NATURA IMPACT STATEMENT

INFORMATION FOR

STAGE 2 APPROPRIATE ASSESSMENT

PROPOSED

RIVER SLANEY (ENNISCORTHY) DRAINAGE SCHEME

ENNISCORTHY, CO. WEXFORD

Project Reference:		170068			
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D01	Draft	MMW	PS	PS	07/11/2017
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TABLE OF CONTENTS

List of Appendices

1 INTRODUCTION

This Natura Impact Statement (NIS), which contains information required for the competent authority to undertake Stage 2 Appropriate Assessment (AA) in respect of the proposed River Slaney (Enniscorthy) Drainage Scheme, also referred to as the Enniscorthy Flood Defence Scheme, at Enniscorthy, County Wexford, was prepared by Scott Cawley Limited on behalf of the applicant. In this instance confirmation of the scheme is sought from the Minister of Public expenditure and reform under the Arterial Drainage Act. The promotor of the scheme is Wexford County Council on behalf of the Office of Public Works (OPW). The NIS provides information and appraises potential adverse effects, either individually or in combination with other plans or projects, on the integrity of any Natura 2000 sites (hereafter "European sites"[1]). The information in this report forms part of, and should be read in conjunction with, the documentation accompanying the application for confirmation for the proposed scheme and the separate AA Screening report contained in Appendix A of the NIS.

Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (hereafter "the Habitats Directive") requires that, any plan or project not directly connected with or necessary to the management of a European site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to AA of its implications for the site in view of the site's conservation objectives. For the purposes of the application for permission in respect of the proposed scheme at the proposed scheme site (hereafter referred to as the "scheme"), the requirements of Article 6(3) have been transposed into Irish law by Part XAB of the Planning and Development Act 2000, as inserted.

The mere possibility of there being a likelihood of a significant effect on a European site will generate the need for a Stage 2 AA to be carried out by the competent authority for the purposes of Article 6(3). Accordingly, a Stage 1 Screening for AA in respect of an application for consent for proposed scheme must be carried out by the competent authority in order to assess, in view of best scientific knowledge, if the proposed scheme, individually or in combination with another plan or project is likely to have a significant effect on any European site. A Stage 2 AA is required if it cannot be excluded, on the basis of objective information, that a proposed scheme, individually or in combination with other plans or projects, will have a significant effect on a European site. The Stage 1 Screening operates merely to determine whether a Stage 2 AA must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

A separate report has been prepared to provide the necessary information to allow the competent authority to carry out the Stage 1 Screening. Section 6 in the NIS summarises the conclusion of the NIS. It was regarded that is not possible to exclude, on the basis of objective information, that the proposed scheme, individually or in combination with other plans or projects, will have a likely significant effect on specific European sites.

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[1] Natura 2000 sites are defined under the Habitats Directive (Article 3) as a European ecological network of special areas of conservation composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats. In Ireland these sites are designed as European sites – as defined under the Planning and Development Act s and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs).

This NIS comprises information to enable the competent authority to perform its obligation to conduct a Stage 2 Appropriate Assessment. The information in relation to the Stage 1 Screening is presented in the Screening Report (Scott Cawley Ltd., 2017).

2 OVERVIEW OF PROPOSED SCHEME AND ITS RECEIVING ENVIRONMENT

2.1 DESCRIPTION OF RECEIVING ENVIRONMENT

The River Slaney is approx. 117km long and flows from its source in a southerly direction through Co. Wicklow, Co. Carlow and Co. Wexford before entering the Irish Sea at Wexford Harbour, draining a catchment of 1,631km^2. Downstream of Enniscorthy the River Slaney enters a 19km long estuary before discharging into Wexford Harbour at Wexford town. This transitional water is divided in to the Upper Slaney Estuary and the Lower Slaney Estuary. Wexford Harbour is an extensive, shallow estuary which dries out considerably at low tide exposing large expanses of mudflats and sandflats.

Ecological monitoring of the River Slaney has been carried out since the 1970's. According to EPA Envision mapping, the most recent sampling carried out in 2013 recorded macroinvertebrate fauna that indicated a 'high ecological status' in the upper reaches of the river, with a sharp decline to 'poor ecological status' in a monitoring station downstream of Baltinglass and further declines in seven monitoring stations downstream to Kilcarry Bridge. However, all monitoring stations downstream of Bunclody were found to be in 'good ecological status', one of which improved from a moderate status in 2010. The Upper Slaney Estuary (freshwater tidal) is currently assigned 'good ecological status' while the Lower Slaney Estuary (transitional) is assigned 'poor ecological status'.

The groundwater body of the River Slaney includes mostly 'poorly productive bedrock' with 'productive fissured bedrock' at Enniscorthy where the proposed scheme is located. North of the 'productive fissured bedrock' groundwater has been scored as 'possibly at risk of not achieving good status' and south of the 'productive fissured bedrock' is 'expected to achieve good status'. Corresponding with the area of 'productive fissured bedrock' the groundwater score is 'at risk of not achieving good status'.

2.2 DESCRIPTION OF PROPOSED WORKS

The proposed development utilises works to improve flow conveyance, and containment measures to prevent flooding in Enniscorthy town. The scheme contains localised measures including the removal of the Seamus Rafter Bridge and construction of the replacement bridge downstream of the Riverside Park Hotel. The design as presented in this report has been developed in sufficient detail to confirm the positions and dimensions of all the principle elements including the earthworks, structures, road pavements, and drainage. The following is a list of works to be undertaken as part of the flood defence scheme;

- Increase Conveyance;
    - River Excavation and Dredging;
    - River Widening;
    - Permanent deposition zone;
    - Instream Sediment trap;
    - Debris Trap;
    - Compound Channel;
    - Flow deflectors;
- Flood Defences;
    - Glass-Wall Flood Protection walls;
    - Raising Roads/Ground levels;
    - Pumping Storm Waters from Behind the Flood Defences;
    - Underpinning of the Enniscorthy Railway Bridge and Old Bridge.
- New Road Bridge across the River Slaney and Approach Roads;
- New Road Bridge across the River Slaney junction with the existing N11 and N30 and Approach Roads; and

- Restoration of North Island Back Channel.

Full details of the proposed scheme are provided in the EIAR Chapter 4: Description of the Proposed Works and construction methods in the Interim Construction Environmental Management Plan (CEMP), Appendix B of the NIS.

2.2.1 Summary of Proposed Works

2.2.1.1 Conveyance Works

River Dredging

A key part of the scheme involves dredging (deepening) and/or widening and filling along various sections of the river in and adjacent to Enniscorthy. The existing minimum bed for approximately half of the proposed works lengths are currently between 0.25 and 1.5m lower than the design bed level while the remainder bed levels will need to be deepened by approximately 0.25m to 0.5m to achieve the design bed level. See scheme drawings Ref: 355741-MMD-00-XX-DR-N-0400 to Ref: 355741-MMD-00-XX-DR-N-0406.

The proposed works will cause the design bed levels to fall 1.25m over a river length of 3 kilometres. The river dredging works will commence upstream of Enniscorthy town, approximately 0.9km upstream of the Railway Bridge, from river chainage 6600 to 4400, (adjacent to the confluence with River Urrin), a total length of 1.7km. An area of the east side of the channel downstream of Seamus Rafter Bridge to river chainage 5556 to 5125 is below the design bed levels and is therefore is not required to be dredged. The river bed will be reinstated with some variability, to enable river bed habitats to develop over time.

River Widening

River widening is proposed along both sides of the river channel upstream of the Enniscorthy bridge. The eastern extent of the river will be widening from river chainage 6785 to 5725 immediately upstream of the Railway Bridge. The channel will be widened by 7m to 33m. River widening is also proposed on either side of the river channel between the Railway Bridge and the Enniscorthy Bridge. The channel on the western extent of the river is expected to be widened by 2-4.5m, and the channel of the eastern extent is expected to be widened by 6-9m.

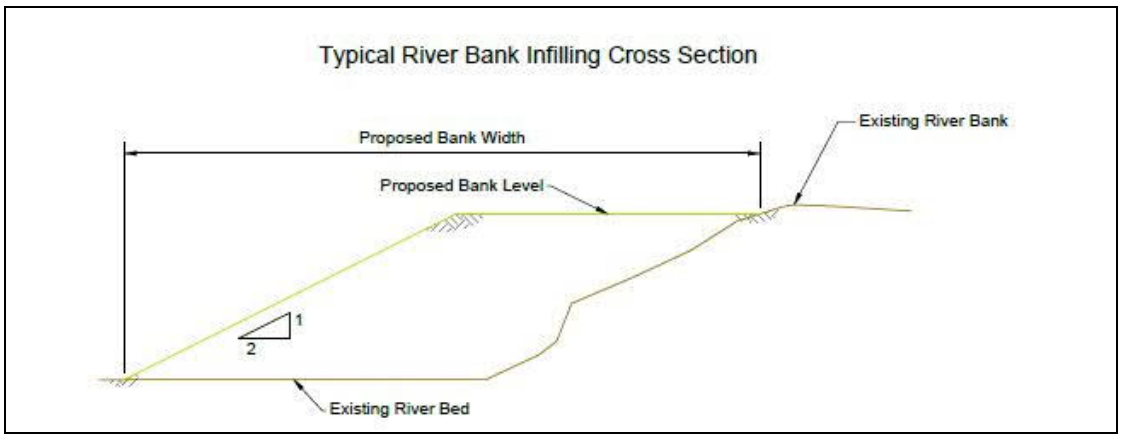
The river widening will then extend downstream from the Seamus Rafter Bridge location (chainage 5356) to the northern end of the Riverside Park Hotel at chainage 4960 will be widened by approximately 2.5m to 14m.

In order to facilitate the integrity of the conveyance works, river widening is also proposed some 700m downstream of the Riverside Park Hotel (chainage 4200 to 3800). Widening is also proposed on the eastern bank of the channel (chainage 3972 to chainage 3800). The channel is expected to be widened by maximum 4.8m width.

River Infilling

River infilling is proposed on the western side of the river upstream of the Railway Bridge between river chainage 5775 to chainage 6175 (approximately 400m) reclamation would take place. The infill works would result in approximately 3900m^3 of river being infilled. Where possible, reused dredged material will be used to infill the channel at this location. Proposed infilling works will also facilitate the construction of a new Sand Martin nesting wall along this reach of the bank.

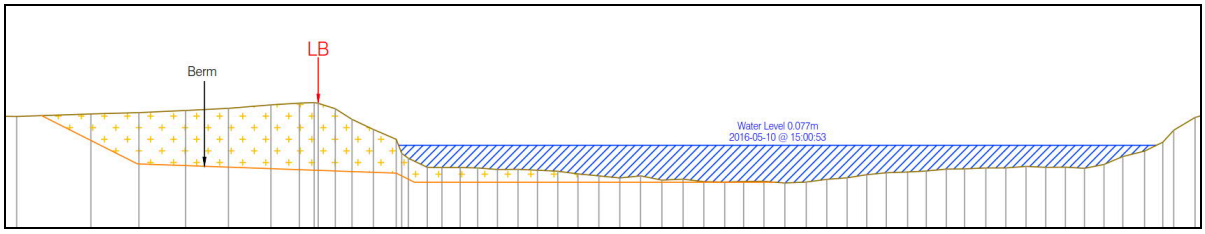
Figure 1: Typical River Bank Infilling Cross Section



Bare Meadows Compound Channel

A compound channel will extend along the eastern side of the bank of the river opposite the downstream end of the Riverside Park Hotel along the Bare Meadows. The channel will run south for approximately 940m. A cross section of the proposed channel is illustrated in Figure 2 below. A compound (or '2-stage) channel would only have an effect during periods of high flow. The channel will be between 0.5m and 1.4m below existing river bank level. The purpose of this channel is to convey more flow during a flood scenario than the existing channel while not reducing the low flow depth of the River Slaney.

Figure 2: Cross Section of the proposed Bare Meadows Compound Channel



Summary of Conveyance Works

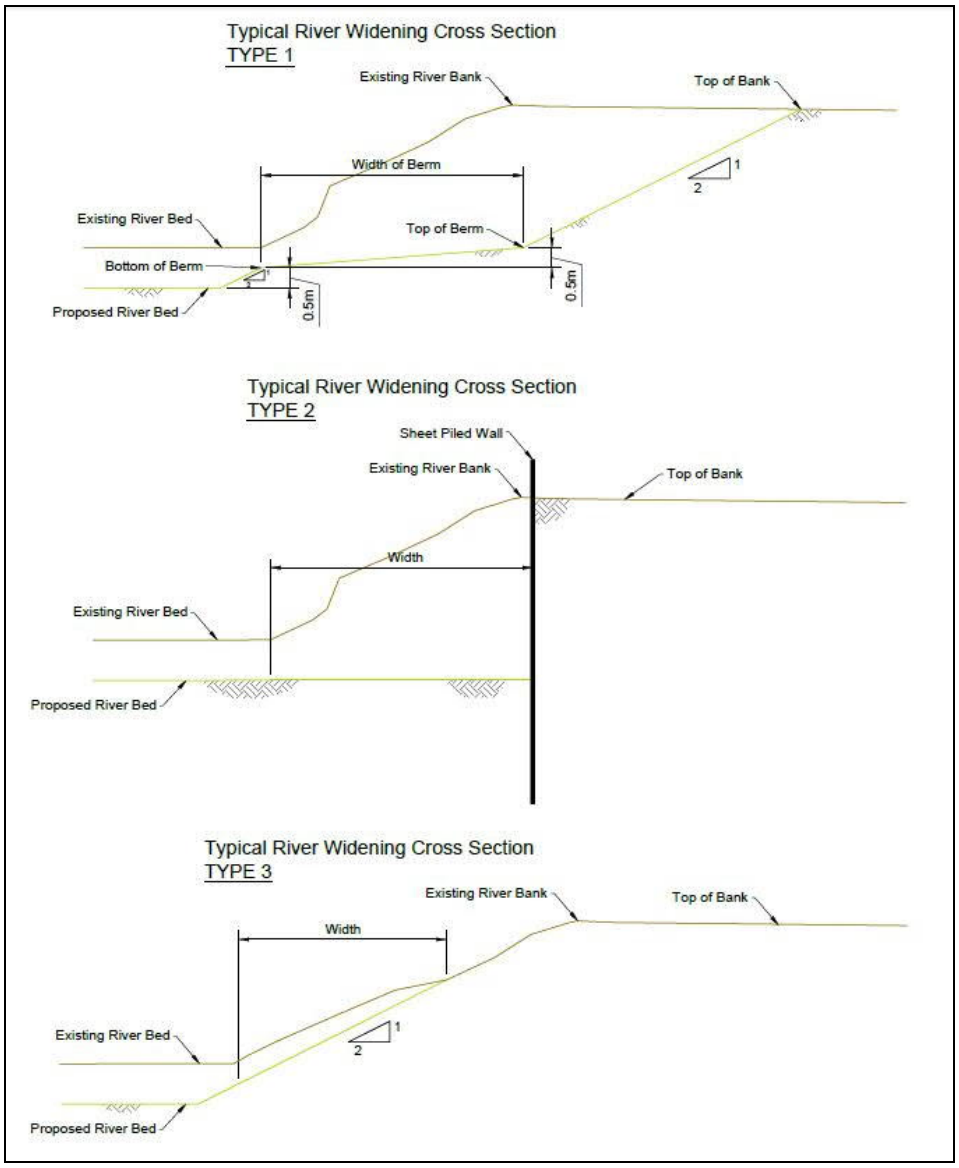
The proposed river widening works will generally comprise three different approaches which are carried out in consideration of the bank conditions encountered. Typical cross sections of the proposed works are shown in Figure 3.

