits, done on as needed basis (e.g. daily, weekly, continuous. Oversight during times of high potential for sediment release or during excavations where groundwater strike is likely will be undertaken, with a log should be maintained of results.
- Revising the mitigation measures if the monitoring evidence indicates that the measure is not effectively protecting the environment
- Provide toolbox talks to all sub-contractors before they start on site.

4.1.3 Staff and Operators

Staff and operators will be responsible for;

- Ensuring that mitigation measures are in place before the work commences;
- Reporting any environmental incidents to the Site Manager and the ECoW; and
- All site personnel will undertake site induction prior to carrying out any activity. Induction topics to be covered include:
- Duties and responsibilities;
- Emergency response procedure;
- Site rules;
- Environmental best practice; and
- Waste management and housekeeping.

4.2 Continuous Monitoring

Continuous monitoring of the site will be performed by the site manager.

5 Construction Operations

The work will be contained within the redlined area outlined in Appendix A.

The construction of the scheme will lead to employment by direct construction work, and indirectly by the requirement for other local support services during the works. The numbers employed are unknown at this stage and are also likely to vary over the construction period.

5.1 Programme of works

It is estimated that the works will take approximately 18 months to complete. Vegetation clearance works where required will need to take place outside the bird breeding season (March to August inclusive).

5.2 Equipment, machinery and works

Equipment to be used during the construction of the works will be typical of a project of this scale. The precise configuration of on-site plant will be determined by the contractor. In general, the following machinery will be used:

- Excavators,
- Dumpers,
- Forklifts,
- Delivery vehicles for materials; and
- Generator.

The main construction activities on site will involve construction of the new riparian zone and habitats, and diversion of the stream, and construction of flood walls.

5.3 Site Confines

The site and proposed works are indicated in Appendix A.

Site establishment by the Contractor will be limited to the following:

- Setting up of access control to the site;
- Construction traffic management and alert signage, including pedestrian management;
- On-site toilet facility, site offices and site canteen;
- Temporary fencing, hedgerow/tree protection fencing, silt (watercourse protection) fencing and site security;
- Bunded storage of fuels and refuelling area; and
- Storage of materials.

Mitigation measures associated with site and compound establishment are outlined in Section 6.1.

5.4 Construction Timescale

It is anticipated that construction works will take approximately 18 months to complete.

5.5 Method Statements

In advance of any operations commencing at the site the appointed contractor will prepare Method Statements for the works. These may include:

- Location of site compounds and storage areas;
- Car parking facilities for workers;
- Site security fencing and hoarding, including fencing off of sensitive ecological features;
- Traffic management plan;
- Waste disposal plan;
- Details on vegetation clearance and earthworks;
- Landscape Plan;

- Biosecurity Plan;
- Storm Water Management Plan; and
- Bunding/drip tray proposals for fuel storage & vehicles as required.

6 Environmental Impacts and Mitigation Requirements

During the construction and operational stages of the development there are potential risks to ecological features from the following;

- Potential leakage of hydrocarbon/lubricants;
- Increased surface water runoff and sediment loading;
- Physical and noise disturbance to habitats and species;
- Dust deposition;
- Noise,
- Vibration;
- Lighting disturbance.

Measures will be proposed in the following sections to mitigate against any potentially significant impacts on the surrounding environment in the vicinity of the site and downstream of the site. These measures were developed in and as a result of the EIAR and NIS prepared for the development.

6.1 Toolbox talks and Environmental Management

A suitably qualified ECoW will be appointed to oversee all site installation activities with respect to the environment. This shall include preparation and delivery of toolbox talks to on-site personnel. Topics covered will include spill control, working on or near watercourses, silt management, storage of waste, working around trees and hedgerows, nesting birds, protected species and invasive non-native species.

The ECoW will oversee critical activities on site that could have an impact on sensitive habitats and species. The ecologist will be responsible for ensuring that measures set out in the Ecological Impact Assessment (EcIA) shall be implemented.

6.1.1 Environmental Management of Site Compounds

The principal contractor will be required to ensure good environmental management within the site compounds. The below list of measures will be incorporated into site compound environmental management:

- Site compounds will use existing hard-standing areas as a priority to reduce the level of ground disturbance. If within a flood zone, assessment of the risk of flooding will be untaken for the main site compound and spoil storage locations, which will include likelihood of flooding, predicted depths and velocities of flood waters to ensure mobilisation of sediment does not occur. An emergency response plan will be drawn for implementation in the event of a predicted storm or weather event with the potential to cause flooding.
- Site compounds, spoil heaps and welfare facilities will not be within Flood Zones A or B, where possible.
- Storage of hazardous materials will be outside of Flood Zone A or B lands in accordance with OPW guidelines[1].
- Only plant and materials necessary for the construction of the works will be permitted to be stored at the compound location.
- All sub-contractors will be given induction talks and toolbox talks so that they are aware of material storage arrangements and site details;
- Construction materials within the compound will be stored in a designated area in an organised manner so as to protect them from accidental damage and deterioration as a result of exposure;
- Bunded storage of fuels and refuelling area. Bunds shall be 110% capacity of the largest vessel contained within the bunded area.
- A chemical storage plan will be in place as required, including spill kits.
- A separate container will be located in the Contractors compound to store absorbents used to contain spillages of hazardous materials. The container will be clearly labelled, and the contents

1 OPW, “The Planning System and Flood Risk Management,” Guidelines for Planning Authorities (Environment, Heritage and Local Government, 2009). OPW, “The Planning System and Flood Risk Management,” Guidelines for Planning Authorities (Environment, Heritage and Local Government, 2009).

of the container will be disposed of by a licenced waste contractor at a licenced site. Records will be maintained of material taken off site for disposal.

- A maintenance programme for the bunded areas will be managed by the site environmental manager. The removal of rainwater from the bunded areas will be their responsibility. Records will be maintained of materials taken off site for disposal.
- The site environmental manager will be responsible for maintaining all training records and weekly environmental inspections.
- Drainage collection system for washing area to prevent run-off into surface water system.
- Stockpiling of spoil and spoil-like materials will be appropriately located within the compounds to minimise exposure to prevailing winds and risk of runoff.
- All refuelling of vehicles will be carried out at the fuel stores within the site compounds and only ADR trained personnel will be permitted to operate fuel bowsers.

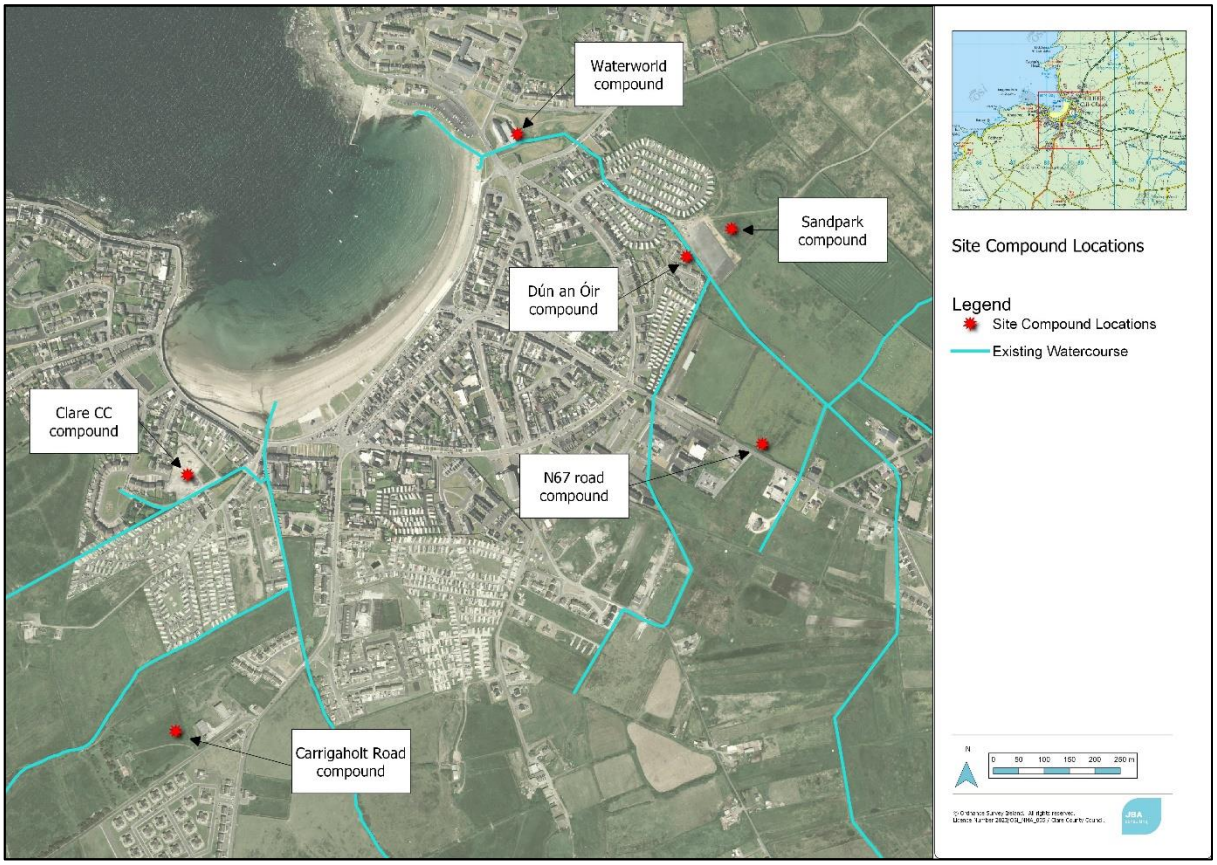

Figure 6.1: Site Compound Locations (indicative only, land parcel level).

6.2 Planned Erosion and Sediment Control Practices

6.2.1 Protecting Water Quality - Surface Water Controls

In order to protect surface water throughout the proposed development site, the principal contractor will be required to develop and implement a Surface Water Management Plan and Pollution Control Plan.

Surface Water Management Plan

In order to safeguard the local surface water network, and in turn the local groundwater network, from surface water-based pollution events, the following must be strictly adhered to:

- The principal contractor will ensure compliance with environmental quality standards specified in the relevant legislation, namely European Communities (Environmental Objectives (Surface Waters)) Regulations, 2009 (S.I. No. 272 of 2009 and amendments)
- An Ecological/Environmental Clerk of Works will be appointed to oversee the protection of water quality and manage the prescribed mitigation measures.