Table 1: Approximate Location of River Channel Works

Approximate Chainage	Location	Length of Bank Widening/Fill	Details
6785-6670	East Bank of River, North Island	128m	River Widening Type 3
6670-5735	East Bank of River, North Island	843m	River Widening Type 1
6125-5750	West Bank of River, Island Road	392m	Bank In-fill Works
5710-5556	East Bank of River, Leisure Centre	154m	River Widening Type 2
5744-5556	West Bank of River, Island Street	183m	River Widening Type 3
5544-5500	West Bank of River, Abbey Quay below Enniscorthy Br.	36m	River Widening Type 2
5375-4893	West Bank of River, The Promenade	480m	River Widening Type 2
5180-4930	East Bank of River, Wexford Road	255m	River Widening Type 3
4930-4765	East Bank of River, West of Wexford Road	164m	River Widening Type 2

Approximate Chainage	Location	Length of Bank Widening/Fill	Details
4765-4100	East Bank of River, West of Wexford Road	620m	River Widening Type 1
4200-3830	West Bank of River, At WWTP	347m	River Widening Type 1
3915-3750	East Bank of River, At Hospital	172m	River Widening Type 1

Figure 3: Typical River Widening Cross Sections



2.2.1.2 Flow Deflectors

A series of flow deflectors are proposed within the River Slaney, these deflectors will be positioned approximately 200mm below the design bed level. The location of these deflectors is shown on the scheme drawing Ref: 355741-MMD-00-XX-DR-N-0400 to Ref: 355741-MMD-00-XX-DR-N-0406.

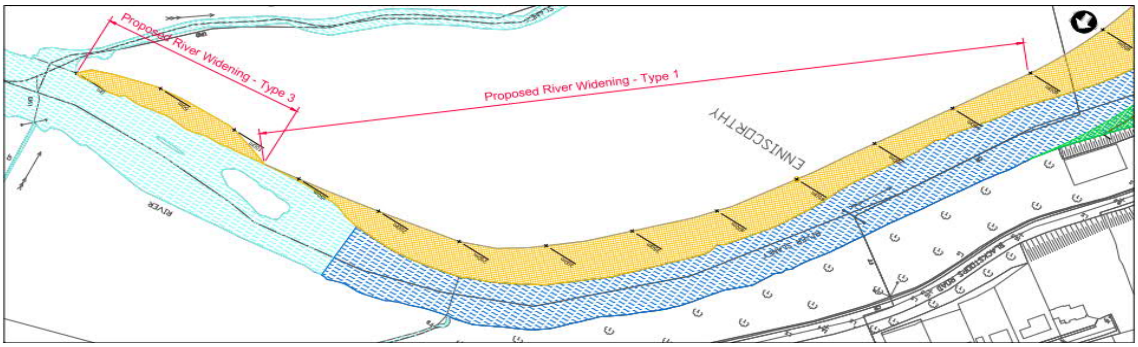
2.2.1.3 Sediment Trap

The proposed development design includes creating a sediment deposition zone or trap in the upstream extent of the scheme. This area will enable the majority of sediment arriving from upstream to be deposited, reducing the need for future removal within the town. Sediment removal

will be limited to the east bank of the river and will be undertaken in dry working conditions only. The design of the sediment trap eliminates the need for regular maintenance dredging of the entire reach of the river channel in Enniscorthy.

The location identified is close to the existing mid-channel gravel bar on the North Island (chainage 6750), which has formed in an area where the channel is currently about 10m wider than up and downstream. Figure 4 below illustrates the location and design of the sediment depositional trap.

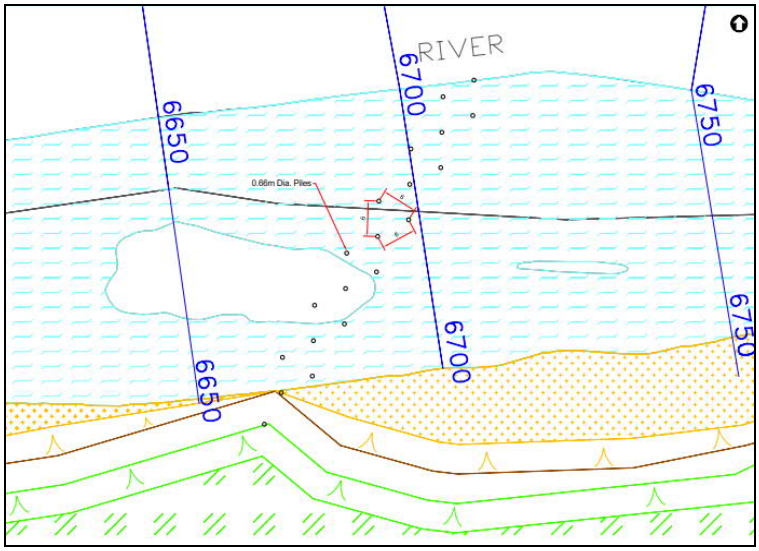
Figure 4: Location of the Proposed Instream Sediment Depositional Trap Design (Type 3 Widening)



2.2.1.4 Instream Debris Trap

The proposed development design includes installation of a debris trap upstream at river chainage 6620. The purpose of the debris trap is to trap large floating debris i.e. trees, that could block the openings of the Railway Bridge or the Old Bridge in Enniscorthy. If these are trapped in the debris trap they will periodically have to be removed by heavy machinery like a long reach excavator from the river bank on the North Island.

Figure 5: Proposed Design for the Proposed Debris Trap



2.2.1.5 Permanent Depositional Zone

The deposition site for the excavated dredged materials will be located within the meadow on the North Island. A portion of the dredged material is likely to be re-used in the proposed flood defences on site. Material that is removed from the river channel and river banks upstream of the existing Seamus Rafter Bridge will be loaded onto trunks and transported via the dry works haul route upstream to the North Island. To facilitate the permanent deposition of material on the North Island, topsoil from the designated area will be removed in a phased approach and placed in temporary stockpile. Depositional material will be placed on exposed subsoil and compacted with a compaction

plant (roller). Topsoil will be reinstated, and the area will be rotavated and reseeded with a dry calcareous and neutral grass seed mix. The excavated material will be set back by a minimum of 5m from the widened river sections.

2.2.1.6 North Island Back Channel Restoration

A key ecological benefit on the proposed development is the restoration of the North Island Back Channel. Currently, the channel is partially dry and contains stagnant water, however based on historical mapping this was previously a functional distributor channel which became silted up. The channel is currently not connected to the River Slaney, however in high flow levels the river tends to overflow into this channel. The proposed back channel will cater for minimum 5% of ambient flow in the existing main channel of the River Slaney c. 0.24m^3/s at 95 percentile flow; c. 1.55m^3/s at mean flow. The proposed channel is approximately 945m long and flows from north-east to south-west. See NIS Appendix C.

Some of key design features proposed on the Back Channel are summarised below;

- Meanders have been included to imitate the natural flow of a river and to promote oxygenation, and ensure a good range of flow currents, substrates and banks forms are sustained throughout the year;
- All the proposed banks will be provided with a gentle slope and root wads and brushwood mattresses will be installed as bank protection measures as required;
- Fencing will be installed to further protect the banks from erosion and will be installed at least 5m back from the channel edge;
- New tree planting will also aid in holding banks together by roots and reduce the potential for erosion of banks;
- 3no. fish refuges have also been encompassed in the design at approximately 310m, 627m and 730m downstream of where the existing River Slaney enters the Back Channel;
- 5no. woody deflectors will provide a barrier to the main channel behind which silt will deposit to create suitable lamprey ammocoete habitat. The flow deflectors will also provide variations in flow that will last all year round;
- 2no. spawning areas are also included in the design. These will be utilised by lamprey and salmonid;
- A rock armouring control structure will be constructed at the upper extent of the back channel where it leaves the River Slaney flows; and
- An island feature is also included approximately 410m downstream of the Back Channel. This feature will create interesting habitat that may be used by otter and bats or birds foraging and commuting along the channel.

2.2.1.7 Flood Defences

Flood Protection walls

The proposed development includes the construction of new flood walls within Enniscorthy town. The location and extent of the walls are illustrated on the scheme drawings Ref: 355741-MMD-00-XX-DR-N-0400 to Ref: 355741-MMD-00-XX-DR-N-0406. A summary of the proposed works is provided in Table 2 below.

Table 2: Summary of proposed flood defences

Appropriate Chainage	Location	Length of Wall
6089-5740	West Bank of River, Island Road	355m
5696	West Bank of River, Along North Side of Rail Line	56m
5682	West Bank of River, Along South Side of Rail Line	54m
6000-5750	East Bank of River, Train Station to Enniscorthy Bridge	164m
5530-4893	West Bank of River, Enniscorthy Bridge to South end of Hotel	626m
4980-4885	West Bank of River, Wall around Hotel	158m
4980-4875	West Bank of River, Wall at back of Hotel/along Rail Line	129m
5544-4930	East Bank of River, Enniscorthy Bridge - Wexford Road	662m

Raising Roads/Ground levels

To maintain the connectivity with the river and curtail the potential visual impact of the proposed flood walls, it is proposed to raise the ground level on the land side of the flood wall at key locations. Along both Abbey Quay and the Promenade, the road and the footpath are proposed to be raised by over 1m. On Shannon Quay and for a section of the Wexford Road immediately downstream of the pedestrian bridge the footpath is proposed to be raised.

The road and footpath around the Riverside Hotel and the carpark at both the Train Station and 'The Bailey Bar & Eatery' are proposed to be raised to form part of the proposed scheme.

Reprofiling works on Enniscorthy Bridge and Railway Bridge

To ensure structural stability of the existing bridges, interventions are required on these existing the bridges. The river bed level at these structures is being lowered by between 1 and 1.5m exposing the piers and foundations of these structures to scour forces during high velocity flow events. In order to mitigate this risk, it is proposed to construct scour protection aprons at the bridge locations. These concrete structures will span between the piers and abutments of the bridge structures and will prevent high river velocities from scouring the river bed and exposing the foundations of the bridge to damage. In order to prevent damage to the river habitat, it is proposed to set the level of the top of the concrete apron at a depth of 500mm below the proposed dredge level. Where the concrete apron meets the piers and abutments of the bridge the top of concrete is raised to equal the dredge level locally.

Pumping Storm Water from Behind the Flood Defences

The management of storm water behind the defence line is a key component of the scheme. The scheme includes for the provision of 14no. pumping stations, varying in size due to the various catchment sizes. The location of these stations is set out on the scheme drawings.

2.2.1.8 Seamus Rafter Bridge Removal and Construction of a New Road Bridge

As part of the flood defence scheme being implemented within the town of Enniscorthy, the Seamus Rafter Bridge at Chainage 5356, which forms part of the N11 Dublin to Rosslare via a one-way traffic circulation system, will be replaced with a new road bridge providing additional vertical clearance to the river. The Seamus Rafter Bridge will be completely removed, including any stonework, pillars, piles etc within the river. A new road bridge will be constructed at chainage 4800 some 100m downstream of the Riverside Park Hotel.

The proposed bridge will be approximately 180m in length and 16.8m wide. The proposed bridge design comprises a pair of steel boxes with a reinforced concrete deck slab, which will incorporate precast panels, thereby minimises requirements for pouring concrete over the railway and river. The preliminary lighting design has been developed and minimises requirements for street lighting over the river span and flood plain on the east side of the river.

Road Bridge Drainage

The preferred bridge structure falls from west to east. A bridge deck drainage system will be provided on either side of the carriageway over the length of the bridge. On the cantilevered footpaths/cycleways, it is proposed to provide an ACCO type drain adjacent to the safety barrier upstand and pedestrian parapet upstand. Both systems will discharge to a chamber at the low side of the bridge and tie into the N11 drainage network for the junction arrangement. Subsurface drainage will be provided on the bridge and will discharge positively to the abutment gallery at the low end.

New Footbridge in Enniscorthy

In addition to the new road bridge, a new footbridge will be built across the River Slaney just upstream of the existing Seamus Rafter Bridge at chainage 5400. The new bridge will ensure that no pedestrian's detours are necessary following the removal of the Seamus Rafter Bridge.

2.2.2 Construction Programme and Sequencing of Proposed Works

It is anticipated that a contractor will be appointed in 2019 subject to the completion of the consent process. At the time of the application submission, a construction contractor had not been appointed. Therefore, a preliminary construction programme prepared by Mott MacDonald in October 2017 was used as a basis for the assessment of the construction programme and sequencing of the proposed works. An Interim CEMP has been prepared for the construction works, and is contained in NIS Appendix B. This overview includes mitigation measures to manage the environmental effects during the construction period, incorporating the mitigation measures identified within the EIAR and NIS.

Construction is currently programmed to commence in Q1 of 2020. The actual construction programme will be dependent on the appointed contractor's works proposals, and the selected construction methods. For the purposes of the EIAR, a 36-month construction period is envisaged for the proposed instream works and an additional 18-month construction period for the proposed road bridge.

The core working hours will be from 07:00 and 19:00hr, Monday to Friday and 07:00-13:00 on Saturdays.

The construction activities are divided between three primary work streams, these are described hereunder;

1. The construction of the new road bridge downstream of the Riverside Park Hotel will be carried out in advance of the main flood defence scheme. The removal of the Seamus Rafter

Bridge will only commence following the completion of the new road bridge and its approach roads;

2. Flood Defence Civil Engineering works- construction of flood walls, underpinning of Railway Bridge and Enniscorthy Bridge, construction of the new pedestrian bridge and construction of new flood defence walls;
3. River Slaney Instream Works- comprises dredging (deepening) and/or widening and filling along various sections of the river in and adjacent to Enniscorthy town and associated measures such as the depositional zone and compound channel and regrading and reprofiling of the Back Channel on the North Island. For this stage of the works, it is necessary to isolate and de-water the work area to create dry working conditions. Dry works areas reduce the risk of pollution and significant sedimentation in the river. Further details on the dry works areas are set out below. It is also envisaged that the proposed Back Channel restoration works will be constructed in advance of the main channel works.

Flood Defences will be constructed at the Promenade and the Leisure Centre and the construction of the new road bridge before the instream work can take place.

Table 3: Indicative Construction Programme

	2020				2021							2022
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Flood defences												
New Road Bridge and Approaches												
Demolish Seamus Rafter Bridge												
River Widening and Dredging in dry works area												
River Widening downstream of Urrin												
Pedestrian Bridge												
Pumping Stations												

3 METHODOLOGY

3.1 AUTHORS' QUALIFICATIONS & EXPERTISE

This Natura Impact Statement (NIS) has been prepared by Paul Scott and Maeve Maher-McWilliams with specialist contributions from William O'Connor, Evelyn Moorkens, Joanne Denyer, and Eleanor Mayes.