- Oil booms and oil soakage pads will be maintained on-site to enable a rapid and effective response to any accidental spillage or discharge. These shall be disposed of correctly and records will be maintained by the environmental manager of the used booms and pads taken off site for disposal.
- Management of silt-laden water on-site, including procedures for accidental leaks / spills to ground, as well as water quality monitoring to ensure compliance with environmental quality standards specified above.
- At no point during the construction phase will treated water be discharged to local surface water network without the water quality meeting the statutory limits as set under the environmental quality standards specified above.
- Fail-safe site drainage and bunding through drip trays on plant and machinery will be provided to prevent discharge of chemical spillage from the sites to surface water.
- To prevent the spread of any accidental discharge into the surface water network, oil booms will be on hand when construction activities are located beside aquatic habitats in order to control and minimise the spread of the spill.
- Temporary stockpiles will be monitored for leachate generation. These stockpiles will be placed within designated areas and not located within the vicinity of watercourses, wetlands, or artificial surface water drainage features.
- Excavated contaminated soils will be segregated and securely stored in a designated area where the possibility of runoff generation or infiltration to ground or surface water drainage has been eliminated through bunding and imperviable geotextile linings. The contaminated soils will then be classified as clean, inert, non-hazardous, or hazardous in accordance with the EC Council Decision 2003/33/EC. Furthermore, the contractor will ensure that no cross-contamination with clean soils happens elsewhere throughout the development site.
- Silt fencing will be installed prior to the commencement of any construction works in order to enhance the protection of identified water features (Figure 6.2). Silt fencing will be placed along haul roads that are near water features, and along the access route used to build the embankment in the Western Tributary storage area. Shallow interceptor trenches will be installed in front of these silt fences where possible. An Ecological Clerks of Works (ECoW) will be present during the installation of these protective measures to ensure that they are installed to best practice standard and correctly located in their assigned areas. Biodegradable coverings will also be utilised (as necessary) to prevent soil run-off into surface water.
- Silt fences will need to be placed along the banks of the newly constructed watercourse (Victoria and Western Tributary diversions) to protect the new watercourse from run-off from the regraded landscape.
- Where possible, vegetation will be preserved during regrading by carefully excavating and reinstating turf. This should be feasible in many cases, due to the estimated short timelines on excavation and reprofiling, with storage times for excavated turves in timeframes of days/weeks. This a priority mitigation measure in the Long Field in particular due to high quality habitat (Annex I quality).
- Silt fences will be repaired and/or replaced as necessary by the principal contractor as part of the on-going environmental monitoring programme.
- Embankments to be reseeded / covered with saved turf excavated from the field when stream rerouting takes place.

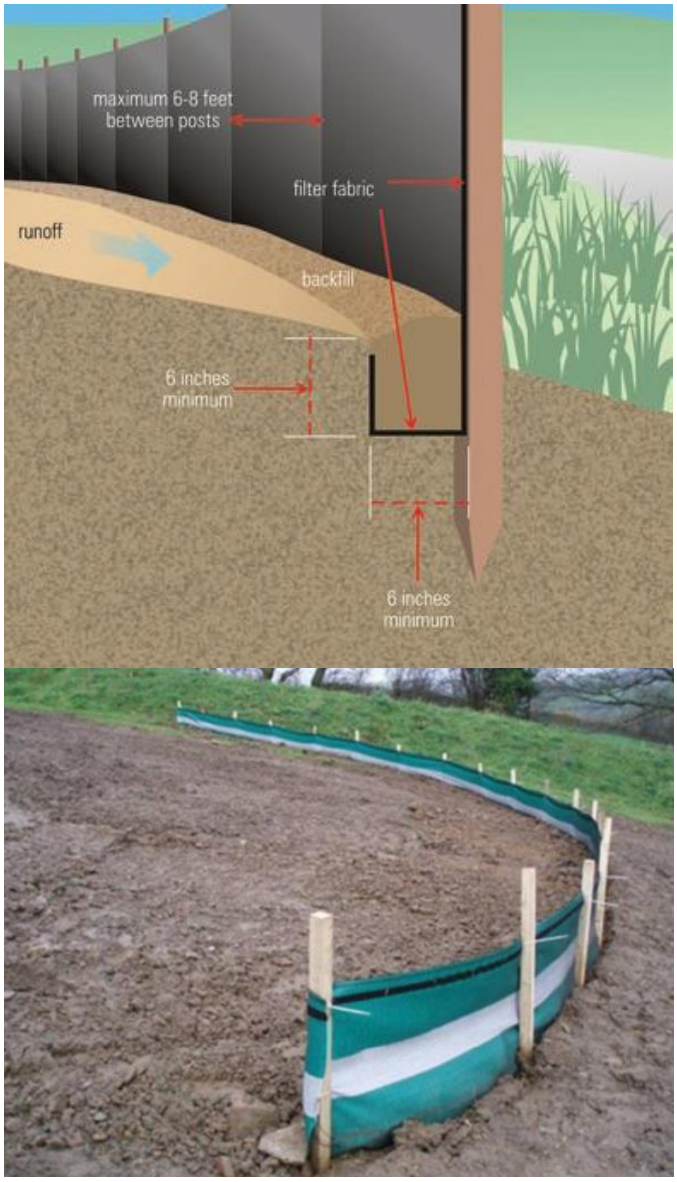

Figure 6.2: Example of suitable silt fence mitigation ensuring maximum safeguarding efficiency

Concrete Management Procedures

A concrete management plan will be drawn up at the outset of the project to ensure safe management of concrete pours, management of concrete lorries and washing of materials used in concrete construction etc. It will cover at minimum the points below:

- Washout of concrete plant will occur at a designated impermeable area with waste control facilities.
- Concrete delivery, concrete pours and related construction methodologies will be part of the procedure agreed with the contractor to mitigate any possibility of spillage or contamination of the local environment. Particular attention will be paid during the pouring process in order to avoid leakages or spills of concrete.
- Concrete control measures to be drawn up e.g. Construction Method Statement for the Atlantic Stream Screen replacement, and the work on the manhole cover on the promenade.
- Wherever reasonably possible, pre-cast concrete features should be utilised to minimise the risk of a concrete-based pollution event.
- Controlled release or pre-washing of installed culverts to ensure the first release of water through culverts does not result in a washing through of concrete (and other built-up debris).

Pollution Control Plan

- Spill kits containing absorbent pads, granules and booms will be stored in the site compound with easy access for delivery to site in the case of an emergency. A minimum stock of spill kits will be maintained at all times and all machinery vehicles will carry spill kits at all times.
- Absorbent material will be used with pumps and generators at all times and used material disposed of in accordance with the Waste Management Plan. All used spill materials e.g., Absorbent pads, will be placed in a bunded container in the contractor's compound. The material will be disposed of by a licenced waste contractor at a licenced facility. Records will be maintained by the environmental site manager.
- Regular inspections and maintenance of plant and machinery checking for leaks, damage or vandalism will be made on all plant and equipment.

In the event of a spill the principal contractor will ensure that the following procedures are in place:

- Emergency response awareness training for all Project personnel on-site works.
- Appropriate and sufficient spill control materials will be installed at strategic locations within the site. Spills kits for immediate use will be kept in the cab of mobile equipment.
- Spill kits must include suitable spill control materials to deal with the type of spillage that may occur and where it may occur. Typical contents of an on-site spill kit will include the following as a minimum:
    - Absorbent granules
    - Absorbent mats/cushions
    - Absorbent booms
    - Track-mats, geotextile material and drain covers.
- All potentially polluting substances such as oils and chemicals used during construction will be stored in containers clearly labelled and stored with suitable precautionary measures such as bunding within the site compound.
- All tank and drum storage areas on the site will, as a minimum, be bunded to a volume not less than the following:
    - 110% of the capacity of the largest tank or drum within the bunded area, or
    - 25% of the total volume of substances which could be stored within the bunded area.
- All hydrocarbons to be utilised during construction are to be appropriately handled, stored, and disposed of in accordance with the TII document ‘Guidelines for the crossing of watercourses during the construction of National Road Schemes’ (NRA, 2008).
- The site compound fuel storage areas and cleaning areas will be rendered impervious and will be constructed to ensure no discharges will cause pollution to surface or ground waters.
- Designated locations for refuelling are within site compounds.
- Potentially contaminated run off from plant and machinery maintenance areas will be managed within the site compound surface water collection system.
- Damaged or leaking containers will be removed from use and replaced immediately.

6.2.2 Flooding During Construction

There is a possibility that a flood will occur during the construction phase. To ensure that Kilkee does not become vulnerable to floods during construction, the contractor will be required to monitor conditions that may cause inundation. In the event of a storm event, temporary flood barriers will be erected at the exposed locations. All works undertaken near the banks will be fully consolidated to prevent scour and run-off of silt. Consolidation may include use of protective and biodegradable matting or geotextiles on the banks and the sowing of grass seed on bare soil. Where possible and practical, earth works will take place during the driest season, to reduce the risk of flooding which could result in mobilisation of significant quantities of unconsolidated material.

An emergency response plan will be drawn for implementation in the event of a predicted storm or weather event with the potential to cause flooding.

6.3 Site Specific Mitigation Measures for Construction Phase

6.3.1 Stream realignment

All instream works will be done in accordance with IFI guidelines, and subject to IFI approval. Stream realignment works will be overseen by an IFI officer and scheme ECoW.

Timing of the instream works will be carried out during the period July-September as per IFI guidelines. Works outside this time should be in consultation of IFI, with cognisance of spawning areas and times specific to this site. At this time the stop log will be in place on the Victoria stream, so discharge to Moore Bay will not be taking place. Instead, water will be pumped to Intrinsic Bay.

Water quality will be monitored during the wetting of the new stream bed, at the lower end of the channel. Wetting will be a gradual process which will reduce the amount of sediment discharged at any one time. Standards will be determined by the IFI in consultation with the ECoW.

Victoria Stream and Western Tributary realignment

The following measures will be implemented during the realignment:

- Stream realignment will be carried out in a manner that does not interrupt the flow of the stream. To do so, the new stream bed, and associated scrapes will be prepared and put in place. As part of standard measure in stream realignment, selected vegetation from the banks of the current stream will be translocated to the edge of the new site to allow for the rapid reestablishment of the herbaceous riparian community as per IFI consultation.
- Any clean gravel substrate will be translocated from the current stream and placed in the new channel. If no such substrate is available, imported material may be used. This should be of local provenance/similar rock type. Consultation with IFI to determine the appropriate materials necessary will need to be carried out.
- The upstream end of the realigned portion needs to be connected to the current stream and let the water flow down the new riverbed gradually with both steams flowing at once for a period of time. Movement of invertebrates can then take place.
- Electrofishing can be carried out and fish moved into the new stream.
- Once water is flowing in the new alignment the upstream end of the old watercourse can be obstructed and left to drain. The riverbed can be searched for remaining invertebrates and small fish/eel, and material moved over.
- The realigned stream will maintain the same gradient that is currently in place, with a similar width to the upstream portion of the stream so as not to reduce the flow below natural conditions.
- All instream works need to be done in accordance with IFI guidelines, and subject to IFI approval. Stream re alignment works will be overseen by an IFI officer.
- Timing of the instream works will be carried out during the period July-September. Works outside this time should be in consultation of IFI, with cognisance of spawning times specific to the sites.
- Water quality (suspended solids) will be measured during the wetting of the realigned channel.
- Banks to be vegetated using turves from a nearby location (e.g. from where the haul roads are due to be, or from the excavated bed of the new alignment.
- Silt fencing, coir logs or other biodegradable materials to be utilised to limit potential for run-off from the surrounding area.
- Monitoring of the newly aligned stream for erosion during the bedding in period. Monitoring will include stability of banks, revegetation as well as water quality.

These measures will reduce the release of sediment during the realignment process, as the new bed will be in place and wetted in a gradual process. The sinuosity and ponds will also allow for the deposition of material. Placement of scrapes may add some sediment, but the receiving environment is not considered sensitive to sediment release.

The translocation of riparian material will also prevent large volumes of sediment release. The shallower sloping banks and scrapes will also limit the potential for sediment release through erosion.

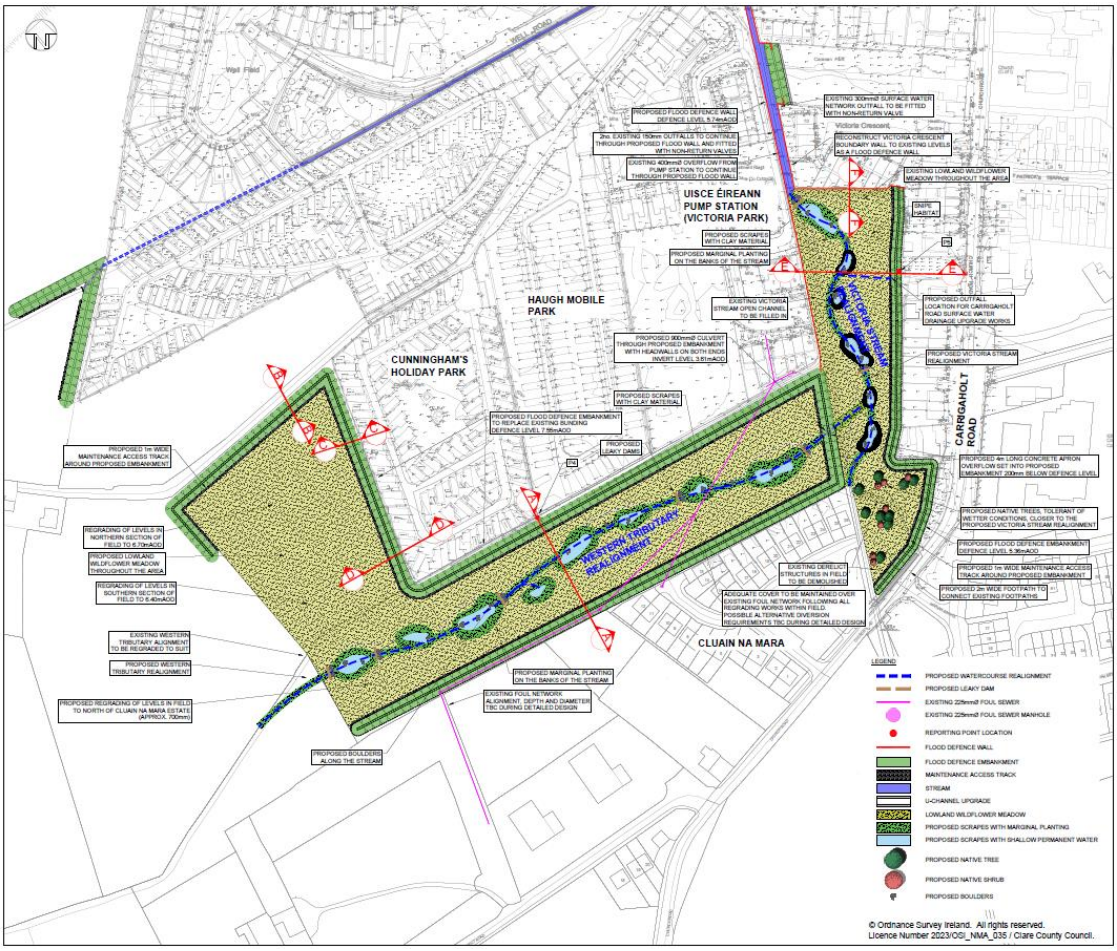

Figure 6.3: Visualisation of the realignment of the Victoria and Western Tributary

6.3.2 Wall construction

Whenever possible wall construction must be carried out from the dry side. Materials must be prevented from falling into the stream, with particular care given to concrete. Concrete management procedures outlined in Section 6.2.1 will be in place at all times.

The demolition of the existing walls adjacent to the streams will require the creation of a dry zone and water diversion to minimise the risk to the aquatic environment. This will preferably be done with a partial isolation or coffer dam, which will preserve flow, and prevent sedimentation, but it is likely that full damming will be required due to the narrowness of the channel. This work will be overseen by an ECoW.

The works on the walls in areas where the stream is to be diverted into the new channel will be carried out in the dry as the watercourse diversion will have taken place at the outset of the project.

It will be necessary to create a dry bed to construct/repair the wall at Victoria Court and to construct the outfall of the new Well Stream Culvert. These works will take place during the period when the stop logs are in place. Therefore, there is no-through flow in the baseline condition. The intention is to move the point of flow restriction upstream of the works area. This doesn't impact on any downstream receptors or the hydraulic regime upstream as it retains the baseline condition of flow restriction.

The area will be first isolated with an upstream dam constructed of sandbags. The isolated area will then be electrofished and pumped dry.

6.3.3 Stormwater Drains

The installation of new stormwater drains has the potential to result in the release of contaminated surface/stormwater release at the tie of tying in the new stormwater drain to the network e.g. new pipes will be contaminated with soil, or where concrete pipes are used, cement dust. Upgrading of stormwater drains could also result in similar release of materials.

6.3.4 Embankments

The following measures will be applied to excavated materials allocated for reuse in the embankments.

- Materials will be stored in the Main Compound off the Kilrush Road. Portions of the field which don't flood will be utilised for storage of materials, close to the road (SE corner).
- Materials allocated for reuse will be covered whilst stored to prevent runoff in the event of rain and prevent weeds growing in stored material.
- Materials allocated for reuse will be covered during transport to each embankment construction site to prevent dust release.
- Materials will be stored at least 10m away from the nearest water course or drainage ditch.
- Silt barrier or bunding to be constructed around the stockpiled materials to contain any runoff in the event of adverse weather.
- Maintain a vegetated grass strip around the perimeter of the compound to act as filter for any potential runoff not contained within the bunded area.
- Materials should be stored for as short a period as practically possible.
- Slope of stored material will be minimised as much as practically possible within the constraints of the site.

The following measures will be applied to work on establishment of new embankments.

- Embankment sides will be left roughened.
- Turf from excavation works will be saved and strips will be used to cover parts of the embankment where practical.
- Establishment of turves from the existing banks will be prioritised and utilised where possible.
- Areas vulnerable to silt/soil run-off will be prioritised e.g. areas in proximity to watercourses; slopes rather than the top of the bank; areas of heavier usage by people or animals; areas in the drip lines of trees or where other run-off is predicted. This will allow for the maintenance of the local seedbank and provide some buffer to prevent the risk of erosion.
- This will be managed by the ECoW.
- Suitably sourced native species seed, with a grass, rush and herbaceous content of local provenance will be used to revegetate the embankment, if enough turves are not preserved. Hay from the Long Field would be a suitable cheap and locally available source of seed.
- Biodegradable matting to prevent soil erosion/silt run-off maybe used in some locations, and reseeding of appropriate native species will be used in conjunction with this, as above.
- Mulch may be used to prevent erosion and hold seed until establishment of vegetation.
- Silt barriers will be placed along the bottom to hold back materials in the event of heavy rainfall prior to revegetation of the area. Once the vegetation has reestablished silt barriers may be removed, taking care not to dislodge any trapped sediment.
- Fertiliser must not be used on the embankment as runoff could lead to nutrient loading of the water and eutrophication. This will ameliorate negative impacts on water quality from sediment and nutrient run-off.
- Material used for the embankments must be free of contamination, from hydrocarbons and / or Invasive Species, and care must be taken not to spread INNS when moving materials.

6.3.5 Screens and headwall installation

The installation of the new screen at the Atlantic Stream, and the new screen and headwall at the back of the Kilkee Bay Hotel, will require a pre-construction method statement to be drawn up. The following measures will be detailed in the construction method statement:

- Concrete control (to ensure no uncontrolled release)
- Blocking of stream and overpumping (Section 50 required for the Atlantic Stream screen installation) e.g., use of sandbags and a geotextile to allow working in the dry.
- Plan for monitoring water control during over pumping at inlet and outlet.
- Use of precast headwall or other concrete material.

- Filter mesh to be placed on the inlet to pump to prevent small fish (stickleback) and other aquatic life being sucked into the pump to the existing pipework which is still in-situ.
- Back-up pump to be on hand to ensure that in case of pump failure during works an alternative pumping option is in place.
- Original bed of stream to be kept as clean as possible at all times (e.g., no use of hydrocarbons in the bed of the stream while working in the dry).
- Works to be overseen at set-up stage by ECoW and daily water samples to be taken.
- Pre-washed material to be used to bed in the headwall. This is a standard measure to control release of sediment from new gravels and release of concrete. Controlled reconnection/rewetting to prevent sediment release.
- Ensure stability of the existing riverbank at all times.

6.3.6 Well Stream culvert and embankment

The new culvert and culvert extension will be constructed offline from the existing system, therefore will be undertaken in dry conditions.

Sediment release will be required for both the installation of the culvert, and the work on the existing channel (upgrade to flood risk potential). The programme of works indicates that the culvert will be the first element of the Well Stream upgrade to be constructed. The flow from the Well Stream will be prevented from entering the new culvert at the connection point via a sandbag dam diverting it into its existing route. No other diversion will be required while this new culvert and headwall are constructed as the current flow route for the Well Stream does not follow this route. It is intended to also have the upstream embankment in place prior to the construction of the Well Stream culvert.

For the construction of the tie-in point, it will be necessary to partly dam the Well Stream and overpump into the existing system. To minimise the flows entering the Well Stream in this instance, the attenuation storage will be utilised to minimise flows conveying through the Well Stream open channel. This will be done in conjunction with the Well Stream U channel installation.

Sediment release from Embankments will be adhered to as outlined in Section 6.3.4 Embankments.

The work will be managed by an ECoW. It is anticipated that diversion will be required at this location for 4-6 weeks.

6.3.7 Well Stream upgrade

The Well Stream will be constructed offline from the existing system, therefore will be undertaken in dry conditions.

As above, working in the dry will control the release of potentially contaminated water. The top end of the channel will be blocked using sandbags, and the stream piped to the outlet, via the attenuation chamber to the north of the Well Stream, which will allow flood risk to be managed during the construction period.

Standard construction sediment controls should be applied here.

These upgrade works replace the existing stream using a U-shaped channel. A pre-construction method statement to be drawn up for this works, which will take place in the dry (full diversion in place). The construction method statement will provide for the following:

- This work will be monitored by the ECoW, and water quality samples will be taken throughout the process.
- Controlled water release with progressive sandbag removal to minimise sediment discharge.
- Other measures will help to filter and control the release of sediment during the wetting of the new channel:
- Clean gravels and vegetation will be preserved and used to seed the new channel, under supervision of the ECoW and IFI.
- Coir logs will be used to help form new banks to help control sediment release from any backfill material.

6.3.8 Atlantic Stream Walls and Embankments

Works in the vicinity of the caravan park will require regrading of the banks and ground preparation to accommodate the new embankment. All works will be in the dry.

Where possible suitable turves will be removed and kept to re-seed the new embankment. Biodegradable matting will be used to prevent erosion of soil (Figure 6.5).