3.1.1 Paul Scott – Scott Cawley Limited

Paul Scott is Director with Scott Cawley Ltd. He holds a first class honours degree in Environmental Biology from the University of Liverpool and a Masters in Pollution and Environmental Control at the University of Manchester. He is a Chartered Ecologist and Environmentalist and a full Member of the CIEEM. He is an experienced environmental scientist, specialising in impact assessment and ecology. He has experience in a wide variety of environmental assessment and management projects and also has acted as a member of environmental assessment Expert Panels. Mr Scott has prepared guidance on Strategic Environmental Assessment, Appropriate Assessment and Environmental Impact Assessment to UK and Irish central government and local authorities. Paul has prepared ecological guidance notes designed for planners and developers on behalf of the four Dublin local authorities. He has been involved in many Appropriate Assessments of complex projects and land-use plans including the Cherrywood SDZ, Meath and Clare County Development Plans, East Meath Local Area Plan, and variations to the Meath, Navan, Kells, Galway, Dublin, Ennis and Kildare Development Plans. He developed a review package for Appropriate Assessment as part of the EPA STRIVE funded project Integrated Biodiversity Impact Assessment. He lectures on EIA and Appropriate Assessment practice at University College Dublin, Trinity College Dublin and NUI Galway. Mr Scott was responsible for overall review and verification of this report and provided additional text where required.

3.1.2 Maeve Maher-McWilliams – Scott Cawley Limited

Maeve Maher-McWilliams holds an honours degree in Biological Sciences from Queens University Belfast and attained a distinction in her Masters in Evolutionary and Behavioural Ecology from University of Exeter. She is an Associate member of Chartered Institute of Ecology and Environmental Management (CIEEM). Maeve has worked in ecological consultancy for over five years and has worked on a range of large to small scale projects across Ireland and the UK. Maeve's primary technical specialism is ornithology, however her skills extend to protected mammal and habitat surveys. Her involvement extends from inception to post planning compliance, survey completion, project and survey management, carrying out of Ecological Impact Assessment, and authoring of EIA Chapters and Appropriate Assessment. Maeve has a pragmatic and forward-thinking approach in delivering services, while maintaining the highest protection and consideration for ornithological sensitivities. She regularly undertakes surveys and prepares AA and EcIA reports.

3.1.3 Dr. William O'Connor – Aquatic Ecology Specialist, Ecofact

Dr. William O'Connor is a senior aquatic scientist who has over 25 year's professional ecological management experience. He is a graduate of the University of Wales, Cardiff where he was awarded an MSc degree in Applied Hydrobiology, and the National University of Ireland, Galway where he received a PhD degree in Zoology. He is a Fellow of the Institute of Biology and a full member of both the Institute of Ecology and Environmental Management, and the Institute of Fisheries Management. He was employed as Senior Fisheries Biologist with the Electricity Supply Board during the period 1992-1998 and has been working as a private consultant since 1999. William's primary expertise lies in Water Quality, Fisheries and Aquatic Ecology; with extensive experience of large-scale projects for public and private clients, including national infrastructure EIS studies. William has

operated in a professional consultancy capacity for a number of national statutory bodies including the National Parks and Wildlife Service (NPWS), the Office of Public Works (OPW), the Environmental Protection Agency (EPA), the Northern Ireland Environment Agency (NIES), Waterways Ireland (WI) and the National Roads Authority (NRA). He has also undertaken NPWS wildlife surveys for protected aquatic species, including several catchment-wide studies on lamprey species and a national survey of white-clawed crayfish in Irish lakes, both of which have been published as NPWS Wildlife Manuals. He is a fully trained and licensed NPWS Freshwater Pearl Mussel surveyor, and has held numerous licences for Atlantic salmon, White-clawed crayfish and lamprey species.

3.1.4 Dr. Evelyn Moorkens – Freshwater Pearl Mussel Specialist

Dr. Evelyn Moorkens is an Environmental Scientist and Malacologist. She holds a Bachelor of Arts (Hons) degree in Natural Sciences, a Master of Science degree in Environmental Science, and a Doctor of Philosophy degree in Environmental Science, all from Trinity College, Dublin. Dr Moorkens' Master's and Doctorate theses specialised in Margaritifera status and requirements. She is an acknowledged international expert in Margaritifera. She has twenty eight years national and international experience in research into the biology and ecology species of this species, and in environmental planning and assessment and advice for government policy making, European and national environmental law, ecological surveys and professional opinions towards the designation of Irish Natura 2000 sites, environmental impact assessment, Appropriate Assessment under Article 6 of the Habitat's Directive, planning compliance, baseline surveys, monitoring programme design and implementation, mapping of species distributions and captive breeding of Margaritifera.

Dr Moorkens is an expert in the interpretation and implementation of the Habitat's Directive and its transposition into national law, in the implementation of the Irish Wildlife Acts, and how they relate to Planning. She is a consultant to An Bord Pleanála, the planning review board in Ireland. She has provided independent expert opinion to planning hearings, High Court judicial reviews, High Court injunction proceedings, District Court proceedings and advice to numerous internal governmental policy papers in Ireland. She has acted as Environmental expert in court proceedings and in government policy papers in the UK. She has lectured in Environmental policy and implementation of European Law in Ireland, the UK and Germany. In addition, Evelyn Moorkens has produced over 30 peer reviewed papers and 400 reports over 28 years relating to molluscan surveys and expert opinion.

She is a member of the International Union of Nature Conservation (IUCN) species specialist group committee for Mollusca. She sits on the UK Steering Groups for EU Habitats Directive mollusc species. She sat on the 5th Scientific Advisory Committee of the Irish Environmental Protection Agency (EPA), and maintains the Irish national database of non-marine molluscs. She is a member of the Environmental chamber of the Irish Standard Development Group of FSC (Forest Stewardship Council) certification. She runs the Irish Margaritifera captive breeding programme.

She has drafted the first CEN European Standard for freshwater pearl mussel requirements in Europe. She is currently producing best practice guidance documents for the freshwater pearl mussel for the Republic of Ireland and Northern Ireland for a range of sectors. As well as running an independent consultancy, she is a research associate at Trinity College, Dublin. Her research interests are in catchment management affects, practical measures for conservation and appropriate monitoring protocols for species conservation assessment. She also supervises graduate students in their research. Her research is widely published and referenced in peer reviewed journals. She is a member of the CIEEM and is a Chartered Environmentalist.

3.1.5 Dr. Joanne Denyer – Botanical Specialist, Denyer Ecology

Dr. Joanne Denyer is a highly experienced botanist and bryologist with over 15 years' experience of ecological survey and research. She holds a first class honours degree in Environmental Science from

Leicester University. She completed a DPhil in Plant Ecology (grassland ecology) at the University of Sussex and subsequently worked on the impacts of land-use, climate change and grazing on upland plant communities at the Macaulay Institute in Aberdeen (now James Hutton Institute). She is a full member of the CIEEM. Skills from her academic and research background include a high standard in experimental design, report writing, data collation, literature review and data analysis. Dr Denyer has published in high-ranking international peer-reviewed journals and presented data at over ten international conferences. She is an Adjunct Lecturer at National University of Ireland, Galway (NUIG), Guest Lecturer at University College Dublin (UCD) and Visiting Research Fellow at Queen's University Belfast.

Dr Denyer is experienced in the identification of all plant groups, including difficult groups such as aquatic macrophytes, charophytes and bryophytes. She received the National Biodiversity Data Centre 'Distinguished Recorder Award' in 2014 in recognition of outstanding contribution to bryological recording in Ireland. She regularly provides botanical and bryological training courses for amateurs and professionals and leads training meetings for the British Bryological Society (Irish group), Dublin Naturalist Field Club and the Botanical Society of the British Isles. Training courses provided include grass, sedge and rush identification, bryophyte and Sphagnum identification and using bryophytes as habitat indicators. She also lectures on bryophyte ecology to undergraduates at NUIG and UCD and leads field trips.

Dr Denyer specialises in botanical, wetland and bryological survey in the Republic of Ireland and Northern Ireland. She is experienced in Habitat Survey (Ireland), Irish Vegetation Classification (IVC) survey, Phase 1 Habitat survey (UK), detailed botanical survey, National Vegetation Classification (NVC), rare plant survey and vegetation monitoring. She is highly experienced in wetland surveys including lowland and upland fens, springs and flushes; raised and blanket bogs and transition mire; wet woodlands and aquatic macrophytes of rivers, lakes and ditches. She has undertaken wetland surveys in Ireland and the UK for a range of projects such as flood defence schemes, local development plans, road schemes, reservoir enhancement, conservation monitoring, postconstruction monitoring, windfarm and other developments. Her aquatic macrophyte experience includes detailed surveys of river, lakes and ditches, research experiments and monitoring of aquatic plant regeneration; review of scientific literature on macrophyte regeneration and production of a risk assessment for non-native aquatic species. In addition, she has undertaken Ecological Impact Assessments for wetland sites and acted as an expert witness on calcareous springs and wetland vegetation at an Oral Hearing (2014).

She is frequently employed as a specialist botanist by other ecological consultancies to provide expertise and advice on habitat survey and assessment, in particular wetland and bryophyte dominant habitats.

3.1.6 Eleanor Mayes – Bird Specialist

Eleanor Mayes graduated with a B.A. (Mod) in Natural Science (Zoology) in 1978, and has been employed as a professional biologist/ecologist since 1979, completing an M.Sc. in Zoology in 1983. Her ornithological research work includes studies contributing to the conservation management of two Annex 1 listed birds: research on the diet, feeding ecology and energetics of Greenland White-fronted geese in semi-natural and intensive farmland habitats in Ireland (1983-86), and she contributed census co-ordination, census and habitat survey to the investigation of the role of habitat change in the decline of the Corncrake population in Ireland and Britain (1988). She has carried out policy work including analysis of the implementation of the EU Birds Directive in Ireland, and developed of guidance for Habitats Directive and Water Framework Directive cross-compliance in 2008. She has worked as an independent ecological consultant since 1991, working with a range of clients and inter-disciplinary professional teams on a wide range of projects including flood alleviation schemes, recreational infrastructure including inland marinas and waterway restoration developments, waste water and potable water infrastructure, submarine and intertidal cable routes,

overhead high voltage power lines, wind farm development proposals, and power stations, preparing material for publication in scientific literature, in report form, preparing and contributing to Article 6 Screening for Appropriate Assessment, Natura Impact Statement, Environmental Impact Statement, Environmental Report, and Ecological Impact Reports. Survey work completed includes ornithological survey (wintering waterbird and breeding bird surveys including breeding waders, vantage point surveys across a range of upland, lowland and wetland habitats), development of GIS databases for use in presentation and analysis of results, and pre-construction, construction phase, and post-construction and operational phase ecological and bird monitoring of approved developments.

3.2 GUIDANCE AND SOURCES OF INFORMATION

This Natura Impact Statement has been prepared having regard to the following guidance documents here relevant:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. (Department of Environment, Heritage and Local Government, 2010 revision);
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 & PSSP 2/10;
- Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General, 2001); hereafter referred to as the EC Article 6 Guidance Document. The guidance within this document provides a non-mandatory methodology for carrying out assessments required under Article 6(3) and (4) of the Habitats Directive;
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (EC Environment Directorate-General, 2000 updated draft April 2015); hereafter referred to as MN2000; and
- Guidelines for Good Practice Appropriate Assessment of Plans under Article 6(3) Habitats Directive. Findings of an international workshop on Appropriate Assessment in Oxford, December 2009.

The information comprised in this report was based, inter alia, on a suite of ecology surveys (habitat surveys, mammal surveys, bat surveys, ornithology surveys, and aquatic surveys for lamprey, other fish species and freshwater pearl mussel), carried out at the site of the proposed Scheme over 2016 and 2017 (see Section 3 for more details).

Desktop data relied upon the following resources;

- Data on designated sites was obtained from the online National Parks and Wildlife Service (NPWS) database http://www.npws.ie/mapsanddata;
- Data held by the Botanical Society of Britain and Ireland (BSBI) Vice County Recorder for Wexford;
- Irish Wetland Bird Survey (I-WeBS);
- County Wexford Biodiversity Action Plan 2013 - 2018 (Wexford County Council, 2013);
- Data on rare/protected/threatened species held by the National Parks and Wildlife Service (NPWS) accessed online http://www.npws.ie/mapsanddata;
- Data on designated sites was obtained from the online National Parks and Wildlife Service (NPWS) database http://www.npws.ie/mapsanddata;

- Data on rare/protected/threatened species and bat landscape suitability mapping held by the online National Biodiversity Data Centre database, available online at http://www.biodiversityireland.ie;
- Data on environmental conditions of the site and environs available from the Environmental Protection Agency (EPA) Geo Portal accessed online http://gis.epa.ie/Envision;
- Data on catchments, sub-catchments, assessments and trends from https://www.catchments.ie;
- Data held by the Botanical Society of Britain and Ireland (BSBI) Vice County Recorder for Wexford;
- Records of bat roost and activity within 10km of the proposed scheme survey area, held by Bat Conservation Ireland (April 2016);
- Records from the All-Ireland Daubenton's Bat Surveys 2006-2011;
- Information from the Irish Bat Monitoring Schemes BATLAS Republic of Ireland Report for 2008 – 2009;
- County Wexford Biodiversity Action Plan 2013 - 2018 (Wexford County Council, 2013);
- M11 Gorey to Enniscorthy Scheme – Environmental Impact Statement. Volumes 1 – 4 (Ryan Hanley WSP, 2009);
- Habitat Survey of the River Slaney Valley around Enniscorthy, Co. Wexford (Goodwillie, 2003);
- Natura Impact Statement (NIS) Screening Report and Appropriate Assessment (including mitigation) and Baseline Survey of Flora and Fauna for the proposed Extension of the River Slaney Trails at Enniscorthy (Ted Walsh & Associates LTD, 2013);
- An Assessment of the River Slaney for the Presence of Bats, Badgers and Otters in Advance of a Flood Relief Scheme at Enniscorthy, County Wexford and Proposed Mitigation (Keeley, 2005);
- NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland;
- King J.J., Hanna G. And Wightman G.D. (2008) Ecological Impact Assessment (EcIA) of The Effects of Statutory Arterial Drainage Maintenance Activities on Three Lamprey species (Lampetra planeri Bloch, Lampetra fluviatilis L., and Petromyzon marinus L.). Series of Ecological Assessments on Arterial Drainage Maintenance No 9 Environment Section, Office of Public Works, Headford, Co. Galway;
- Records of bird species held by the National Biodiversity Data Centre; and
- I-WeBS data for the River Slaney, provided by BirdWatch Ireland and by Alyn Walsh, NPWS. The Irish Wetland Bird Survey (I-WeBS) is a joint scheme of BirdWatch Ireland and the National Parks and Wildlife Service (NPWS).