Back fill of vegetation material to be carried out in flat areas.

Works will follow the mitigation outlined in Sections 6.3.2 for Wall Construction and 6.3.4 for Embankments.

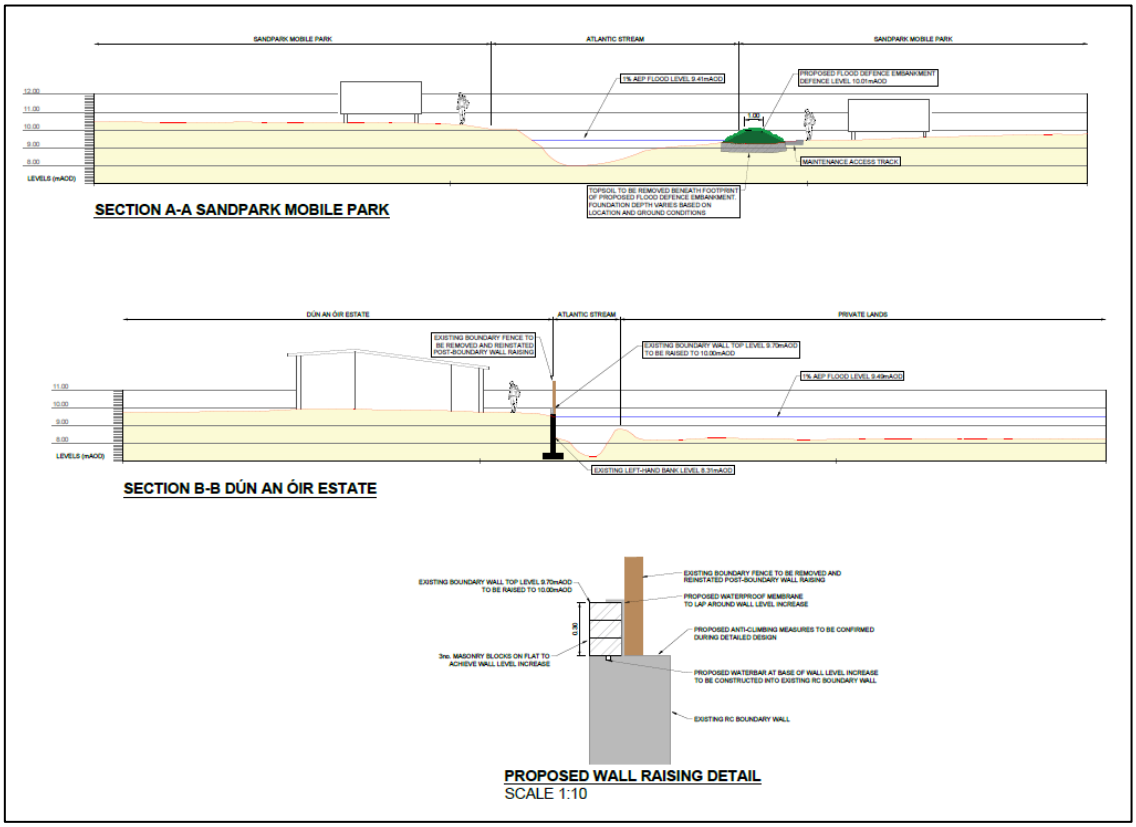

Figure 6.4: Works in the vicinity of the caravan Park (top) and near Dún An Óir Estate (bottom)

Figure 6.5: Use of biodegradable matting can protect sediment release from soil erosion, but allow natural regeneration of vegetation (from SEPA 2009)

All instream works need to be done in accordance with IFI guidelines, and subject to IFI approval (IFI 2016, 2020).

- Stream re alignment works will be overseen by an IFI officer.
- In stream works will be carried out between July and September
- Where possible suitable gravels will be reinstated
- Aquatic species will be translocated.

6.3.9 Atlantic Stream realignment

Works here will follow a similar process to the realignment of the Victoria and Well tributaries. Procedures for installation of the headwall will follow the mitigation measures in Section 6.3.5 for screens and headwalls installation.

The Atlantic Stream realignment needs to be carried out in a manner that does not interrupt the flow of the stream.

The following measures will be implemented during the realignment:

- New stream bed, and associated scrapes need to be prepared and put in place. Suitable vegetation from the banks of the current stream needs to be translocated to the edge of the new site to allow for the rapid reestablishment of the herbaceous riparian community.
- Any clean gravel substrate will be translocated from the current stream and placed in the new channel. If no such substrate is available, imported material may be used. This should be of local provenance/similar rock type. Consultation with IFI to determine the appropriate materials necessary will need to be carried out.
- The upstream end of the realigned portion needs to be connected to the current stream and let the water flow down the new riverbed gradually with both steams flowing at once for a period of time. Movement of invertebrates can then take place.
- Electrofishing can be carried out and fish moved into the new stream.
- Once water is flowing in the new alignment the upstream end of the old watercourse can be obstructed and left to drain. The riverbed can be searched for remaining invertebrates and small fish/eel, and material moved over.
- The realigned stream will maintain the same gradient that is currently in place, with a similar width to the upstream portion of the stream so as not to reduce the flow below natural conditions.
- All instream works will be done in accordance with IFI guidelines, and subject to IFI approval.
- Stream re alignment works will be overseen by an IFI officer.
- Timing of the instream works will be carried out during the period July-September.
- Water quality (suspended solids) will be measured during the wetting of the realigned channel.
- Banks to be vegetated using turves from a nearby location (e.g. from where the haul roads are due to be, or from the excavated bed of the new alignment.
- Silt fencing, coir logs or other biodegradable materials to utilised to limit potential for run-off from the surrounding area.
- Monitoring of the newly aligned stream for erosion during the bedding in period. Monitoring will include stability of banks, revegetation as well as water quality.
- No fertilisation of the vegetation will take place.

These measures will ameliorate the release of sediment during the realignment process, as the new bed will be in place and wetted in a graduation process. The sinuosity and ponds will also allow for the deposition of material. Placement of scrapes may add some sediment, but the receiving environment is not considered sensitive to sediment release.

The translocation of riparian material will also prevent large volumes of sediment release. The shallower sloping banks and scrapes will also limit the potential for sediment release through erosion.

6.3.10 Atlantic Stream Manhole Work

There will be two main phases to these works. First demolition of the existing manhole cover which will lead to the production of dust and concrete particles. Then, construction of the new cover will require concrete to be poured.

A Pre-Construction Method Statement will be drawn up for this work (either individually, or as part of the same body of work as the work on the Atlantic Stream Screen, Section 6.3.5). The method statement will include:

- All works along the waterfront will be under supervision of an ECoW.
- Work will be carried out in the dry.
- Washing of pre-cast materials.
- Concrete control to ensure no uncontrolled release.
- No uncured cement to enter the waterways.
- Plan for monitoring water control during over pumping at inlet and outlet.
- Works to be overseen at set-up stage by ECoW and daily water samples to be taken.
- Controlled reconnection/rewetting to prevent sediment release.
- Monitoring of water quality during the re-wetting process, including water quality on the outlet to the reefs.

6.3.11 Culverts

- Where possible, open-bottomed type culverts should be adopted, leaving the stream-bed undisturbed and maintaining some natural bank on both sides to allow for the passage of mammals.
- Where natural banks cannot be accommodated, ledges may be required to facilitate mammal passage. Ledges shall be at least 500mm wide, constructed at least 150mm above the 1 in 5-year flood event. There should be a minimum of 600mm of headroom and the ledge must be accessible at both ends from the bank and the water (for example, by ramps).
- The diameter of any culvert providing for the passage of fish should not be less than 900mm. The culvert should be installed so that it has a constant slope through its length, except for an appropriate camber allowance where settlement is anticipated.
- All culverts should be installed so that the bottom (invert) is at least 500mm below the grade line of the natural stream bed.
- Culverts should be equipped with baffles and / or have a naturalised base to improve fish passability.
- Where fish passage facilities are required, an outlet pool of adequate dimensions with tail-water control should be installed at the culvert entrance and exit.
- Minimum water levels should be maintained at all times to allow for fish passability.

In situations where closed culverts are used, the following criteria should be applied:

- All culverts should be over-sized so that they can be set a minimum of 500 mm below bed-level. This requirement should be assessed on a case-by-case basis where a crossing is on bedrock.
- The culvert should be of similar width to that of the natural low-flow channel. The use of multiple units of lesser width is unacceptable.
- In all cases, the culvert should be laid at a level and grade which allows the upstream invert to remain drowned (by back-watering) under low-flow conditions, to a depth suitable for the easy passage of the largest species frequenting the stream. This requirement can be readily met where the natural bed gradient is shallow.
- Pools should be formed at each end of the culvert to provide for transition from the shape of the pool to the shape of the river downstream. Pools should, ideally, be built in natural rock and be designed to provide take-off conditions for upstream migrants entering and leaving the culvert. The downstream pool should be designed to act as a stilling-chamber that will prevent erosion of the banks below and provide quiescent take-off conditions for fish, and to serve the purposes above.

The effective slope of the culvert should generally not exceed:

- 0.5% for a culvert greater than 24m in length, unless baffles are added.
- 1.0% for a culvert less than 24m in length, unless baffles are added.
- 5.0% at any time, even with the addition of baffles.

- >5.0%, site specific design will be required.

6.3.12 Habitat creation

The realignment of the stream will introduce meanders into the waterways, giving a more naturalised aspect to them and restoring some of their ecological functions. Creation of scrapes and additional pools in the field around the stream will also improve habitat for plant, invertebrates, and bird species. The scrapes and pools of shallow water fill up during rain events, and dry slowly over the spring and summer months. Some permanent year-round larger and deeper pools will also be present.

The creation of scrapes should follow key designs to allow for ecological benefits:

- Scrapes should be at least 20 m2. Aiming for 1 ha of combined area of overall habitat.
- Create multiple smaller areas rather than one large one.
- Vary shape and size of scrapes, avoiding straight edges. Favour irregular shapes.
- Edges and bottom should be left rough (bucket teeth marks provide varied micro topography and rough surfaces).
- Variety of depths across the scrape with a maximum depth of 45 cm. Keep at least 10cm of height variation from the base of the scrape.
- Create gently sloping edges to increase the area of muddy edge.
- Use excavated top spoil and turves to reseed the embankments.
- Leave scrapes unfenced, allow some grazing at the edge of the scrape, to avoid vegetation becoming too dense.
- Where possible create a complex of smaller ponds with wetland between them. Some pools should be permanent, some temporary.
- Create a variety of water depths, in particular very gently sloping margins.
- Leave excavated surfaces rough and hummocks and hollows on the bottom of the pond and around the edge.
- Avoid trees, shrubs and fencing as these deter open-country birds and can harbour predators.
- Monitor scrapes for build-up of vegetation and increased silt deposition and manage accordingly.

6.3.13 Mammals

Bats

Guidance for treatment of Bats prior to construction is set out in:

- (NRA 2006a): Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes
- (ILP 2023): Guidance Note 8 Bats and Artificial Lighting

As a precautionary measure any trees that need to be felled will be assessed for bat roost potential prior to the works being carried out. At present only one mature tree is identified as needing felling, on the Well Stream, and this was not considered suitable for bat roosts. If tree-based bat roosting features are identified during the pre-construction site enabling works phase, soft felling measures will be put in place where trees will be cut and left over night to allow any bats to get out, and such felling will take place outside the main maternity season. This will take place under the supervision of the ECoW. No same day mulching or cutting up will take place.

There will be no operational lighting as a result of these works. Construction will be confined to daylight hours in the majority. Night work can be facilitated under the supervision of the ECoW in specific circumstances. In areas around the site compound where some safety or security lighting may be required this must meet bat criteria:

- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats, and 2700 Kelvin in the warmer part of the spectrum.
- Lighting should not spill on to ecologically sensitive habitats (must be limited to built-up areas).

Badger

No badger setts have been recorded within the footprint of the scheme. Prior to any work being commenced, further badger surveys will be carried out to establish whether badger have moved into the area, and whether any active setts are likely to be impacted by the works. These are a mobile species that can establish rapidly. These surveys will determine whether the baseline data are still valid.

Guidance for treatment of Badgers prior to construction is set out in (NRA 2005b): Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. The following mitigation will apply:

- Trenching works shall not create confined areas where Badger or any other mammal may get trapped. If trenching works create such features, the area will be fitted with an escape ramp at an angle of no more than 45º, to allow trapped animals to escape. These areas must be made safe before leaving site each day. OPW EP23.
- Badger sett tunnel systems can extend up to c. 20m from sett entrances. No heavy machinery should be used within 30m of badger setts; lighter wheeled machinery should not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance should not take place within 10m of sett entrances.
- If the pre works surveys establish the presence of badger in the area, and that mitigation measures need to be put in place regarding sett closure or translocation, then post work surveys need to be carried out. A full methodology should be established with a suitably qualified ecologist / NPWS ranger.

Otter

Guidance for treatment of Otter prior to construction is set out in: (NRA 2006b): Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.

A pre-construction survey for Otter will be carried out within 10 months prior to construction. This should be supplemented by inspection of the development area immediately prior to site clearance to ensure no holts or couches have been created in the intervening period. This should particularly be undertaken around the Victoria Stream. If any holts are found appropriate steps will be taken and a derogation licence will be applied for from NPWS.

- No works to be carried out within 150m of a holt until ecological guidance has been sought.
- Trenching works shall not create confined areas where Otter or any other mammal may get trapped. If trenching works create such features, the area will be fitted with an escape ramp at an angle of no more than 45º, to allow trapped animals to escape. These areas must be made safe before leaving site each day; OPW EP 20
- Lighting will be minimised during hours of darkness and will not illuminate the streams and newly created wetland areas to ensure no effect on wildlife.
- Box or bottomless arch culverts to be used in preference. Where mammal passage is restricted to the culverts box or bottomless arch culvert will be used.
- Obstacles to mammal passage, such as weirs and sluice gates, should allow for ledges or steps by which mammals may avoid them.
- Where practicable, such cover, using the same native species, should be restored as soon as possible after construction to limit short- and long-term impacts on the use of watercourses by faunal species. Riparian habitats can often be improved by additional planting along the affected watercourse. The aim of landscaping should be to ensure, in so far as is possible, maintenance of a vegetated wildlife corridor along all watercourses affected by any scheme.
- Any holts or couches found in the pre-work survey will require guidance from a suitably qualified ecologist / NPWS to ensure no Otter are disturbed. Derogation licence required.
- Artificial holts to be provided if any disturbance to holts is anticipated.
- The U-Shaped culvert will have a naturalised bottom, with provisions for herbaceous aquatic vegetation to grow. This is facilitated by the gradient, which is the same as the current gradient and will allow for natural deposition. A mammal ledge will be provided to allow for any otter to travel along the stream in the dry at all times.

Other

The measures set out for Badger and Otter are applicable to other mammal species and will ensure that no mammals are harmed during the construction works. This includes not leaving unprotected trenching or excavations, not disturbing any dens during breeding season. Inspecting vegetation for hibernating small mammal such as Hedgehog before clearance in the winter and relocating individuals to suitable habitat or temporary housing. This needs to be carried out by a suitably qualified ecologist and with guidance from NPWS.

6.3.14 Birds – general measures

General construction mitigation measures will minimise risk of disturbance to breeding and non-breeding birds. Limit displacement and habitat degradation by controlling vehicle movement and working from non-vegetated areas as much as possible. This will be managed by the ECoW via toolbox talks to provide constraints for workers, and monitoring during the scheme.

- Vehicles will not encroach on to habitats beyond the proposed development footprint.
- Tree felling and vegetation clearance will take place outside the statutory breeding season (March to August, inclusive), unless permission is obtained from NPWS outside of these times. Any clearance outside this timeframe will require a suitably qualified ecologist or ECoW to be present and to check the area for nesting birds prior to any vegetation removal.
- Where possible, construction will take place outside the breeding season to minimise disturbance, and/or displacement to breeding birds. Where works are necessary, a suitably qualified ecologist or ECoW will be present and carry out pre work checks to ensure that no nesting birds are disturbed. If nesting birds are present, works in the area will be postponed until the birds have fledged; advice may be sought from a suitably qualified NPWS ecologist / ranger.
- Works in the Carrigaholt Road field will be timed to avoid bird nesting season. If this is not feasible, Reeds will be mown prior to the bird nesting season and prior to the arrival of Sedge Warbler and maintained short for the duration of the works to prevent the establishment of nests. Once the works are complete vegetation will be left to grow back to offer nest sites for the following years.
- Areas to remain intact will be fenced off from machinery using wildlife friendly fencing.
- All plant and equipment will conform with the Construction Plant and Equipment Permissible Noise Levels Regulations 1996 (SI 359/1996) and other relevant legislation.
- Plant and equipment will be turned off when not in use, with no unnecessary revving.
- Lighting will not shine directly onto surrounding areas and will be switched off at night.
- Overhead cables that go over wetland areas, and open greenspace susceptible to be used by birds are to be equipped with flight deflectors.

Marine Birds

Avoid loud noise if large flocks (>50 individuals) are roosting within 100m of site of works. Normal vehicular traffic noise, and presence of workers is not anticipated to cause disturbance.

Snipe

Clear any necessary vegetation at the end of the breeding seasons of the year preceding the first winter of works. Snipe are likely to still use the habitat when no work is being carried out. Snipe will flush and displace to nearby fields.

Stagger the works so all fields are not under construction at the same time. Retain and fence off areas (wildlife friendly fencing) that will remain intact.

Sedge Warbler

Clear vegetation at the end of the breeding seasons in the year prior to the works being carried out and maintain low vegetation in work areas. Leave pockets of reeds to grow to offer nesting habitat.

6.3.15 Aquatic environment

Fish

Mitigation measures for fish will relate to all stream works being carried out. Therefore, all instream works need to be done in accordance with IFI guidelines, and subject to IFI approval. Stream re-alignment works will be overseen by an IFI officer.

- (IFI 2016): Guidelines on protection of fisheries during construction works in and adjacent to waters.
- (IFI 2020): Planning for Watercourses in the Urban Environment.
- (OPW 2022): Design Guidance for Fish Passage on Small Barriers

The works should also take into account future connectivity and improvements of the waterways in accordance with the WFD. Therefore, long term connectivity measures will be built into the mitigation in a way that future improvements will not be impeded by the current work. At the time of the survey, water depths of approximately 20 cm were recorded. These depths are too shallow for salmonid passage, but sufficient for Eel and Lamprey species (OPW 2022).

Mitigation measures for fish will involve the rehabilitation and improvement of the Streams, providing better connectivity, improved habitat and future stream potential with a long-term ambition to reconnect the streams to the sea.

- In stream works to be carried out between July and September
- Minimum water levels to be maintained to allow passability and future proof of design (requirements: Eel 1cm, Lamprey 15cm, Trout 24cm, Salmon 42cm)
- Maintain light access, avoid dark corridors.

Victoria Stream:

The Victoria stream outfall is equipped with side hung gates allowing for overtopping. This existing feature is not within the remit of the scheme. IFI recommend addressing passability issues for fish. A number of measures are possible but these are not part of the project and therefore not discussed in detail here. The electrofishing report and IFI consultation have both identified that passability could be improved whilst not amending the current regime in terms of Victoria Stream discharge significantly. It is proposed to pursue this improvement of passability outside of this scheme. No change to current baseline passability at the point of discharge of the Victoria Stream (i.e. at the stop-logs) will occur.

Eel nursery:

The eel nursery is at Site 4 in the Electrofishing report, and is from the stop log gate to Victoria Park (approx. 150m), and make extend further upstream, but was no eel were present at points 1 (near Marian estate) or 3 (on Western Tributary).

The construction of the left-hand bank wall will use in-situ poured concrete and therefore measures must be put in place to prevent uncured concrete and cement to enter waterways.

The full damming of the stream will require the displacement of the Eel nursery, followed by its reinstatement upon completion of the works.

At the site of the nursery, work will be carried out in the dry. First the stream will be electrofished to collect all fish in stream. Then, a dam will be put in place around the zone of works; further electrofishing for any Eel within the exclusion area will be carried out. The area can then be drained of water, sediment and gravels removed and stored. The wall will be dismantled manually, taking care to remove all Eels that are within the wall structure. The Eel will be translocated upstream to the newly created ponds within the Carrigaholt Road Field. This will be part of the Victoria Stream watercourse and continue to allow movement up and downstream. Post work monitoring will be carried out to ensure that the Eel are established in the newly created pools. Upon completion of the works, the stored gravels can be reinstated.

Western Tributary:

The culvert will be such that it allows for fish passage (see Section 6.3.11 on Culverts).

The culvert will be designed and installed such that a permanent pool of water is present at all times on either end of it. In the event that a bottomless culvert is not possible to install at this location, a

naturalised bottom to the culvert will be put in place. A naturalised bottom will be facilitated by the gradient of the culvert and will allow for natural deposition. The length of the proposed culvert is <9m long. This is consistent with passability for both Eel and Lamprey.

Dry working

All construction works that require working in the dry will require the temporary partial or full closure of the stream, with overpumping.

Highly mobile species can be encouraged to leave an area using disturbance methods. Following this, electrofishing and translocation will be carried out to ensure no fish are trapped. The proposed area for dry working will be fenced off using mesh fencing. A pulse and draw methodology will be used for up to one minute per square meter along the area of works. Fish will then be collected using a hand net and placed into a bucket of water pending translocation. Captured fish should be translocated to suitable habitat away from the zone of works. Once translocation efforts are completed the zone of works should remain isolated, preventing fish from returning to the area in advance of works. The electrofishing must be carried out by a suitably trained ecologist following an IFI approved protocol.

Where overpumping is required, pumps will be equipped with suitable intake screens (e.g. Passive Wedge-wire Cylinder (PWWC)) to prevent any juvenile fish or Eel being taken in. Bio-fouling of screens can be reduced through the use of a copper nickel alloy screens. The sizing and configuration of the intake and protective screens will need to limit water velocities through the intake screens to no more than 0.15m/s to avoid fish entrapment[2].

Damming to obtain dry working conditions will require electrofishing.