The following planning and policy documents were relevant to the subject lands, in particular with regard to the assessment of other plans and projects with potential for cumulative effects:

- Wexford County Development Plan 2013 – 2019; and
- Enniscorthy Town and Environs Development Plan 2008 – 2014 (as extended).

3.3 FIELD SURVEY METHODOLOGY

Table 4 below provides a summary of surveys carried out and dates they were carried out on and reference to the baseline report which details full methodology and results of the surveys.

Table 4: Summary of ecology surveys carried out for the Enniscorthy Flood Defence Scheme and reference to baseline report

Survey	Surveyor	Survey Dates	Baseline Report
Macrophyte survey	Dr. Joanne Denyer	July 2016	Appendix D
Old oak woodland survey	Dr. Joanne Denyer	17th July 2016	Appendix E
Wet woodland survey	Dr. Joanne Denyer	13th May 2016; 15th, 17th July 2016; 25th September 2016; 2nd May 2017	Appendix F
Mammal surveys	Scott Cawley	25th, 26th February; 2nd, 3rd March 2016	Appendix G
Waterbird surveys (wintering, passage and breeding)	Eleanor Mayes	11th, 18th, 24th February 2016; 3rd, 10th, 22nd, 23rd March 2016; 13th, 29th April 2016; 19th, 30th May 2016; 17th, 27th June 2016; 6th, 12th, 20th, 29th July 2016; 24th, 30th August 2016; 19th, 29th September 2016; 17th, 27th October 2016; 28th November 2016; 13th, 15th December 2016; 17th, 24th January 2017; 21st February 2017, 16th March 201722nd, 23rd March 2016	Appendix H
Breeding bird surveys	Eleanor Mayes	12th, 13th, 29th April 2016; 18th, 19th, 30th, 31st May 2016; 16th, 17th June 2016; 6th, 12th, 20th July 2016; 24th August 2016; 16th March 2017; 11th April 2017; 4th, 29th May 2017	Appendix H
Raptor surveys	Eleanor Mayes	3rd, 10th March; 5rh April; 18th May 2016	Appendix H
Vantage point surveys	Eleanor Mayes	February 2016 - January 2017	Appendix H
Lamprey and fish surveys	Dr. Will O'Connor, Ecofact	14th, 15th, 22nd April 2016; 4th, 5th,14th, 15th, 26th May 2016; 7th, 14th June 2016; July 2016	Appendix I
Freshwater pearl mussel survey	Dr. Evelyn Moorkens	7th September 2016; 28th October 2016; 20th February 2018; 3rd July 2018;	Appendix J, K, L, P and Q

3.4 CONSULTATION

Consultation was carried out with National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland (IFI) and John Cross (Woodland specialist). Meetings were on-going throughout preparation of this EIAR chapter and NIS, as summarised in Table 5 below. Furthermore, in advance of aquatic surveys, consultation with NPWS and Inland Fisheries Ireland (IFI) was also carried out regarding existing information for the area and where licensing was involved to carry out surveys, specifying appropriate methodologies and stipulating conditions for surveys. The table below demonstrates the extent of consultation carried out throughout the development of the proposed scheme. Comments and observations were addressed in the appropriate sections of the NIS.

Table 5: Summary of Consultation

Consultee	Date	Details
National Park and Wildlife Service (NPWS)	2016-2018	Correspondence with NPWS staff. Communications informed the survey methodology used to collect data for the proposed development.
NPWS	17th February 2016	Local NPWS staff met with staff from Scott Cawley. Scope of surveys was discussed and included lamprey, invasive species, otter, bats, birds and Annex I habitats- Alluvial Woodland, Floating River Vegetation. Comments from NPWS were incorporated into the survey design.
NPWS	6th July 2016	Meeting attendance included Ciara Flynn from NPWS; Mott MacDonald, Scott Cawley and Wexford County Council. Overview of ecology baseline survey results and discussion in relation to key issues/constraints identified to inform the design of the scheme.
NPWS	6th July 2016	Meeting attendance included local NPWS staff; Mott MacDonald, Scott Cawley and Wexford County Council. Overview of ecology baseline survey results and discussion in relation to key issues/constraints identified to inform the design of the scheme.
Inland Fisheries Ireland (IFI)	November 2017	Meeting between Mott MacDonald staff and IFI discussed the progress of the scheme and construction approach
John Cross	February and October 2017	Dr. John Cross (Woodland Specialist) provided comment on the specialist wet woodland surveys and potential impacts relating to Annex I habitat [3260] Alluvial woodland.

3.5 STAGE 2 AA METHODOLOGY

For Stage 2 AA, the potential for a proposed development, individually or in combination with other plans or projects, to adversely affect the integrity of European sites must be examined with respect to the specific conservation objectives of the relevant European sites. Stage 2 AA must provide a clear conclusion regarding the absence of adverse effects on the integrity of European sites. In order to grant permission, the competent authority must conclude, having conducted the Stage 2 AA that the proposed scheme will not have an adverse effect on the integrity of any identified European sites.

For the avoidance of doubt, and as demonstrated by the conclusions of this report, it is not necessary in the case of this proposed Scheme to progress to further stages of the assessment process i.e. the developer does not seek to rely upon the provisions of Article 6(4) of the Habitats Directive.

The methodology of the information collected to inform the assessment outlined in this NIS has sought to answer the following key questions:

1. Will the proposed scheme have a significant negative effect on the Qualifying Interests (QIs) of the River Slaney Valley SAC, and Special Conservation Interests (SCIs) of the Wexford Harbour and Slobs SPA?
2. Will the identified effect on the QIs of the SAC be of magnitude that could impact the integrity of the European site?
3. Will the identified effect on the SCIs of the SPA be of magnitude that could impact the integrity of the European site?
4. Will mitigation measures reduce potential impacts with scientific certainty?

These questions have been derived from an examination and extrapolation of the attributes and targets of the relevant European sites' conservation objectives, see Table 7. The conservation objectives for the focus of the AA process.

The potential for significant effects arising from the proposed scheme on the integrity of River Slaney Valley SAC and Wexford Harbour and Slobs SPA in light of their conservation objectives, is examined in Section 5 below. This sets the scope for the Stage 2 AA.

3.6 SUMMARY OF EUROPEAN SITES RELEVANT TO THE STAGE 2 APPROPRIATE ASSESSMENT

3.6.1 Slaney River Valley cSAC

Condition of site and management

The Natura 2000 Standard Data Form (NPWS, 2015b) lists the SAC representing estuaries and intertidal sand and mud flats particularly well with salinity ranging from full freshwater to full seawater. The Slaney River and its tributaries display good examples of floating river vegetation. The site includes an important area of alluvial forest and old oak woodlands. The site is of high importance for the conservation of fish species, salmon Salmo salar, river lamprey Lampetra fluviatilis, brook lamprey L. planeri and sea lamprey Petromyzon marinus, and twaite shad Alosa fallax fallax. Otter Lutra lutra are distributed along the River Slaney and fresh water pearl mussel Margaritifera margaritifera also occur within the site. The freshwater pearl mussel Margaritifera margaritifera is also present within the site, but is not within the (Derreen River) sub-population that is designated for protection within this SAC. Harbour seal Phoca vitulina occupy the site which represents regionally significant breeding and moulting sites for the species. The designation is also important for wintering waterfowl and more recently the site supports a nesting colony of little egret Egretta garzetta. Threats to the site include agricultural practices such as fertilisation, removal of hedgerows and scrub, forestry management, invasive non-native species, pollution to surface waters from agriculture and forestry activities, household sewage and wastewater treatment works, and surface water abstractions. The site is not currently under any management plan (NPWS, 2015b).

3.6.2 Wexford Harbour and Slobs SPA

Condition of site and management

The Natura 2000 Standard Data Form (NPWS, 2015c) states that the SPA is one of the top three sites in the country for numbers and diversity of wintering birds and, of particular importance, it is one of the two most important sites in the world for Greenland white-fronted geese Anser albifrons flavirostris. The site also supports internationally important populations of Brent geese Branta bernicla hrota, Bewick swans Cygnus columbarius bewickii and Bar-tailed godwit Limosa lapponica. As mentioned above for Slaney River Valley cSAC, a nesting colony of Little egret has become established within the site. Threats to the site include forestry management and practices, disturbance from nautical sports and recreational activities including walking, horse-riding and non-motorised vehicles. The overall SPA site is not currently under any management plan (NPWS, 2015c). Wexford Wildfowl Reserve on the North Slob is actively managed for Greenland white-fronted geese in particular. A number of activities in and adjoining the SPA are regulated under S.I. No. 194 of 2012.

3.7 CONSERVATION OBJECTIVES

The Habitats Directive and Part XAB of the Planning and Development Act 2000 requires the NIS to focus on the implications of a proposed scheme, on its own or in-combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the sites. In accordance with Article 6(3) of the Habitats directive, a project must be assessed in terms of its potential effect(s) on a European site's conservation objectives.

Site specific conservation objectives (SSCOs) for the QIs of River Slaney Valley SAC or the SCIs of Wexford Harbour and Slobs SPA are presented in Table 6 below, as sourced directly from conservation objectives documents (accessed online at www.npws.ie). SSCOs aim to define the favourable conservation condition for a SCI species at that European site. The favourable conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The proposed Scheme has been assessed in context of the conservation objectives' attributes "population trend" and "distribution" and their specific targets (listed below in Table 7 and 8) for each QI and SCI of the relevant European sites. The SCI of Wetlands [999] relates specifically to wetland habitat located within each SPA as a resource for the waterbirds that utilise it.

The current conservation status of the qualifying interests are summarised in Table 6. The current site conservation condition of each SCI species are produced in the Conservation Objectives Supporting Document for Wexford Harbour and Slobs SPA and The Raven SPA (NPWS, 2011). The current national conservation status of each SCI species (i.e. "Green", "Amber" or "Red" categories) is sourced from Birds of Conservation Concern in Ireland 2014 – 2019 (the "BoCCI" list, Colhoun & Cummins, 2013). It should be noted that the conservation condition assessments for individual species within individual SPAs do not necessarily mirror the national population trends that are taken into account in the BoCCI listings.

There are a number of environmental conditions that support and underpin the QIs and SCIs of the two European sites which may potentially be impacted upon as a result of the proposed scheme, most of which relate to the aquatic conditions such as water quality, availability of suitable habitat for spawning lamprey species, sessile freshwater pearl mussel colonies, and birds, conditions for floating river vegetation, and disturbance to waterbirds. The potential for these conditions to be impacted upon has been investigated as part of this assessment, the results of which are presented in Section 5 of this report.

Table 6: Qualifying Interests, BoCCI Status, Conservation Status

Site Name & Code	Qualifying Interests [Species code and BoCCI status]	Conservation Condition (items indicated in bold are of relevance to the proposed scheme)
Special Areas of Conservation (SACs)		
Slaney River Valley SAC [000781]	<u>Annex I habitats for which the site is designated:</u> • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] • Mediterranean salt meadows (Juncetalia maritimi) [1410] • Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] • Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	[1130] - Unfavourable-Inadequate [1140] - Unfavourable-Inadequate [1330] - Stable [1410] - Stable [3260] - Unfavourable-Inadequate [91A0] - Unfavourable- Bad

Site Name & Code	Qualifying Interests [Species code and BoCCI status]	Conservation Condition (items indicated in bold are of relevance to the proposed scheme)	
	• Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	[91E0] - Unfavourable- Bad	
	<u>Annex II species for which the sites is designated:</u> • Margaritifera margaritifera (Freshwater Pearl Mussel) [1029][2] • Petromyzon marinus (Sea Lamprey) [1095] • Lampetra planeri (Brook Lamprey) [1096] • Lampetra fluviatilis (River Lamprey) [1099] • Alosa fallax fallax (Twaite Shad) [1103] • Salmo salar (Salmon) [1106] • Lutra lutra (Otter) [1355] • Phoca vitulina (Harbour Seal) [1365]	[1029] - Unfavourable- Bad [1095] - Bad [1096] - Favourable [1099] - Favourable [1103] - Inadequate- Bad [1106] - Stable [1355] - Good [1365] - Favourable	
Special Protection Areas (SPAs)		Conservation Status	BoCCI
Wexford Harbour and Slobs SPA [004076]	• Little Grebe (Tachybaptus ruficollis) [A004] • Great Crested Grebe (Podiceps cristatus) [A005] • Cormorant (Phalacrocorax carbo) [A017] • Grey Heron (Ardea cinerea) [A028] • Bewick's Swan (Cygnus columbianus bewickii) [A037] • Whooper Swan (Cygnus cygnus) [A038] • Light-bellied Brent Goose (Branta bernicla hrota) [A046] • Shelduck (Tadorna tadorna) [A048] • Wigeon (Anas penelope) [A050] • Teal (Anas crecca) [A052] • Mallard (Anas platyrhynchos) [A053] • Pintail (Anas acuta) [A054] • Scaup (Aythya marila) [A062] • Goldeneye (Bucephala clangula) [A067] • Red-breasted Merganser (Mergus serrator) [A069] • Hen Harrier (Circus cyaneus) [A082] • Coot (Fulica atra) [A125] • Oystercatcher (Haematopus ostralegus) [A130] • Golden Plover (Pluvialis apricaria) [A140] • Grey Plover (Pluvialis squatarola) [A141] • Lapwing (Vanellus vanellus) [A142] • Knot (Calidris canutus) [A143] • Sanderling (Calidris alba) [A144] • Dunlin (Calidris alpina) [A149]	[A004] Intermediate (Unfav.) [A005] Intermediate (Unfav.) [A017] Favourable [A028] Favourable [A037] Highly Unfavourable [A038] Favourable [A046] Favourable [A048] Intermediate (Unfav.) [A050] Intermediate (Unfav.) [A052] Favourable [A053] Intermediate (Unfav.) [A054] Favourable [A062] Favourable [A067] Unfavourable [A069] Intermediate (Unfav.) [A082] Not stated for winter roost [A125] Unfavourable [A130] Favourable [A140] Favourable [A141] Unfavourable [A142] Unfavourable [A143] Unfavourable [A144] Intermediate (Unfav.) [A149] Highly Unfavourable	[A004] Amber [A005] Amber [A017] Amber [A028] Green [A037] Red [A038] Amber [A046] Amber [A048] Amber [A050] Red [A052] Amber [A053] Green [A054] Red [A062] Amber [A067] Red [A069] Green [A082] Amber [A125] Amber [A130] Amber [A140] Red [A141] Amber [A142] Red [A143] Amber [A144] Green [A149] Red

[2] The European Communities Environmental Objectives (freshwater pearl mussel) Regulations 2009 and 2018 (S.I. 296 of 2009/S.I. 355 of 2018) provide the environmental quality objectives for the habitats of the freshwater pearl mussel populations that are named in the First Schedule to these Regulations, these are populations that are within the boundaries of a site notified in a candidate list of European sites, or designated as a Special Area of Conservation, under the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94/1997). The environmental objectives for the Slaney River Valley SAC are solely restricted to the Derreen River population.