Amphibians

A preconstruction survey to check streams and any standing water for the presence of amphibians will be carried out. If any spawn is found, or evidence of breeding is recorded works will be rescheduled until the young amphibians are mobile enough to disperse. Alternatively, a derogation licence will be obtained from the NPWS to carry out licenced translocation of spawn and amphibians. This will be carried out under guidance from a suitably qualified ecologist or NPWS ranger, following approval by the NPWS. Spawn will be relocated to nearby water features with similar characteristics, that are unlikely to be disturbed by the construction activity, or any other anthropogenic activities nearby. To avoid impacts on breeding amphibians, instream works will be carried out during the summer months under supervision of the ECoW. Any amphibians found will be translocated to a suitable habitat away from the works area. Exclusion fencing (e.g. silt fences) may be required to keep mobile individuals out of the zone of works. This should be determined during pre-construction site surveys. Suitable habitat for amphibians will be created during the wetland creation works.

6.3.16 Hay meadow habitat

The construction of the access road to the Field south of Cunninghams' caravan park will be aligned such that it avoids the high-density patch of orchids at the western end of the field, and the route will be agreed with the ECOW. Vehicles will be restricted to the road and designated work area. The patch with the highest density of plants will be fenced off using wildlife fencing to prevent the area being damaged. The duration of the works, and fencing off of the area will be temporary/limited in time to avoid excessive disturbance in the is Annex I habitat.

- Vehicles will not be permitted to drive off road and outside of the designated storage areas and zones of work.
- Turves to be excavated from vicinity river alignment and preserved.
- Turves to be excavated from embankment footprint and preserved.
- In species rich grassland areas machines will work from protective mats to preserve vegetation and prevent soil compaction.
- Work during dry ground periods to minimise soil disturbance and compaction.
- Access roads will avoid orchid rich areas. Bog mats to be placed over sensitive ground.

2 A. W. H. Turnpenny and N. O'Keefe, "Screening for Intake and Outfalls: A Best Practice Guide," Science Report (Environment Agency, 2005), https://assets.publishing.service.gov.uk/media/5a7c9293ed915d6969f45d2d/scho0205bioc-e-e.pdf.

- If the section of orchids within the vicinity of the embankment cannot be avoided, an orchid specialist/ suitably qualified botanist will be employed to oversee translocation within the zone of works. Excavated orchids to be replanted in suitable habitat once the construction works are over. This will be determined by pre-works surveys.
- Excavated turves to be replaced on to the embankments once construction is complete.
- Waste material will not be discarded into the adjacent field area.
- Access road will be removed once the construction is complete, and the access will be reinstated to pre-construction state. Suitable turves from excavation areas can be used to help speed up reinstatement of the area.
- No fertilising of any green space to be carried out.
- Where any areas of soil compaction are noted via machine tracking, a tine harrow will be utilised to break up compacted areas and aerate the soil.

6.3.17 Invasive Non-Native Species

A preconstruction invasive species survey will be carried out to re-map stands of invasive species, to determine effectiveness of current management plans, detect any new contaminated areas, to inform management and construction strategies.

Data collected as part of this survey will include species, approximate area covered, a detailed description of each patch (e.g. approximate total number of stems, growth and information on other vegetation present). This information will inform calculations of volumes of infested soils to be excavated, as part of the measures outlined below.

For specific measures in relation to these species, reference should be made to the UK Environment Agency document The Knotweed Code of Practice: Managing Japanese knotweed on development sites (UK Environment Agency, 2006) and to the Best Practice Management Guidelines for Japanese Knotweed (Invasive Species Ireland, 2008).

6.4 Dust and Air Quality

The following mitigation measures are to be implemented during the construction phase:

6.4.1 General Measures

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The DMP may include monitoring of dust deposition, dust flux, real-time PM10 continuous monitoring and/or visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.
- If applicable, hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.

Preparing and maintaining the site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.

- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Waste Material to be disposed of at an appropriately licensed facility.

6.4.2 Measures specific to demolition

- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

6.4.3 Measures specific to earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

6.4.4 Measures specific to construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

6.4.5 Measures specific to trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

If a programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM10 are not exceeded, the following limits are recommended;

- Dust Deposition Rate limit = 350 mg/m2/day (averaged over a 30+/-2-day period using Bergerhoff Gauge Method).
- Dust Deposition Rate limit affecting sensitive ecological receivers = 1,000 mg/m2/day
- PM10 24 Hour Mean concentration limit = 50 µg/m3 not to be exceeded more than 35 times a calendar year
- PM10 Annual Mean concentration limit = 40 µg/m3
- PM2.5 Annual Mean concentration limit = 25 µg/m3

Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented. A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.

6.5 Noise and Vibration

Appropriate mitigation measures have been identified to ensure the Construction Phase target noise limits are not exceeded. The contractor will be required to implement the control measures recommended in BS 5228 and apply the appropriate measures where applicable. Other measures will include:

- Working hours during site construction operations will be restricted to daytime hours from 07:30 hours to 16:30 hours (Monday to Friday) and, as may be required, from 08.00 hours to 13.00 hours (Saturdays). Evening and night-time work is not expected to take place although it is possible that limited 24 hours working may be required to take place on occasion. This will only take place with the prior agreement of CCC.
- An on-site speed limit will be enforced for all traffic. Drivers of vehicles will be advised of the speed limits through the erection of signs i.e. a typically recommended on site speed limit is 10 km/hr.
- Where practicable, the use of quiet working methods and the most suitable plant will be selected for each activity having due regard to the need for noise control.

- Best practicable means will be employed to minimise noise emissions and will comply with the general recommendations of BS 5228. To this end operators will use “noise reduced” plant and/or will modify their construction methods so that noisy plant is unnecessary.
- By positioning potentially noisy plant as far as possible from noise sensitive receivers the transmission of sound can be minimised. Earth mounds and/or stockpiles of material or perimeter hoarding on site can be used as a physical barrier between the source and the receiver.
- Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately in order to minimise noise breakout from the site while still maintaining their effectiveness.
- All plant will be maintained in good working order. Where practicable, machines will be operated at low speeds and will be shut down when not in use.
- Compressors will be of the “noise reduced” variety and fitted with properly lined and sealed acoustic covers.
- In all cases engine and/or machinery covers will be closed whenever the machines or engines are in use.
- All pneumatic percussive tools will be fitted with mufflers or silencers as recommended by the equipment manufactures. Where practicable, all mechanical static plant will be enclosed by acoustic sheds or screens.
- Employees working on the site will be informed about the requirement to minimise noise and will undergo training on the following aspects:
- *The proper use and maintenance of tools and equipment.*
- *The positioning of machinery on-site to reduce the emission of noise to the noise sensitive receivers.*
- *Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment.*
- *The use and maintenance of sound reduction equipment fitted to power pressure tools and machines.*
- Cognisance will also be taken of the Environmental good practice site guide 2005 compiled by CIRIA and the UK Environment Agency. This guide provides useful and practical information regarding the control of noise at construction sites.

6.6 Materials Source and Transportation

6.6.1 Material Sourcing

In so far as possible, construction materials will be from local sources. All imported material that will be used on site will be procured from approved sources.

All construction products will be subject to the European Union (Construction Products) Regulations 2013. CE marking will be mandatory for all construction products placed on the market for which harmonised standards are in place. The Construction Products Regulation aims to ensure that reliable performance-related data is made available, by means of Declarations of Performance, in relation to construction products being placed on the European market.

6.7 Material Storage

Materials stored on site must be in a waterproof and secured protected storage area.

6.7.1 Transportation of Materials

Transportation of building materials can significantly contribute to their environmental impact, particularly in relation to use of fossil fuels and emissions of pollutants and carbon dioxide. For this reason, insofar as possible, construction materials will be sourced from local suppliers.

Construction of the proposed scheme will require the delivery to site of typical quantities of construction materials. The bulk of these materials will be associated with the construction of embankments and walls.

6.8 Traffic

6.8.1 Site Access

A detailed Construction Traffic Management Plan (CTMP) for the proposed works will be prepared prior to the commencement of construction by the contractor to ensure the safety of road users and construction personnel.

All vehicles entering and exiting the site, including (material and equipment deliveries) and cars/vans (Contractor's personnel, client staff and Visitors) will do so via the agreed route which will be outlined in the CTMP.

6.8.2 Traffic Management Plan

The CTMP will be agreed between the Contractor, local authorities and client's Representative. The following should be considered:

- Delivery times (during operational phase) are to be limited to the specified working hours, i.e., 07:30-18:00, Monday to Friday and 08:00-13:00 on Saturday, or as specified by the Council;
- Construction vehicles will follow the hierarchy of the existing road network and use suitable routes to and from the site;
- Deliveries to site are to be restricted to quiet periods, where possible;
- A wheel wash facility should be provided if necessary;
- Regular road sweeping will be carried out on all access roads;
- Appropriate information and signage along construction routes must be provided on approach roads either side of the construction site;
- Where appropriate, vehicle loads are to be securely sheeted and restrained prior to dispatch;
- Consultation with the local authorities regarding enhancement measures and concerns regarding accidents and road safety along the proposed route is recommended; and
- Traffic signage and temporary construction stage traffic measures are to be implemented in accordance with the Department of Transport's Traffic Signs Manual, particularly Chapter 8 entitled "Temporary Traffic Measures and Signs for Road works".

6.9 Archaeology

A number of mitigation measures are proposed in advance of the Construction Phase. Construction shall not begin until these mitigation measures have been fully implemented and adhered to.

6.9.1 Pre-Construction Phase

Where terrain proves suitable, a programme of archaeological geophysics shall be undertaken under licence from the National Monuments Service focusing on greenfield areas (Areas 3–7, 9 and 10) including the possible earthwork site in Area 5.

Based on the results of the geophysical survey, a programme of licenced archaeological testing shall be undertaken in advance of the Construction Phase. The results of archaeological testing will inform on the requirement for additional archaeological mitigation measures which may include avoidance, archaeological excavation, or archaeological monitoring.

The possible earthworks (CHS14) shall be subject to archaeological testing to assess their nature, extent and archaeological potential, and to inform required mitigation during Construction Phase.

The original scoping response for the scheme by the National Monuments Service stated that test excavations within the watercourses may be required. Due to the low probability of archaeological remains beneath the sediments of the streams, this is deemed unnecessary.

Consultation with a geophysical surveyor has determined that the ground conditions and state of vegetation makes the scheme area unsuitable for geophysical surveys. The timeline for pre-construction mitigations, therefore, would begin with archaeological testing. Three to four weeks is required for processing the licence application followed by four weeks for archaeological testing and reporting. The results as outlined in the report may generate further mitigation.

6.9.2 Construction Phase

A programme of licensed archaeological monitoring shall be carried out at Construction Stage. The programme shall include archaeological monitoring of all vegetation clearance along the watercourses and greenfields. Any additional unrecorded cultural heritage features such as stone revetments or culverts currently obscured by overgrowth shall be fully recorded. Any ground disturbance works in streambeds and along banks shall be archaeologically monitored. The level of archaeological monitoring of excavation works within greenfields will be determined based on the results of the geophysical surveys and archaeological testing.