Site Name & Code	Qualifying Interests [Species code and BoCCI status]	Conservation Condition (items indicated in bold are of relevance to the proposed scheme)	
	• Black-tailed Godwit (Limosa limosa) [A156] • Bar-tailed Godwit (Limosa lapponica) [A157] • Curlew (Numenius arquata) [A160] • Redshank (Tringa totanus) [A162] • Black-headed Gull (Chroicocephalus ridibundus) [A179] • Lesser Black-backed Gull (Larus fuscus) [A183] • Little Tern (Sterna albifrons) [A195] • Greenland White-fronted Goose (Anser albifrons flavirostris) [A395] • Wetland and Waterbirds [A999]	[A156] Favourable [A157] Intermediate (Unfav.) [A160] Unfavourable [A162] Favourable [A179] Not stated [A183] Not stated [A195] Not stated for breeding species [A395] Intermediate (Unfav.)	[A156] Amber [A157] Amber [A160] Red [A162] Red [A179] Red [A183] Amber [A195] Amber [A395] Amber

Table 7: Detailed Conservation Objectives for the Slaney River Valley SAC (where available)

Attribute	Measure	Target	Potential for proposed scheme to affect the conservation objective
Slaney River Valley SAC			
Estuaries [1130] (Maintain the favourable conservation condition)			
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	No, although the tidal reaches of the River Slaney extend to within the scheme extent, the scheme is over 15km upstream of estuarine habitats within the SAC. Hjulstrom analysis and deposition sediment analysis has predicted that sedimentation resulting from the proposed works will be localised and is expected to settle at a maximum 0.5km-2km downstream from the works.
Community distribution	Hectares	The following community types should be maintained in, or restored to a natural condition: Mixed sediment community complex; Estuarine muds dominated by polychaetes and crustaceans community complex; and Sand dominated by polychaetes community complex	No, as the proposed scheme is located over 15km upstream these community types, and Hjulstrom analysis and deposition sediment analysis has predicted that sedimentation resulting from the proposed works will be localised and is expected to settle at a maximum 0.5km-2km downstream from the works.
Mudflats and sandflats not covered by seawater at low tide [1140] (Maintain the favourable conservation condition)			
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	No, as the proposed scheme is located over 15km upstream of mudflats and sandflats, and Hjulstrom analysis and deposition sediment analysis has predicted that sedimentation resulting from the proposed works will be localised and is expected to settle at a maximum 0.5km-2km downstream from the works.
Community distribution	Hectares	The following community types should be maintained in a natural condition: Estuarine muds dominated by polychaetes and crustaceans community complex; and Sand dominated by polychaetes community complex	No, as the proposed scheme is located over 15km upstream of mudflats and sandflats, and Hjulstrom analysis and deposition sediment analysis has predicted that sedimentation resulting from the proposed works will be localised and is expected to settle at a maximum 0.5km-2km downstream from the works.
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] (Maintain the favourable conservation condition)			
Habitat distribution	Occurrence	No decline, subject to natural processes	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Habitat area	Kilometres	Area stable at 12.6km or increasing, subject to natural processes	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.

Attribute	Measure	Target	Potential for proposed scheme to affect the conservation objective
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Hydrological regime: tidal influence	Daily water level fluctuations-metres	Maintain natural tidal regime	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Substratum composition: particle size range	Millimetres	For the tidal sub-type, the substratum of the channel must be dominated by particles of sand to gravel, with the silt at the river margins	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column must be sufficiently low to prevent changes in species composition or habitat condition	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type reach favourable status	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Floodplain connectivity: area	Hectares	The area of active floodplain at and upstream of the habitat must be maintained	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] (Maintain the favourable conservation condition)			
Habitat area	Hectares	Area stable or increasing, subject to natural processes at least 146.17ha for sub-sites surveyed	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Habitat distribution	Occurrence	No decline	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland size	Hectares	Area stable or increasing. Where topographically possible, “large” woods at least 25ha in size and “small” woods at least 3ha in size	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.

Attribute	Measure	Target	Potential for proposed scheme to affect the conservation objective
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: veteran trees	Number per hectare	No decline	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak (Quercus petraea) and birch (Betula pubescens)	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] (Maintain the favourable conservation condition)			
Habitat area	Hectares	Area stable or increasing, subject to natural processes at least 18.7ha for sites surveyed	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Habitat distribution	Occurrence	No decline	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland size	Hectares	Area stable or increasing. Where topographically possible, “large” woods at least 25ha in size and “small” woods at least 3ha in size	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.

Attribute	Measure	Target	Potential for proposed scheme to affect the conservation objective
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; sub-canopy layer with semi-mature trees and shrubs; and well-developed herb layer	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Hydrological regime: Flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: veteran trees	Number per hectare	No decline	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder (Alnus glutinosa), willows (Salix spp.) and locally, oak (Quercus robur) and ash (Fraxinus excelsior)	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Yes, as the proposed scheme could potentially affect this target, in the absence of mitigation.

Attribute	Measure	Target	Potential for proposed scheme to affect the conservation objective
Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] (Maintain the favourable conservation condition)			
Currently under review	Currently under review	The status of the freshwater pearl mussel (Margaritifera margaritifera) as a qualifying Annex II species for the Slaney River Valley SAC is currently under review.	The legal extent of the qualifying interest for Margaritifera margaritifera is the Derreen River sub-population (as covered under the Margaritifera regulations (S.I. 296 of 2009/ S.I. 355 of 2018). The scheme has some minor potential to affect likely targets (currently under review).
Petromyzon marinus (Sea Lamprey) [1095] (Maintain the favourable conservation condition)			
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Yes, as the proposed scheme could result in a barrier to migration.
Population structure of juveniles	Number of age/size groups	At least three age/ size groups present	Yes, as a reduction in spawning habitat could result in a decrease in Sea Lamprey production.
Juvenile density in fine sediment	Juveniles/m^2	Juvenile density at least 1/m^2	Yes, as dredging works will remove fine sediment along the bed of the river, thus affecting juvenile density.
Extent and distribution of spawning habitat	m^2 and occurrence	No decline in extent and distribution of spawning beds. Improved dispersal of spawning beds into areas upstream of barriers.	Yes, as dredging works will result in a physical removal of spawning habitat.
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning sites	More than 50% f sample sites positive	Yes, as dredging works will result in the physical removal of juvenile habitat.
Lampetra planeri (Brook Lamprey) [1096] (Maintain the favourable conservation condition)			
Distribution: extent of anadromy	% of river accessible	Access to all water courses down to first order streams	Yes, as the proposed scheme could result in a barrier to migration.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Yes, as a reduction in spawning habitat could result in a decrease in Brook Lamprey production.

Attribute	Measure	Target	Potential for proposed scheme to affect the conservation objective
Juvenile density in fine sediment	Juveniles/m^2	Mean catchment juvenile density of brook/river lamprey at least 2/m^2	Yes, as dredging works will remove fine sediment along the bed of the river, thus affecting juvenile density.
Extent and distribution of spawning habitat	m^2 and occurrence	No decline in extent and distribution of spawning beds	Yes, as dredging works will result in a physical removal of spawning habitat.
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning sites	More than 50% of sample sites positive	Yes, as dredging works will result in the physical removal of juvenile habitat.
Lampetra fluviatilis (River Lamprey) [1099] (Maintain the favourable conservation condition)			
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem and major tributaries down to second order accessible from estuary	Yes, as the proposed scheme could result in a barrier to migration.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Yes, as a reduction in spawning habitat could result in a decrease in River Lamprey production.
Juvenile density in fine sediment	Juveniles/m^2	Mean catchment juvenile density of brook/river lamprey at least 2/m^2	Yes, as dredging works will remove fine sediment along the bed of the river, thus affecting juvenile density.
Extent and distribution of spawning habitat	m^2 and occurrence	No decline in extent and distribution of spawning beds	Yes, as dredging works will result in a physical removal of spawning habitat.
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning sites	More than 50% of sample sites positive	Yes, as dredging works will result in the physical removal of juvenile habitat.

Attribute	Measure	Target	Potential for proposed scheme to affect the conservation objective
Alosa fallax fallax (Twaite Shad) [1103] (Maintain the favourable conservation condition)			
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Yes, as the proposed scheme could result in a barrier to migration.
Population structure- age classes	Number of age classes	More than one age class present	Yes, as a reduction in spawning habitat could result in a decrease in Twaite Shad production.
Extent and distribution of spawning habitat	m^2 and occurrence	No decline in extent and distribution of spawning habitats	Yes, as dredging works will result in a physical removal of spawning habitat.
Water quality- oxygen levels	Milligrammes per litre	No lower than 5mg/L	Yes, as siltation impacts are likely to arise that would affect water quality and therefore oxygen levels.
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Occurrence	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	Yes, as dredging works will result in physical removal of spawning habitat along the river bed.
Salmo salar (Salmon) [1106] (Maintain the favourable conservation condition)			
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Yes, as the proposed scheme could result in a barrier to migration.
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	Yes, as a reduction in spawning habitat could result in a decrease in Salmon production.
Salmon fry abundance	Number of fry/ 5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment- wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Yes, as a reduction in spawning habitat could result in a decrease in Salmon production.
Out-migrating smolt abundance	Number	No significant decline	Yes, as a reduction in spawning habitat could result in a decrease in Salmon production.
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning reds due to anthropogenic causes	Yes, as a reduction in spawning habitat could result in a decrease in Salmon production.
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Yes, as siltation impacts are likely to arise that would affect water quality.
Lutra lutra (Otter) [1355] (Restore the favourable conservation condition)			
Distribution	Percentage positive survey sites	No significant decline	Yes, as otter were recorded within the extent of the scheme and therefore could affect their distribution within the SAC.

Attribute	Measure	Target	Potential for proposed scheme to affect the conservation objective
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 64.7ha above high water mark (HWM); 453.4ha along river banks/around ponds	Yes, as the scheme will impact river bank habitat within the extent of the works.
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 534.7ha	No, as the scheme will not impact on marine habitats used by otter.
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 264.1km	Yes, as the scheme works involves instream works.
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 0.4ha	No, as the scheme will not impact freshwater (lake/lagoon) habitat.
Couching sites and holts	Number	No significant decline	Yes, as the scheme may impact holts identified within the works extent.
Fish biomass available	Kilograms	No significant decline	Yes, as the proposed scheme's instream works may affect fish biomass.
Barriers to connectivity	Number	No significant increase	Yes, as the proposed scheme could result in a barrier to connectivity.
Phoca vitulina (Harbour Seal) [1365] (Maintain the favourable conservation condition)			
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use	No, as the proposed scheme does not include any barriers across the river channel.
Breeding behaviour	Breeding sites	The breeding sites should be maintained in a natural condition	No, as the proposed scheme is c. 20km upstream of known breeding sites in Wexford Harbour (NPWS 2011b).
Moulting behaviour	Moult haul-out sites	The moult haul-out sites should be maintained in a natural condition	No, as the proposed scheme is c. 20km upstream of known molt haul-out sites in Wexford Harbour (NPWS 2011b).
Resting behaviour	Resting haul-out sites	The resting haul-out sites should be maintained in a natural condition	No, as the proposed scheme is c. 20km upstream of known resting haul-out sites in Wexford Harbour (NPWS 2011b).
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	No, as harbour seal were recorded very occasionally on an ad hoc basis within the survey area of the proposed scheme and are not expected to be impacted by the proposed scheme during the construction works or post-construction.

Table 8: Detailed Conservation Objectives for the Wexford Harbour and Slobs SPA

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
Wexford Harbour and Slobs SPA			
Little Grebe (Tachybaptus ruficollis) [A004] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable) in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Single Little Grebes were recorded on the River Slaney in the proposed scheme area on three occasions during baseline surveys. The main distribution within the SPA is the main channel in the North Slob, with small numbers recorded on the River Slaney. There is a potential for temporary displacement and this has been considered further.
Great Crested Grebe (Podiceps cristatus) [A005] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable) in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	A single Great-crested Grebe was recorded immediately downstream of the proposed scheme area during baseline surveys. The main distribution within the SPA is in Wexford Harbour, in the sheltered & shallow subtidal over sand flats, and has not been recorded during I-WeBS counts of the River Slaney. No likely significant effects were identified for this species.
Cormorant (Phalacrocorax carbo) [A017] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	The peak count of Cormorants within the proposed scheme area was 14, recorded in February 2016. Numbers were highest during the winter months. The peak count of Cormorants recorded flying upstream through the proposed road bridge corridor at dawn was 29, and the peak count moving downstream at dusk was 21. The peak I-WeBS count in the River Slaney is 57; Cormorants make daytime feeding use of the River, with daytime roosting on trees, fallen timber, and the river bank at the Bare

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
			Meadow. The main feeding distribution within the SPA is in Wexford Harbour, in the sheltered & shallow subtidal over sand flats, with roosts on Raven Point and on sand banks in Wexford Harbour. I-WeBS mean peak count 353. There is a potential for temporary displacement and permanent collision risk and these have been considered further.
Grey Heron (Ardea cinerea) [A028] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	The proposed scheme area supports a nationally important number of Grey Herons, including a breeding colony of 12 nests with re-occupation of nests after successful fledging of early broods. The Enniscorthy colony, including all 12 nests and the chicks recorded, would appear to give rise to a breeding seasonal peak numbering in the order of 40 or more Grey Herons, and is assessed as contributing significantly to the overall population within the SPA. Grey Herons occur in Enniscorthy as a resident breeding species, and make feeding, roosting and breeding use of the scheme area; typically, 10 to 15 Grey Herons feed within the scheme area, mostly during the lower stages of the tide. Key roosts are the wetland in the Bare Meadow, and trees in its vicinity. There is a small breeding Colony of Grey Herons in the North Slob (4 nests in 2017). On the basis of the available data, the proposed scheme area supports 75% of the Wexford Harbour and Slobs SPA population productivity. There is a potential for temporary displacement, temporary and permanent habitat loss and disturbance, and permanent collision risk and these have been considered further.
Bewick's Swan (Cygnus columbianus bewickii) [A037] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Highly Unfavourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas	There should be no significant decrease in the numbers or range of areas used by waterbird	In recent years, Bewick's Swans have been recorded only within the North Slob, where they feed and roost. This species has not been recorded in the

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
	used by waterbirds	species, other than that occurring from natural patterns of variation	proposed scheme area. No likely significant impacts have been identified for this species.
Whooper Swan (Cygnus cygnus) [A038] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	A single Whooper Swan was recorded within the proposed scheme area in February and March 2016. This individual was considered to be a straggler from the main flock; Whooper Swans have not been recorded on the River Slaney. The main distribution of Whooper Swans is on the North and South Slobs, where they feed and roost. Occasional roosting and loafing use is made of sand bars and tidal channels in Wexford Harbour. No likely significant impacts have been identified for this species.
Greenland White-fronted Goose (Anser albifrons flavirostris) [A395] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable) in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Greenland White-fronted Geese have not been recorded within the proposed scheme area. There are no I-WeBS records along the River Slaney. In Wexford, the North Slobs is the single most important site for this sub-species. The North Slob comprises some 1000ha of farmland, c. 200ha of which comprise the Wexford Wildfowl Reserve, owned by NPWS/BWI, and these lands are rented to farmers to farm the land in such a way that is sympathetic to the foraging requirements of the geese. They roost primarily on tidal sandbanks located within The Raven SPA. During consultation, a query arose regarding migration flight lines used by Greenland White-fronted Geese, and whether there was any possibility of adverse impacts or collision risks arising from a cable-stay road bridge design initially under consideration as part of the scheme. Two migration routes from the North Slob have been identified (Alyn Walsh, NPWS, pers. comm.). A north-westerly route crosses between Mount Leinster and Slieveboy/Gibbet Hill near Bunclody and Clonegall. An easterly route

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
			follows the east coast north through Wexford and Wicklow, and is used by geese moving between Wexford and Islay in Scotland, the two main wintering areas used by the sub-species. When leaving the North Slob on migration, geese quickly ascend to c. 100m above ground level, from which elevation route landmarks are visible. The north west route used by Greenland White-fronted Geese crosses above the Enniscorthy area. It has been concluded that no barriers to migration, collision or range risks arise to this sub-species. No likely significant impacts have been identified for this species.
Light-bellied Brent Goose (Branta bernicla hrota) [A046] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Light-bellied Brent Geese have not been recorded within the proposed scheme area, or along the River Slaney during I-WeBS counts. This sub-species feeds on green macroalgae in intertidal habitats in Wexford Harbour during the autumn and spring, and on agricultural land in the North and South Slobs. They roost on tidal sandbanks off the Raven Point, and on sheltered inshore coastal waters. No likely significant impacts have been identified for this species.
Shelduck (Tadorna tadorna) [A048] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable) in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Shelduck have not been recorded within the proposed scheme area. There has been a single record on 5 Shelduck in 2009/10 on the River Slaney during I-WeBS counts. I-WeBS counts recorded a mean peak count of 553 Shelduck in Wexford Harbour and Slobs during the 2011/12 to 2015/16 period. This species favours intertidal muds and feeding use is largely concentrated in the Hopeland area of Wexford Harbour, and roost above tide level in this are also known. Some roosting use is made of the main channel on the North Slob. No likely significant impacts have been identified for this species.