Following the vegetation clearance at Well Stream, the stone revetment walls (CHS15) shall be fully recorded with photography, measurements and drawings where appropriate along with any other features revealed by the clearance works in the streams.

Toolbox talks shall be given to make workers aware of features within the streams and along the stream banks (such as CHS2) as well as the West Clare Railway line (CHS8) which are located close to proposed works.

Figure 6.6: RMPs for archaeological sites within the Scheme Area.

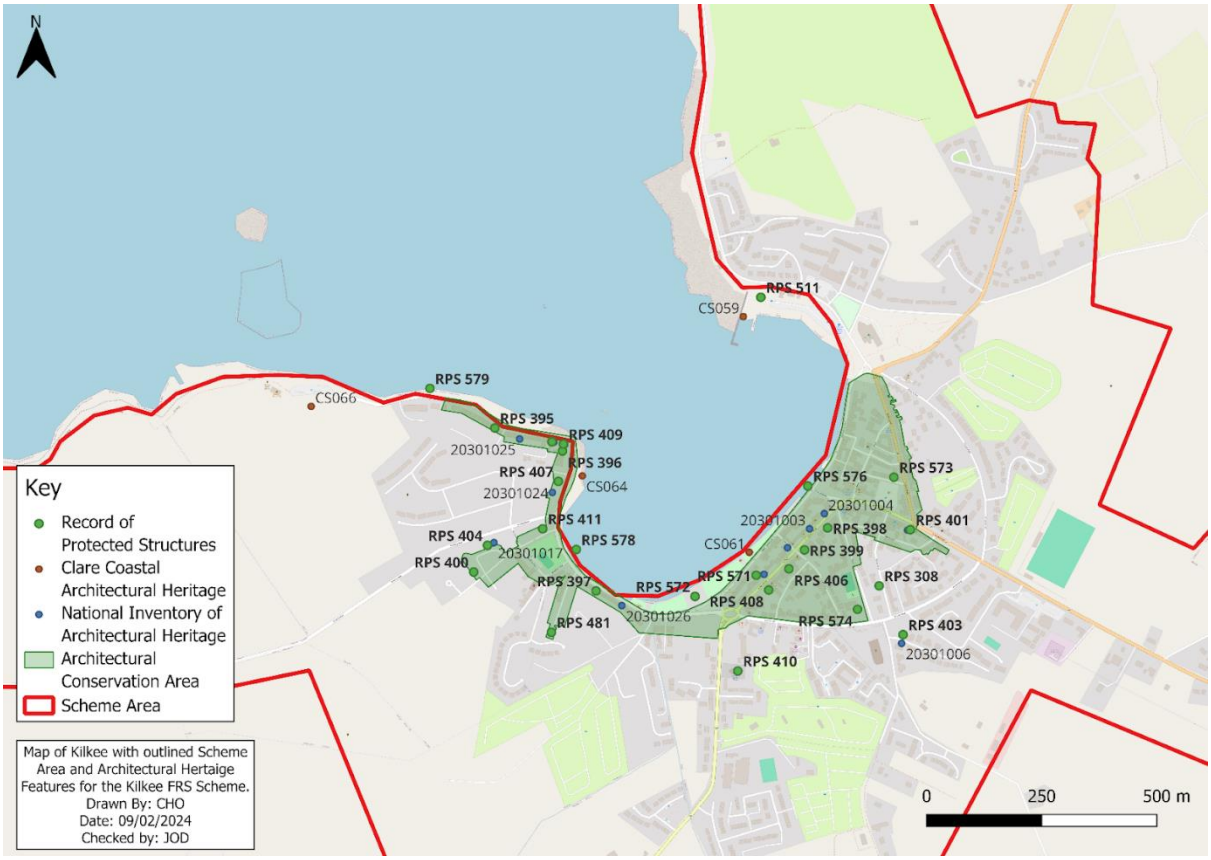

Figure 6.7: RPS, NIAH, and ACA of Kilkee within the Scheme Area.

6.10 Waste Management

6.10.1 Clearance and Excavation

During the construction phase any excess soil/subsoil will be removed off site. These activities will be detailed in a Resource Waste Management Plan (RWMP) to be produced by the appointed contractor. The quantity of material to be excavated is not currently known. Encounters with contaminated ground are not anticipated.

Excess inert soils and sub-soils will be recovered off-site. Soil will only be removed by authorised waste collectors to an authorised site. Any material excavated at the site, which is deemed to be contaminated (i.e., non-hazardous or hazardous) will be stored separately to the inert material, sampled and tested, in order to appropriately classify the material as non-hazardous or hazardous in accordance with EC Council Decision 2003/33/EC10, which establishes the criteria for the acceptance of waste at landfills before being transported to an appropriately authorised facility by permitted contractors.

The contractor will be required to carry out a waste characterisation of the material that will be taken off site for disposal. A waste acceptance criteria (WAC) analysis and asbestos levels should be determined on any material that will be taken off site for disposal. All wastes in the European Waste Catalogue are classified by a unique 6-digit code. In this case (waste soil/stones), two List of Wastes (LoW) Codes are applicable to material that may be taken off site for disposal during the construction phase:

- 17 05 03* - Soil and stones containing hazardous substances
- 17 05 04 - Soils and stones other than those mentioned in 17 05 03.

Any soil samples that are found to contain contaminants should be subjected to full quantification analysis. If the waste soil is sent to a waste licenced soil recovery facility, the chemical analysis of the soil must meet the requirements given in Table 3.3 (Summary of Soil Trigger Levels for Soil recovery Facilities) of the Environmental Protection Agency's Draft Publication – Waste Acceptance Criteria and Development of Soil Trigger Values for EPA-Licenced Soil Recovery Facilities, December 2017. The acceptance of this material at a licenced soil recovery facility will be subject to the approval of the facility operator.

6.11 Pest Control

It is recommended that a rodent and pest control plan is put in place to manage and limit any potential disturbance to populations that may utilise the site. The pest control plan should be in accordance with the following guidelines:

- Chartered Institute of Environmental Health (CIEH) “Pest minimisation: Best practice for the construction industry” or a similar appropriate standard.

A Pest Control Plan for the construction phase shall be completed and included in the Contract specific CEMP written by the Contractor.

6.12 Soils and Geology

- The Contractor is required to install a Soil Management Programme for the operations at the site. The Programme will contain as a minimum, ways to minimise truck movements across the site to avoid soil compaction, and re-use of suitable material on-site to minimise the quantities that need to be imported.
- Temporary pathways and roads will be constructed to allow for the movement of heavy machinery and minimise the risk of soil compaction.
- Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. Covering of topsoil stockpiles with rapid vegetation or other means is proposed as part of the construction methodology. The material will be stored away from any surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.
- Stockpiles will not exceed 1.5m in height and shall be shaped to shed water.
- Fill material will be tested and imported from a licensed facility to ensure no external contamination is introduced to the soil and geological environment.
- Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.
- Re-fuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area (or where possible off the site) which will be away from any existing surface water gullies or drains, or exposed ground or excavations.
- An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in any refuelling areas and site compounds. All relevant personnel will be fully trained in the use of this equipment.
- A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated stormwater to the underlying subsoil.
- The pouring of concrete will take place within a designated area using a geo-synthetic material to prevent concrete runoff into the soil/ groundwater media. Wash down and washout of concrete transporting vehicles will take place in a designated bunded concrete washout area.

6.13 Biosecurity

Under European legislation, Regulation (EU) No 1143/2014 prohibits the introduction and dispersal of invasive non-native species (INNS) listed in the Third Schedule.

Biosecurity measures will be implemented to prevent the spread of invasive species. These measures will include:

- Toolbox talks on invasive plant species to be provided to all relevant personnel prior to access to site being permitted.
- A 3-metre buffer zone to be erected around the identified infested areas, no unauthorised personnel to be admitted within this buffer.
- All works carried out within the buffer zone will be done by suitably trained personnel.
- All machinery being brought to site must be clean and free from contaminants.

- Any machinery used within the 3-metre buffer zone must be thoroughly cleaned and checked before being removed.
- No vehicles are to be allowed on or off site without being thoroughly inspected and cleaned.
- On completion of the works all machinery must be thoroughly inspected and cleaned down before being removed from site.
- All contaminants and contaminated soils are to be disposed of in an appropriate manner.
- Removed soils need to be disposed of in an appropriate manner to a licenced facility.
- Imported soils must be free from invasive species

7 Monitoring

7.1 Ecology Monitoring

To determine the effectiveness of proposed mitigation measures, the site will be monitored prior to, during and for at least 5 years post construction. This is to determine how measures are performing and if management strategies are effective at maintaining the function of the area, and its ecological benefits. Suggested monitoring procedures are presented in the different following sub sections, targeted toward different habitats and organisms. Monitoring methods must be approved by the relevant competent authority, have clearly defined objectives, and reports submitted to the competent authority and refined following their guidance. Data collection will be carried out in a systematic and standardised manner to allow for inter survey comparison and following established procedures to feed into national databases (e.g. EPA for water quality, I-WEBS, BBS for bird monitoring). A copy of all data on species will be uploaded to the NBDC within 4 weeks of a survey being carried out, and all data will be made available in a public repository, in line with the Open Data Directive 3. Data on sensitive species will have a restricted availability (e.g. Badger setts). Monitoring procedures should be carried out for a sufficient length of time (minimum 1 year) in order to assess effectiveness of the measures. At the end of the monitoring period, a review of the findings will be carried out, and if necessary, monitoring will be prolonged.

Monitoring will include the following methodologies/guidance:

- Annex I monitoring of the Long Field to ensure Annex I status is maintained following procedures outlined in 4, with commentary on suitability of management, or similar established condition assessment.
- Monitoring of other disturbed habitats to determine condition using indicators of disturbance and assessment of vulnerabilities, including invasive species.
- Monitoring of overall biodiversity of the ponds at the site, including macro-invertebrates and diatoms (suggested methodology of: A guide to monitoring the ecological quality of ponds and canals using PSYM) but other methods may be utilised by a wetlands specialist.
- Bird monitoring using I-WEBs methodology for winter birds, and countryside bird survey methodology for breeding birds, with a walk through of suitable habitat to determine presence/absence of breeding ground-nesting or non-calling birds.
- Monitoring should be carried out until it is established that the ecosystems are functioning well, and of good condition – this will allow for tweaking of management until such conditions are achieved.
- Annual post-construction monitoring for a minimum of 1 to 5 years depending on ecological receptor, and to be reviewed at the end of each term until adequate outcomes are achieved.
- Water quality monitoring in conjunction with Clare Co. Co. standard water quality monitoring standards.
- Data to be submitted to NBDC 4 weeks post survey.
- 5 year reviews of management plans to ensure long term effectiveness of the site.

Further details for monitoring are given under each relevant habitat/species.

7.1.1 Mammal Monitoring

If the pre works surveys establish the presence of Badger in the area, and that mitigation measures need to be put in place regarding sett closure or translocation, then post work surveys must be carried out. A full methodology should be established with a suitably qualified ecologist / NPWS ranger to ensure no lasting negative impact on Badger.

- Surveys to be carried out at minimum quarterly for 12 months post construction.