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
Wigeon (Anas penelope) [A050] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable) in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Wigeon were recorded on the southern floodplain in both winter seasons of the scheme baseline studies, with a peak count of 51. This herbivorous duck species feeds within wet grassland on the Bare Meadow and at Motabeg and was not recorded along the river channel or in the northern floodplain. Wigeon roost on the ponds in the core wetland area on the Bare Meadow. The baseline surveys provide the first records of Wigeon on the Slaney north of Edermine Bridge, extending the known range of this species in wetlands directly supported by the Slaney. Within Wexford harbour and Slobs SPA, Wigeon occur principally on the North Slob, and also use the South Slob, and feed on intertidal habitats. I-WeBS counts recorded a mean peak count of 1,614 Wigeon in Wexford Harbour and Slobs during the 2011/12 to 2015/16 period; on the basis of this information the scheme area supports c. 3% of the SPA population. There is a potential for temporary displacement, temporary and permanent habitat loss and disturbance, and these have been considered further.
Teal (Anas crecca) [A052] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Teal was the most numerous duck species recorded within the scheme area, the peak count of 174 recorded during high river water levels in December 2016 reached just above 50% of the threshold level for national importance. Teal occur in nationally important numbers in the River Slaney, as well as within Wexford Harbour and Slobs. Teal were recorded on the southern floodplain at the Bare Meadow Killagoley and at Motabeg and in the adjoining river channel in all survey months between August and April, occurring less regularly and in smaller numbers in the northern floodplain and river. Teal roost on the ponds in the core wetland area on the Bare Meadow. Teal are omnivores and have a variety of foraging methods (e.g. dabbling and

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
			up-ending) within differing habitats and water depths. Within Wexford Harbour and Slobs SPA, Teal occur mainly on the North Slob and along the River Slaney. I-WeBS counts recorded a mean peak count of 448 Teal in Wexford Harbour and Slobs, and 862 on the River Slaney from Ferrycarrig to the Urrin during the 2011/12 to 2015/16 period; on the basis of this information the scheme area supports c. 13% of the SPA population. There is a potential for temporary displacement, temporary and permanent habitat loss and disturbance, and permanent collision risk and these have been considered further.
Mallard (Anas platyrhynchos) [A053] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable) in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Mallard were recorded in every month within the scheme area. The peak count of 58 was recorded in December 2016. Mallard made feeding use of the wetlands on the southern floodplain, and of the river channel throughout the scheme area where they fed on submerged and emergent and riverbank vegetation and habitats. During 2016, there were 5 confirmed Mallard successful breeding outcomes in southern floodplain area. No nests were found, but females with ducklings were recorded using the ponds and wetland area in the Bare Meadow as nursery. Two Mallard broods were recorded on the Slaney at the northern floodplain in 2016, and two pairs were recorded in this area in February 2017, with two additional pairs recorded upstream within 1km of the scheme area. The drainage channel to the east of the northern floodplain provides suitable nursery habitat. Within Wexford Harbour and Slobs SPA, Mallard occur mainly on the North Slob, South Slob, and along the River Slaney. I-WeBS counts recorded a mean peak count of 845 Mallard in Wexford Harbour and Slobs, and 289 on the River Slaney from Ferrycarrig to the Urrin during the 2011/12 to 2015/16 period; on the basis of this information the scheme area supports c. 5% of the SPA population. There is a potential for temporary displacement, temporary and permanent

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
			habitat loss and disturbance, and permanent collision risk and these have been considered further.
Pintail (Anas acuta) [A054] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Pintail have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Pintail occur primarily within the main channel at the North Slob. No likely significant impacts have been identified for this species.
Scaup (Aythya marila) [A062] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Scaup have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Scaup occur primarily within the main channel at the North Slob. No likely significant impacts have been identified for this species.
Goldeneye (Bucephala clangula) [A067] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Unfavourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Goldeneye have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Goldeneye occur primarily within the main channel at the North Slob. No likely significant impacts have been identified for this species.
Red-breasted Merganser (Mergus serrator) [A069] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable) in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural	Red-breasted Merganser have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Red-breasted Merganser feed and

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
	waterbirds	patterns of variation	roost in Wexford Harbour in sheltered and shallow subtidal habitats, moving inshore to forage over intertidal habitats during high tide (personal observation). No likely significant impacts have been identified for this species.
Coot (Fulica atra) [A125] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Unfavourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Coot have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Coot occur on the North and South Slobs. No likely significant impacts have been identified for this species.
Oystercatcher (Haematopus ostralegus) [A130] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Oystercatcher have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Oystercatcher feed in intertidal habitats, mussel beds, and along rocky shorelines in Wexford Harbour, and also make some feeding use of agricultural lands. Roost occur along shorelines and sand bars in Wexford Harbour. No likely significant impacts have been identified for this species.
Golden Plover (Pluvialis apricaria) [A140] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Golden Plover have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Golden Plovers feed primarily within agricultural grassland and arable land, on the North and South Slobs. Tidal flats are used but more so as a roosting/resting habitat and the birds tend to favour large, open tidal flats. No likely significant impacts have been identified for this species.

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
Grey Plover (Pluvialis squatarola) [A141] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Unfavourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Grey Plover have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Grey Plover feed in intertidal habitats and roost on sand banks and islands in Wexford Harbour. No likely significant impacts have been identified for this species.
Lapwing (Vanellus vanellus) [A142] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Unfavourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Lapwing were the most numerous wader species recorded in the scheme area and occurred only on the southern floodplain at the Bare Meadow, where they fed during the day on wet and dry grassland, and roosted overnight at the core wetland. The peak count of 376 was recorded in February 2016, with a similar winter peak of 311 Lapwing recorded in January 2017. The Bare Meadow may be the most consistently used area within the River Slaney between Ferrybank and Enniscorthy, though it is noted that I-WeBS counts along the Slaney are infrequent. Lapwing are traditionally "inland" waders. During winter they can be observed across a wide variety of habitats, principally using lowland farmland and freshwater wetlands (e.g. turloughs and callows) but also coastal wetlands where they feed on a variety of soil and surface-living invertebrates. They are opportunistic and mobile birds and will readily exploit temporary food sources such as newly-ploughed fields. Elsewhere within Wexford Harbour and Slobs SPA, Lapwing occur principally on the North and South Slobs. Based on I-Webs data for Wexford Harbour and Slobs for the period 2011/12 to 2015/16, where a mean peak of 4,043 Lapwing was recorded, with 695 on the Slaney, the scheme Bare Meadow area supports c. 7% of the SPA population. There is a potential for temporary displacement, temporary and permanent habitat loss and disturbance, and permanent collision risk, and these have

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
			been considered further.
Knot (Calidris canutus) [A143] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Unfavourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Knot have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Knot feed in intertidal habitats and roost on sandbanks in Wexford Harbour. No likely significant impacts have been identified for this species.
Sanderling (Calidris alba) [A144] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable).
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Sanderling have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour & Slobs SPA, Sanderlings are recorded foraging intertidally on more sandy habitats, and roosting on sandbanks. No likely significant impacts have been identified for this species.
Dunlin (Calidris alpina) [A149] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Highly Unfavourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Dunlin have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Dunlin feed in intertidal habitats, mainly in Hopeland and Rosslare Backstrand, and roost on sandbanks in Wexford Harbour. No likely significant impacts have been identified for this species.
Black-tailed Godwit (Limosa limosa) [A156] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural	Black-tailed Godwit have not been recorded in the scheme area, although it is noted that the wetland habitats on the Bare Meadow are suitable for this wader species. In the River Slaney between Ferrycarrig and the River Urrin

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
	waterbirds	patterns of variation	inflow, a nationally-important number of Black-tailed Godwit has been recorded between Ferrybank and Killurin. Within Wexford Harbour and Slobs SPA, Black-tailed Godwit feed in intertidal and estuarine muds, and on agricultural land in the North and South Slobs, and roost along the shoreline at high tide. No likely significant impacts have been identified for this species.
Bar-tailed Godwit (Limosa lapponica) [A157] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Intermediate (Unfavourable) in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Bar-tailed Godwit have not been recorded in the scheme area, or in the River Slaney. Within Wexford Harbour and Slobs SPA, Bar-tailed Godwit feed in intertidal sandy substrates, mainly near the Raven Point, where they also roost. No likely significant impacts have been identified for this species.
Curlew (Numenius arquata) [A160] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Unfavourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Curlew have not been recorded in the scheme area, but do occur along the River Slaney between Ferrybank and Edermine Bridge. Within Wexford Harbour and Slobs SPA, Curlew feed in intertidal habitats and on the North Slob, roosting on sand banks in Wexford Harbour and in the North Slob. No likely significant impacts have been identified for this species.
Redshank (Tringa totanus) [A162] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Favourable in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Redshank were recorded consistently on the southern floodplain in both winters of the baseline studies, with peak winter counts of 22 and 26. Redshank were recorded only on the Bare Meadow in the southern floodplain wetland, where they fed by day and roosted overnight. The Bare Meadow may be the most consistently used area within the River Slaney

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
			between Ferrybank and Enniscorthy, though it is noted that I-WeBS counts along the Slaney are infrequent. Within Wexford Harbour and Slobs SPA, Redshank feed primarily in intertidal muddy substrates at Hopeland and in the Castlebridge to Ferrybank area, making some use of other intertidal areas and the North Slob. Based on I-Webs data for Wexford Harbour and Slobs for the period 2011/12 to 2015/16, where a mean peak of 363 Redshank was recorded, the scheme Bare Meadow area supports approximately 7% of the SPA population. There is a potential for temporary displacement, temporary and permanent habitat loss and disturbance, and these have been considered further.
Black-headed Gull (Chroicocephalus ridibundus) [A179] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Conservation Condition not noted in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Black-headed Gulls were the most numerous gull species using and passing through the Enniscorthy area. The peak count recorded during waterbird counts was 267, recorded on the ponds and wetland on the Bare Meadow in southern floodplain. Higher numbers were recorded passing through, with a peak upstream movement past the location of the proposed new bridge of 504, and a peak downstream movement of 1,124. This species feeds opportunistically on agricultural land as well as in wetland and coastal habitats, most use of the River Slaney and of the Bare Meadow was by preening, bathing and loafing birds. Black-headed Gulls were observed to feed within the river in small numbers, taking small unidentified prey items from the water surface or just below the surface. Black-headed Gulls commute to overnight roosts in Wexford Harbour. Within Wexford Harbour and Slobs SPA, Black-headed Gulls use intertidal flats, sheltered and shallow subtidal areas for feeding and roosting. It is assumed that I-WeBS counts underestimate gull numbers in the SPA since specific dawn and dusk roost surveys would be required. There is a potential for temporary displacement, temporary and permanent habitat loss and disturbance, and permanent collision risk and these have

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
			been considered further.
Lesser Black-backed Gull (Larus fuscus) [A183] (Maintain or restore the favourable conservation condition)			
Population trend	Percentage change	Long term population trend stable or increasing	Conservation Condition not noted in Wexford Harbour and Slobs SPA.
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Lesser Black-backed Gulls were generally recorded in small numbers in the scheme area, but were observed moving downstream in more significant numbers during dusk watches in the autumn: 268 on 29 September, and 393 on 27 October 2016. These could have been birds on migration, or birds exploiting a temporary food source. The peak count of 393 Lesser Black-backed Gulls passing through Enniscorthy could represent a significant proportion of the Wexford Harbour and Slobs SPA population, however it is assumed that I-WeBS counts underestimate gull numbers in the SPA since specific dawn and dusk roost surveys would be required. Within Wexford Harbour and Slobs SPA, Lesser Black-backed Gulls use intertidal flats, sheltered and shallow subtidal areas for feeding and roosting. There is a potential for temporary displacement, temporary and permanent habitat loss and disturbance, and permanent collision risk and these have been considered further.
Hen Harrier (Circus cyaneus) [A082] (Maintain or restore the favourable conservation condition)			
Roost attendance: individual hen harriers	Number	No significant decline	Roost site located c. 17km distant from proposed Enniscorthy Flood Defence Scheme. No potential impact to the roost site arises from the proposed scheme.
Suitable foraging habitat	Hectares	No significant decline	Hen Harriers were not recorded within the proposed Enniscorthy Flood Defence Scheme during baseline surveys. No potential impact on foraging habitat arises from the proposed scheme.
Roost site: condition	Area (hectares); structure	The roost site should be maintained in a suitable condition	Roost site located c. 17km distant from proposed Enniscorthy Flood Defence Scheme. No potential impact to the roost site arises from the proposed scheme.
Disturbance at the roost site	Level of impact	Human activities should occur at levels that do not adversely affect the Hen Harrier winter	Roost site located c. 17km distant from proposed Enniscorthy Flood Defence Scheme. No potential impact to the roost site arises from the

Attribute	Measure	Target	Baseline conditions and potential for the proposed scheme to affect the conservation objectives
		roost population	proposed scheme.
Little Tern (Sterna albifrons) [A195] (Maintain or restore the favourable conservation condition)			
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Colony site located c. 20km distant from proposed Enniscorthy Flood Defence Scheme. No potential impact to the colony site arises from the proposed scheme.
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Little Tern foraging habitat in Wexford Harbour and coastal waters is not assessed as having a potential to be adversely affected by the proposed Enniscorthy Flood Defence Scheme.
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	Habitats recorded within the proposed Enniscorthy Flood Defence Scheme are not suitable for the establishment of Little Tern breeding colonies. No potential impact to the colony site arises from the proposed scheme.
Prey biomass available	Kilogrammes	No significant decline	Little Tern foraging habitat in Wexford Harbour and in coastal waters is not assessed as having a potential to be adversely affected by the proposed Enniscorthy Flood Defence Scheme.
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	Little Terns have not been recorded in the proposed Enniscorthy Flood Defence Scheme area, suitable breeding and foraging habitat does not occur, and thus no barriers to connectivity will arise. No potential impact to the colony site arises from the proposed scheme.
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding little tern population	Colony site located c. 20km distant from proposed Enniscorthy Flood Defence Scheme. No potential impact to the colony site arises from the proposed scheme.
Wetlands [A999] (Maintain or restore the favourable conservation condition)			
Wetland habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 4,207ha, other than that due to natural patterns of variation	No, as the c. 2ha wetland area in the Bare Meadow which supports a proportion of some of the waterbird populations listed as SCIs for the SPA, is additional to the 4,207ha wetland habitat area cited in the Conservation Objectives for the SPA.

4 POTENTIAL IMPACTS ON EUROPEAN SITES

4.1 SLANEY RIVER VALLEY SAC

As identified in the Stage 1 AA Screening report, supported by desktop study and survey results carried out in 2016 and 2017, it was considered that likely significant effects resulting from the proposed Scheme could occur on the following QI species and habitats;

- Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
- Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-padion, Alnion incanae, Salicion albae) [91E0]
- Freshwater pearl mussel (Margaritifera margaritifera) [1029]
- Sea lamprey (Petromyzon marinus) [1095]
- Brook lamprey (Lamptera planeri) [1096]
- River lamprey (Lamptera fluviatilis) [1099]
- Twaite shad (Alosa fallax fallax) [1103]
- Salmon (Salmo salar) [1106]
- Otter (Lutra lutra) [1355]

4.2 WEXFORD HARBOUR AND SLOBS SPA

As identified in the Stage 1 AA Screening report, supported by desktop study and survey results carried out in 2016 and 2017, it was considered that likely significant effects resulting from the proposed Scheme could occur on the following SCI species;

- Little Grebe (Tachybaptus ruficollis) [A004]
- Cormorant (Phalacrocorax carbo) [A017]
- Grey Heron (Ardea cinerea) [A028]
- Wigeon (Anas penelope) [A050]
- Teal (Anas crecca) [A052]
- Mallard (Anas platyrhynchos) [A053]
- Lapwing (Vanellus vanellus) [A142]
- Black-headed Gull (Chroicocephalus ridibundus) [A179]
- Lesser Black-backed Gull (Larus fuscus) [A183]

5 APPRAISAL OF POTENTIAL IMPACTS ON EUROPEAN SITES

5.1 RIVER SLANEY VALLEY SAC

This section assesses potential impacts in the context of the conservation objectives of the QIs and SCIs set out in Table 7 of this report.

5.1.1 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]

5.1.1.1 Habitat loss

Aquatic macrophyte populations fluctuate annually and can be absent from suitable habitat in any one year. It is considered that in 2003 the Floating River Vegetation was at a minimum (very little growth and/or species diversity recorded in most of the river). In 2016, however, aquatic plant growth was recorded throughout much of the channel and four main areas were identified as being important for aquatic macrophytes within the project area:

1) Adjacent to the northern floodplain (chainage 6150-6850);
2) Below the Seamus Rafter bridge (chainage 5340-4800);
3) Adjacent to the southern floodplain (chainage 4300-4700); and
4) Southern end of the project area (chainage 3220-4000).

Floating river vegetation was most abundant close to the riverbanks where water depth is c. 1.5m. As aquatic plant growth was in good condition in 2016, it is considered that all significant areas of potential Floating River Vegetation were detected.

The construction works that have the potential to disturb the floating river vegetation within the channel are in-stream works (dredging and widening), associated movement of equipment and vehicles within the channel and construction of hard flood defences (e.g. walls). It should be noted that the 'habitat' of Floating River Vegetation is the river and river bed. Therefore, whilst aquatic macrophyte vegetation will be removed and the habitat will be disturbed, in most areas there will not be any direct loss of this habitat the river will still be suitable for aquatic macrophyte growth post construction.

All works within the channel will be carried out within dry works areas. An impermeable barrier (i.e. sheet piling) will be constructed along the centreline of the river along the extent of the works area. Works will be undertaken over a 36-month period. The expected programme of relevant works is:

- Year 1: Instream works will be undertaken upstream of the Seamus Rafter Bridge on the east side from July to August and on the west side from September to October;
- Year 2: Instream works will be undertaken downstream of the Seamus Rafter Bridge on the west side from July to August and on the east side from September to October; and
- Year 3: No dry works but river widening downstream of the River Urrin, July to August.

A summary of the main works likely to disturb macrophytes in each of the four main macrophyte areas is summarised below.

1) Northern floodplain (chainage 6150-6850): river widening by up to 30m on the eastern bank; creation of a wall on the western bank (but this is outside of the main floating river vegetation distribution); dredging in one c. 100m length as existing river bed mostly below the desired bed level.

2) Below Seamus Rafter Bridge (chainage 5340-4800): dry works area and river widening on the western bank (no dry works on the eastern half of the channel); flood defence wall on both banks; little or no dredging as existing river bed mostly below the desired river bed level.
3) Southern floodplain (chainage 4300-4700): dry works area and river widening on eastern bank and shallow dredging in channel (10-20cm). NB Area where P. x cooperi was found is just above end of dredging zone. There is no planned widening on the western bank. This would also leave vegetation in situ for recolonisation of the channel opposite and downstream. P. x cooperi is very rare in Ireland and this river stretch is good for macrophytes.
4) Southern end of survey area (chainage 3220-4000): widening in the north of the area on both banks. No dredging required but dry works on both sides of channel.

Dredging and river widening will lead to direct removal of aquatic macrophyte vegetation from the river channel. In addition, the flow in the main channel adjacent to the dry works areas will be temporarily increased as the channel width will be halved. Removal of vegetation and increased flow does not necessarily mean the complete loss of floating river vegetation habitat. The amount of macrophyte growth in any one year is variable, due to factors such as water temperature, winter flooding, plant life-cycles and water clarity. This is a dynamic habitat that is adapted to natural disturbances such as high flows, flooding and scouring. Aquatic macrophytes have features that facilitate quick regeneration (such as the ability to regenerate from vegetative fragments, seeds and other propagules). Vegetation can recover from severe disturbances within a couple of years, but the speed at which recovery occurs will depend on habitat suitability, source of propagules for regeneration and vegetative spread from nearby stands of macrophytes. Most propagules involved in the short-term regeneration of aquatic macrophytes are located within the top 10cm of sediment, (Dugdale et al., 2001, cited in Combroux and Bornette, 2004; Ozimek, 2006). However, seeds within the long-term seed bank may be buried up to 15cm deep and still have the ability to germinate if exposed to the right conditions (de Winton et al., 2000). In addition, many aquatic macrophyte species in rivers can grow from fragments washed down from upstream (Haslam, 2006). A species rich assemblage can regenerate within two to five years, with species such as Elodea spp., Chara spp., C. demersum, E. canadensis, P. pusillus, M. spicatum, P. crispus and P. pectinatus as early colonisers (Beltman et al., 1996; Boedeltje et al., 2001; Capers, 2003; Chow-Fraser, 2005; Haslam, 2006; Moss et al., 1996a and 1996b).

Sediment stability is also a major factor determining the growth, recolonisation success and stability of recovering macrophyte populations (Schutten et al., 1997). Where deep silt has accumulated in a watercourse (e.g. 1m), some macrophyte species remain rooted at a consistent level, whilst silt accumulates above. Plants can become easily dislodged and damaged where sediment is loose (Schutten et al., 2005) and dredging can improve plant growth (Haslam, 2006). In alluvial plains, the subsoil is soft and after dredging a soft substrate remains (Haslam, 2006). In this case or where the hard bed is untouched/broken but the watercourse is silting, aquatic macrophytes will quickly regenerate (Haslam, 2006). Temporary drawdown can also be used to stabilise sediments (Cooke et al., 2005).

After the in-stream works have been completed within a section of the river, the section will be re-flooded. Aquatic macrophytes that were previously present within the section (if works occur during the growing season), will have been removed from dry works areas. In addition, sediment will have been removed by dredging in some sections. The total area to be dredged is c. 85,000m^2, which is about 50% of the channel within the survey area. As most sections will require a dry works area and vehicle and equipment movement within the dry works area, most areas that are not dredged will still be disturbed. However, the propagule bank will remain in situ in undredged areas and those that are dredged to a depth of less than 10cm (c. 30,200m^2, 35% of the dredged area). In total,

approximately 70% of the channel within the survey area will either be not dredged, or dredged to a depth of less than 10cm, thus leaving the propagule bank in situ.

Propagules in the sediment will survive and regenerate when re-flooded (for instance this reproductive strategy allows macrophytes to quickly regenerate in drawdown zones or reservoirs). There will therefore be a small source of in situ propagules in each macrophyte section, as well as the recolonisation from aquatic macrophytes to the north (upstream) of the project area. After work on the eastern side of the river has been completed, the floating river vegetation in the western side of the river will be intact. However, the impermeable barrier in the centre line of the river channel will prevent vegetative spread of aquatic macrophytes from the west to the newly dredged east side of the channel.

The drawdown and sediment removal will stabilise the substrate and, where soft substrate is still present (i.e. not dredged down to bedrock or gravels), conditions will be suitable or improved for macrophyte growth. Conditions may not be immediately optimal if compaction of the sediment occurs during vehicle use within the dry works area. However, the gravels within the channel are not highly likely to compact and silt will re-accumulate within the channel (e.g. at times of high flows). Therefore, whilst these areas may recolonise more slowly, they are still likely to support potential floating river vegetation habitat in the long-term. Regeneration will also occur from propagules within the sediment (where no dredging or shallow dredging only has taken place) and from fragment of plants washed down the river from north of the works area.

Regeneration of aquatic plants after construction works can be facilitated by methods such as replacement of the top 15cm of sediment (propagule bank) or vegetative fragments into the channel. These would be removed prior to the works, stored (wet/dry) and then replaced before re-flooding. The main native aquatic macrophyte species that was found within the survey area was Potamogeton perfoliatus. This lacks specialised vegetative propagules and does not colonise well from vegetative fragments (Capers 2003; Preston and Crofts, 1997). It does however germinate from seed (e.g. Boedeltje et al., 2002) and by vegetative spread from adjacent plants (Capers 2003). Seed would be expected to be present in up to 15cm depth of sediment and would withstand drying during storage. Conversely the non-native invasive Elodea species only reproduce vegetatively and regenerate well from plant fragments (Barrat-Segretain & Bornette, 2000; Cronk and Fennessy, 2001; Preston and Crofts, 1997; Strand, 1999). The use of sediment replacement as a mitigation method would assist the establishment of aquatic macrophytes post-dredging. There is the potential that some of the replaced sediment could become suspended during re-flooding of the dry works area and be carried downstream. This could potentially facilitate the regeneration and spread of Elodea species within the channel and downstream. However, Elodea species were present at very low cover within the channel and these species are well established in the river within the project area and downstream. In addition, dry storage of sediment will favour the native Potamogeton perfoliatus, which can regenerate from seed, whilst reducing the potential of regeneration of Elodea species (as plant fragments have a lower tolerance to drying than seeds and specialised propagules). It will be important to ensure however that sediment from areas with high cover of Elodea species prior to works (if present) is not replaced post-construction.

The widening (and in some areas the dredging) will lead to the creation of additional habitat for floating river vegetation within the river channel. The Type 1 and Type 3 riverbank widening will have the same or greater area of shallow water as the present riverbank profile. Type 2 widening has sheet piling wall and may result in localised loss of habitat in deeper water areas. Aquatic macrophytes were found in water that was below 1.5m in depth within the survey area. The area that is currently below 1.5m depth in the channel is 13,670m^2. Post-dredging, the area of channel below this depth will be 70,900m^2. This is an increase of greater than five times the amount of potential floating river vegetation habitat. In addition, the modification of the back channel on the northern floodplain (which is currently heavily shaded with little flow) will improve its potential to

support aquatic macrophytes. This will increase the abundance and distribution of aquatic macrophytes within the project area.

During operation, maintenance dredging will be limited to the sediment trap on the North Island on the east bank. The design of this trap eliminates the need to undertake extensive maintenance dredging along the main channel. The maintenance on the trap is expected to take place approximately every 5 years but this may be less. The new road bridge will shade the channel under the bridge in this location. However, the Seamus Rafter Bridge to the north will have been removed, and the new bridge is a higher height and therefore there will be no increase in shading of aquatic macrophytes within the channel.

5.1.1.2 Habitat degradation

The in-stream works will be undertaken in a dry works area. Water will be allowed to leave the dry works area naturally (by leaving the downstream end open). Any residual water that remains will be pumped out with an appropriate filter on the pipe to prevent sediment being released downstream. Therefore, there will be no impact on water quality during this stage. When the dry works areas are re-flooded there is the potential for silt to become suspended in the water column and be washed downstream. However, most of the silt is likely to be deposited shortly after the works areas. This may be re-suspended and carried further downstream during a flood event, a natural process. If the silt settles within the dredged/disturbed areas, then this would facilitate aquatic macrophyte regeneration on the dredged river surface. If silt is suspended in the water column then it will be rapidly dispersed travel downstream and so be highly unlikely to impact on light levels within the river channel in this area (e.g. as it would in an extreme flooding event). Any accidental spills during construction would be contained within the dry works area and would be remediated before the area was re-flooded. During operation, there will be instream works associated with maintenance works in the northern floodplain which will involve sediment removal and are expected to be required approximately every 5 years. Removal of large items from the debris trap will be carried out following storm events when required and will not involve instream works. The instream works will be undertaken in a dry works area to reduce the potential for sedimentation downstream.

The non-native invasive aquatic macrophyte species Elodea canadensis and E. nuttallii are present in the river channel throughout the project area, at low cover (less than 5%). They are part of the floating river vegetation community and are not currently having any negative impact in this section of the river. Both species freely regenerate from vegetative fragments (they are only found as female plants in the British Isles and therefore must reproduce vegetatively (Preston et al., 2002)). They are highly likely to recolonise the dredged areas. However, as they are currently at relatively low cover in the channel, it is not expected that they would become dominant after construction works. The river bed has had low cover of aquatic macrophytes in previous years (e.g. 2003) and yet Elodea species did not dominate during subsequent recolonisation (as shown by the low cover of the species in relation to other aquatic macrophytes in 2016). Elodea species spread from vegetative fragments so will have less regeneration capacity after dry works than species that spread by seed (which will tolerate higher disturbance and drying). Potamogeton perfoliatus is the main aquatic macrophyte in the channel and regenerates mainly by seed and spread from adjacent plants. Vegetation removed during the creation of the dry works area will not be stored adjacent to a watercourse, to reduce the potential for spread of Elodea species (although they both occur downstream of the project area and are well established in the river). During operation there is no specific reason why Elodea species would become dominant in the channel, as there would be no increase in local nutrients or disturbance regime (e.g. weed cutting or regular dredging) which could favour long-term dominance of these species.