If the pre works surveys establish the presence of Otter in the area, and that mitigation measures need to be put in place regarding holts, dens or couches, then post works surveys need to be carried out to

3 EU, *Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on Open Data and the Re-Use of Public Sector Information (Recast)*, *L 172/56*, 2019 <http://data.europa.eu/eli/dir/2019/1024/oj>.
4 O'Neill and others.

assess effectiveness of the measures. A full methodology should be established with a suitably qualified ecologist / NPWS ranger to ensure no lasting negative impact on Otter.

- Surveys to be carried out at minimum quarterly for 12 months post construction.

7.1.2 Fish and Amphibian Monitoring

In order to accurately assess the biological effectiveness of the works, monitoring data may need to be collected for more than 3 to 5 years before one can conclusively determine what impacts, if any, the works may have had. Surveys should be carried out by suitably qualified ecologists in each of the different fields to be studied. Monitoring procedures will be determined by the ecologist following expert opinion and best practices guidance.

- An overall biodiversity check on the success of the ponds including macro-invertebrates and/or diatoms (suggested methodology of: A guide to monitoring the ecological quality of ponds and canals using PSYM) but other methods may be utilised by a wetlands specialist.
- Monitoring on the presence and success of the eel nursery habitat, and presence/ absence of amphibians.

7.1.3 Habitat Monitoring

Habitat management needs to be carried out to ensure that the ecological features designed serve their purpose and meet ecological enhancement standards. Along with the aquatic and bird surveys, areas that were worked for habitat creation and establishment of new planting need to be monitored for a minimum of 3 years post construction.

- Survey embankment to monitor establishment of vegetation, ensure that a suitable mix of species is present, and that turves have taken.
- Survey of riparian vegetation to assess if it has reestablished.
- Survey for orchids pre-works and monitor recovery post work and spread of the plants over time. Enumeration of number of plants affected by the works, and translocated must be used as baseline conditions to determine effectiveness of measures over time.

7.2 Water Quality Monitoring

Water quality monitoring must be carried out prior to, during and post-construction in order to establish baseline water quality metrics, evaluate the impacts of the construction whilst ongoing, and how the works impact water quality once the site has been restored. Monitoring and assessment should follow EPA guidance. The protocol should be implemented so that data are collected in a standardised manner and can be integrated into EPA databases. Typical metrics that should be recorded to determine the assessment are:

- Flow (continuous monitoring using on-line flow meter with recorder).
- pH.
- Temperature.
- Conductivity
- Biochemical Oxygen Demand.
- Chemical Oxygen Demand.
- Dissolved Oxygen.
- Suspended Solids.
- Ammonium (as N).
- Nitrate (as N).
- Total Phosphorus (as P).
- Ortho-phosphate (as P).
- Turbidity.
- Hydrocarbons.
- Biological Quality (Q Rating).

These metrics will be collected on all streams within the construction area. Monitoring locations should be determined when implementing the monitoring protocol; suggested locations are presented in Figure 7.1. This will include points located upstream of any works, and then points within the works area and at the outfall locations. At connection points between streams (e.g. Western Tributary to Victoria stream), sampling should occur prior to the confluence of the streams, and at the junction point.

Monitoring during construction will be within the remit of the ECoW appointed, who will have a stop-works power to halt activity as needed. In-field/live analysis of results such as:

- pH,
- Dissolved Oxygen,
- Conductivity
- Turbidity/Suspended Solids

will be undertaken by the ECoW to allow reactive management, especially during instream works, and where releasing water after working in the dry, or other high impact situations. Discharge standards will meet Surface Water Regulation Standards for all relevant parameters, or comparable to water quality standards achieved upstream, as determined by baseline.

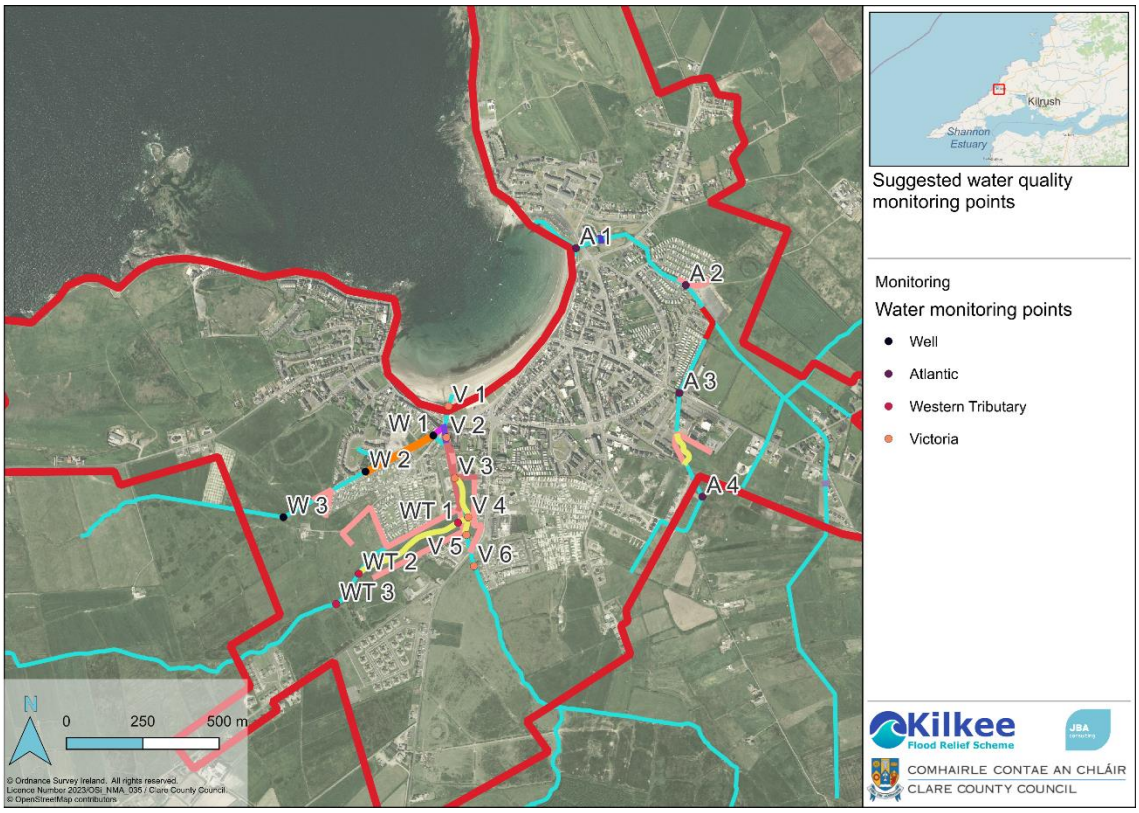

Figure 7.1: Suggested water quality monitoring locations.

7.3 Dust and Air Quality Monitoring

Monitoring of Air Quality and Dust related impacts will be required during the construction stage only of the proposed development. The monitoring activities are to:

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority if and when requested. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the dust management measures, record inspection results, and make an inspection log available to the local authority if and when requested.

- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition and/or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site.

Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

7.4 Archaeological Monitoring

A programme of licensed archaeological monitoring shall be carried out at Construction Stage. The programme shall include archaeological monitoring of all vegetation clearance along the watercourses and greenfields. Any additional unrecorded cultural heritage features such as stone revetments or culverts currently obscured by overgrowth shall be fully recorded. Any ground disturbance works in streambeds and along banks shall be archaeologically monitored. The level of archaeological monitoring of excavation works within greenfields will be determined based on the results of the geophysical surveys and archaeological testing.

8 Health and Safety

As required by the Regulations, a Construction Health and Safety Plan will be prepared which addresses health and safety issues from the design stages through to the completion of the construction and maintenance phases. This plan is treated as a 'live' working document and will be reviewed as the development progresses by the main contractor. The contents of the Construction Health and Safety Plan will follow the requirements of the Regulations.

In accordance with the Regulations, a “Project Supervisor Design Process” has been appointed and a “Project Supervisor Construction Stage” will be appointed.

The Project Supervisor Construction Stage will continue to develop the Construction Health and Safety Plan as the project progresses. The plan will be incorporated into the overall technical record system at the end of the project.

Conditions on the site must be included in the Construction Health and Safety Plan, including safe working conditions such as minimising dust, vibration etc. The plan will include measures for minimisation of dust, vibration and noise to provide a safe place of work (Section 6.4 of this document).

All visitors to the site will be required to report to the site manager and the site is to be adequately secured to prevent unauthorised access. These measures shall not have any negative impact on the safety of human beings when implemented. Ensuring that relevant health and safety legislation is adhered to and that recommended mitigation measures are implemented is the responsibility of the ‘Project Supervisor Construction Stage.’

8.1 Emergency Response Plan

8.1.1 Objective

The emergency response plan is a process/procedure for dealing with environmental preparedness and response. The Project Supervisor Construction Stage (PSCS) will, as required by the Safety Health and Welfare legislation, prepare emergency procedures for major accidents on-site.

If an environmental emergency arises, the contractor will implement the Environmental Emergency Procedures. The procedure will be prepared and agreed with Clare County Council in advance of work proceeding at the site. The most likely causes of an environmental emergency may arise:

- Discharge of potentially polluting materials;
- Rupturing of a silt fence or curtain during heavy periods of rain; and
- An uncontained spillage in the contractor’s compound.

All contractors and sub-contractors will be made aware of the Emergency Response Plan. The Emergency Response Plan will address, as a minimum:

- Fuel handling procedures;
- Silt curtain construction details;
- Adequate supplies of spill control equipment;
- Traffic accidents on the public road;
- Notification procedures; and
- Measures to protect water in the event of a spillage.

In the event of a spill the Contractor will ensure that the following procedures are in place:

- Emergency response awareness training for all Project personnel on-site works.
- Appropriate and sufficient spill control materials will be installed at strategic locations within the site. Spills kits for immediate use will be kept in the cab of mobile equipment.
- Spill kits will be stored in the site compound with easy access for delivery to site in the case of an emergency. A minimum stock of spill kits will be maintained at all times and site vehicles will carry spill kits at all times. Spill kits must include suitable spill control materials to deal with the type of spillage that may occur and where it may occur. Typical contents of an on-site spill kit will include the following as a minimum;
    - Absorbent granules;

    - Absorbent booms; and
    - Absorbent mats/cushions.
- Spill kits will contain gloves to handle contaminated materials and sealable disposal sacks.
- Track mats will be provided to ensure access following heavy rainfall.
- Any contaminated materials/soil media will be segregated, analysed and disposed of by a licensed waste disposal contractor.

8.1.2 Contact personnel in the event of an environmental emergency

Provided below is some contact details for organisations/statutory bodies that should be contacted if an environmental emergency arises on site. The appointed Contractor will add to this as needed.

- Clare County Council Roads, Environment and Water Services Department Tel: (065) 6846331
- Clare County Council Emergency Telephone Contact Outside Office Hours: +353 (087) 2599568
- Inland Fisheries Ireland, 3044 Lake Drive, City West Business Park, 01 884 2600
- Local Conservation officer, NPWS, 90 North King Street, Dublin, (065) 6846307

Offices at
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Limerick

Registered Office
24 Grove Island
Corbally
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t: +353 (0) 61 345463
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