During the dry works, in some areas the river will be reduced to half its width. The velocity within the adjacent river channel is therefore expected to increase during the dry works. This will only be for a few months during one year for each of the sections. As most above-ground macrophyte

growth will be lost from the channel due to the construction of dry works areas and dredging activities, this is not expected to have any additional impact. However, below the Seamus Rafter bridge, there is one section (eastern half of the channel), which will not have a dry works area. The macrophyte vegetation in this area will be undisturbed and can act as a propagule source for regeneration of macrophytes downstream after works have completed. The species present within this area have a relatively wide ecological tolerance (e.g. Myriophyllum spp., Potamogeton spp. and Ranunculus spp.) and it is not expected that there will be a change in species composition or cover due to a short period of higher flows.

5.1.1.3 Callitriche truncata

The rare aquatic plant Callitriche truncata, listed on the Flora (Protection) Order 2015 and only known Irish site within the River Slaney, does not occur within the project area and there will therefore be no direct habitat loss during construction or operation. The project area does not contain suitable habitat for this species and it was not recorded during the 2016 surveys (either from the detailed transects, or from the riverbank walk-over survey). It was also not recorded during the detailed boat survey in this area in 2003. The nearest known historical site for Callitriche truncata is c. 1.9km downstream, from mud on the west bank of the river below Bormount House (recorded by Roger Goodwillie, 2003). This was not re-found during surveys in 2016. The nearest most recently recorded site is c. 6.3km downstream near Jamestown Nature Reserve (Paul Green, pers. comm.). The furthest south known site is c. 9.3 km south of the project area and washed up plants have been recorded from the river over 12km south of the project area. Pre-construction surveys of the sites closest to the project area (Bormount House and Edermine Bridge) will be surveyed prior to construction.

Siltation downstream could occur during construction a result of increased flow in the reduced width channel, leading to mobilisation of fine sediment and when the dry works areas are re-flooded. During the operational phase, there is the potential for siltation impacts associated with maintenance of the silt trap on the northern floodplain. Callitriche truncata tends to occur as an early colonist on mud and silt banks in shallow water at the edge of the river in its tidal reach. Annual surveys of Callitriche truncata (2004 to 2013) at a reservoir in Essex, England show that this species is tolerant of moderate siltation, but can be negatively impacted by deep siltation (e.g. 30cm) and subsequent reduced water clarity (Denyer, 2006-2013). As the nearest Callitriche truncata site is c. 1.9km downstream from the construction area, siltation downstream would need to be significant before there is any potential to impact this species at its furthest north sites. Any impact at its southern most known site (c. 6.3km south) would be highly unlikely. However, this is the only river stretch from which this species has been recorded in Ireland, and it is a component of the Annex I floating river vegetation community within the river. Therefore, a precautionary approach is being taken in assuming a level of risk of water quality impacts to minimise the risk of any perceptible effect on water quality downstream during construction. Impacts to the southern populations (where Callitriche truncata is most frequent and has been recorded recently), however, are highly unlikely.

As previously mentioned, a mitigation measure that can be used to facilitate the regeneration of aquatic plants in newly dredged/ disturbed areas is to return the top layer of sediment (which has been stored wet) to the newly dredged channel. There is the potential that some of this sediment could become suspended during re-flooding of the dry works area and be carried downstream in the absence of mitigation. Similarly, the return of vegetative fragments of plants (which have been stored wet) to the newly dredged channel can be used to restore aquatic vegetation after dredging/ disturbance. However, there is the possibility that this would lead to vegetative fragments travelling downstream. Elodea canadensis and E. nuttallii are both present within the scheme construction area. Both of these species regenerate very successfully (and rapidly) from vegetative fragments. Elodea nuttallii was recorded from the three northernmost Callitriche truncata sites and it is highly

likely that E. canadensis is also established in this area. However, even if these species are established in this area, it is important not to facilitate their spread. For this reason, only sediment from areas with low cover of Elodea species pre-construction will be replaced post-construction. The sediment will be stored dry, which favours species that regenerate from seed (such as the native Potamogeton perfoliatus), rather than Elodea species (as detailed in Section 5.1.1.1). Vegetation removed during the creation of the dry works area will not be stored adjacent to a watercourse, to reduce the potential for spread of Elodea species.

There are no predicted changes to the hydrological regime downstream of the study area during the operational phase.

The results and analysis of the Geomorphology Study (Appendix M) conclude that the proposed works will have relatively limited impacts on sediment processes in the River Slaney. This is 'primarily because the river is a low energy river with very limited geomorphic activity occurring under current conditions, and the proposed works will not substantially change this characteristic'. There is a potential for localised changes to existing erosion and deposition processes. However, the potential changes to erosional processes are negligible under normal flow conditions, and only minor changes are likely to occur during significant flood events (1 in 100yr events).

5.1.1.4 Overall Impact on Conservation Objectives

Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] (Maintain the favourable conservation condition)		
Habitat distribution	Occurrence	There will be a short-term negative impact on the distribution as some areas of the scheme will have all existing FRV removed. However, FRV will regenerate in the medium to long-term and due to the river widening works, there will be an increase in the areas suitable for FRV leading to a long-term positive impact on distribution.
Habitat area	Kilometres	There will be a short-term negative impact on the FRV habitat area as some areas of the scheme will have all existing FRV removed. However, FRV will regenerate in the medium to long-term and due to the river widening works, there will be an increase of 5x in suitable FRV habitat (c5.7ha) and there will therefore be a long-term positive impact on distribution.
Hydrological regime: River flow	Metres per second	No impact on aquatic macrophyte growth. River velocity will be increased temporarily due to reduced channel width adjacent to dry works areas. However, the species present in the river are adapted to changes in river flow and this will only be for a few months per year for 3 years (see Table 3). The proposed scheme is not expected to materially change the flow levels within the River Slaney downstream of the Seamus Rafter Bridge, which is where the main populations of floating river vegetation occur.
Hydrological regime: Tidal influence	Daily water level fluctuations-metres	No impact. During construction, instream works will not interfere with the tidal flooding regime of the River Slaney.
Substratum composition: Particle size range	Millimetres	No impact. There is the potential for limited changes to sedimentation processes within the River Slaney due to the upstream sediment trap and changes to flow velocity.

Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] (Maintain the favourable conservation condition)		
		However, the river is a low energy river with very limited geomorphic activity occurring under current conditions. Callitriche truncata occurs in the tidal sub-type of the River Slaney where sedimentation from upstream is less relevant.
Water quality: Nutrients	Milligrams per litre	The construction and operation of the scheme will have no permanent impacts on water quality of the River Slaney. There will be in-stream works associated with maintenance works in the northern floodplain which will involve sediment removal and are expected to be required approximately every 5years. These works will occur in a dry works area as advised by IFI. In the absence of mitigation, there is the potential for short-term instream siltation.
Vegetation composition: Typical species	Occurrence	The main species present within the survey area have a relatively wide ecological tolerance (e.g. Myriophyllum spp., Potamogeton spp. and Ranunculus spp.). There would need to be large changes to habitat attributes (e.g. flow, tidal regime, substrate, nutrient status, water depth, water clarity etc.) before there would be significant changes to overall species composition. The location of the rare Potamogeton x cooperi will not be dredged. A 100m length of bank x3m wide will be protected at this location. Callitriche truncata occurs downstream from the study area. Siltation downstream as a result of construction activities could lead to a long-term negative impact on the northernmost historical site for this species. Pre-construction surveys of the sites closest to the project area (Bormount House and Edermine Bridge) will be undertaken.
Floodplain connectivity: Area	Hectares	No impact. Although the northern floodplain will be used for sediment deposition during construction, there will be no change to its long-term functioning as an active floodplain. There will be no loss of functional area of the southern floodplain, whilst there will be re-profiling of the channel, the area of active floodplain at and upstream of the habitat will be maintained.

5.1.2 Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]

5.1.2.1 Habitat loss

There will be no direct loss of habitat during construction or the operational phase of the scheme.

5.1.2.2 Habitat disturbance

Currently it is difficult to access the Oak woodland from the N11 due to steep slopes and dense undergrowth, particularly of thorny species such as Rubus fruticosus agg. During construction, an area of the Oak-ash-hazel woodland to the south of the Oak woodland will be removed. This may increase access to the Oak woodland from the road resulting in negative impacts such as trampling, increased nutrients from dogs, litter deposition, burning and wood removal. It would be unlikely to affect a large area of woodland due to the steep slope and dense undergrowth, which make access very difficult in the northern area of the woodland.

5.1.2.3 Habitat degradation

There will be disturbance close to the woodland during construction of the new road bridge and access roads. Non-native species such as the herbs Fallopia japonica and/or Impatiens glandulifera could become established or spread from nearby sites (e.g. on machinery) during construction. This could lead to a reduction in the species diversity of the ground flora within the woodland.

There is no proposed drainage into the woodland. The woodland is a dry habitat type and there are no water dependent features in the woodland. Therefore, there will be no hydrology impacts on the woodland.

There will be no residual impacts of significance on air quality or climate from the construction or operation of the proposed development.

5.1.2.4 Overall Impact on Conservation Objectives

Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] (Maintain the favourable conservation condition)		
Habitat area	Hectares	The habitat area within the SAC is estimated at 146ha. This site is c1ha (0.7% of the SAC habitat). There will be no direct habitat loss and no decline.
Habitat distribution	Occurrence	There will be no direct habitat loss and therefore there is no decline in habitat distribution.
Woodland size	Hectares	The woodland area is c1ha and is therefore smaller than the objective of a 'small' wood to be at least 3ha in size. However, there will be no change in the area of woodland.
Woodland structure: Cover and height	Percentage and metres	Disturbance could lead to changes in the herb layer. However, access to much of the site is difficult due to the steep slope and dense undergrowth and this would therefore only affect a small area. The site accounts for <0.7% of the Oak woodland habitat within the SAC. No decline.
Woodland structure: Community diversity and extent	Hectares	Disturbance could lead to changes in the herb layer. However, access to much of the site is difficult due to the steep slope and dense undergrowth and this would only affect a small area. The site accounts for <0.7% of the Oak woodland habitat within the SAC. No decline.
Woodland structure: Natural regeneration	Seedling: sapling: pole ratio	Disturbance could impact regeneration. However, access to much of the site is difficult due to the steep slope and dense undergrowth and this would only affect a small area. The site accounts for <0.7% of the Oak woodland habitat within the SAC. No decline.
Woodland structure: Dead wood	m^3 per hectare; number per hectare	No change to the amount of dead wood. No decline.
Woodland structure: Veteran trees	Number per hectare	Disturbance could lead to damage of veteran trees. However, access to much of the site is difficult due to the steep slope and dense undergrowth and this would only affect a small area. The site accounts for <0.7% of the Oak woodland habitat within the SAC. No decline

Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] (Maintain the favourable conservation condition)		
Woodland structure: indicators of local distinctiveness	Occurrence	Melica uniflora, a rare species indicative of long-established woodland was recorded in this habitat. It is sensitive to disturbance and spread of non-native species. However, the non-native species Fallopia japonica and/or Impatiens glandulifera are unlikely to become dominant in the areas of the site with thin acid soil on steep ground favoured by Melica uniflora. No decline.
Vegetation composition: native tree cover	Percentage	Disturbance could impact on native tree cover. c and this would only affect a small area. The site accounts for <0.7% of the Oak woodland habitat within the SAC. No decline
Vegetation composition: typical species	Occurrence	Disturbance and non-native species have the potential to impact on vegetation composition. However, access to much of the site is difficult due to the steep slope and dense undergrowth and the non-native species Fallopia japonica and/or Impatiens glandulifera are unlikely to become dominant in the areas of the site with thin acid soil on steep ground. Therefore, only a small area would potentially be impacted. Therefore, this would only affect a small area. The site accounts for <0.7% of the Oak woodland habitat within the SAC. No decline.
Vegetation composition: negative indicator species	Occurrence	The non-native species Fallopia japonica and/or Impatiens glandulifera could become established in this area of woodland. However, they are unlikely to become dominant in the areas of the site with thin acid soil on steep ground. No increase.

5.1.3 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-padion, Alnion incanae, Salicion albae) [91E0]

5.1.3.1 Habitat loss

The new bridge deck will span the northern section of alluvial woodland. There will be no direct loss of habitat, as the bridge supporting structures will be located to the east and west of the alluvial woodland. There will be construction works in close proximity of the alluvial woodland and there is the potential for accidental direct habitat loss during construction. However, the woodland is very wet and separated from the floodplain by a ditch that has standing water for most, if not all, of the year. It is therefore highly unlikely that machinery would accidentally damage the woodland. The woodland in this area is very narrow (c. 30m wide) and any impact would be very localised.

Pruning of the trees to 5m under the bridge deck will be required. The alluvial woodland strip is c. 30m wide in the location of the new bridge and c. 0.06ha of alluvial woodland will require pruning. The total area of alluvial woodland on southern floodplain (to the east and south) is c 3.02ha. Therefore, the pruning will impact c. 0.018% of the alluvial woodland. The main tree species in this area of woodland are Alnus glutinosa and Salix fragilis, which are both trees that have a history of management by coppicing and pollarding. Therefore, pruning at the correct time of year (e.g. November to March) by an experienced arboriculturist should not lead to direct tree mortality. However, there is the potential for disturbance to ground flora during the works. Regular pruning of trees during the operational phase (to 5m) will be required to ensure that branches do not interfere with the bridge structure. This would cause the canopy height criterion of the condition assessment

to fail, as canopy height will be below 7m (Appendix N). However, as 8/10 of the condition assessment criteria at the 1-plot level would pass (with negative species regeneration and canopy height criteria failing), the overall 1-plot assessment in this area would still pass. In addition, the site would pass at the 4-plot level and therefore the alluvial woodland would still be given a 'Green' result for Structure and Function assessment (Appendix N). There will therefore be no direct loss of Annex I wet woodland habitat as a result of pruning works.

Currently there is very low cover of dead wood (fallen and standing dead wood) habitat in the alluvial woodland and this criterion fails the condition assessment (Appendix N). This could potentially be increased by the pruning activity in the area of the bridge, if dead wood is left in situ.

5.1.3.2 Habitat disturbance

The woodland is very wet and has a deep ditch on the western boundary and a steep, overgrown slope on the eastern boundary. Therefore, there will be no increased disturbance to the woodland as a result of the operation of the scheme.

5.1.3.3 Habitat degradation

The alluvial woodland has a high water table for much of the year and is regularly flooded in winter. During construction, contaminated surface water runoff and/or an accidental spillage or pollution event adjacent to the alluvial woodland (or into a surface feature hydrologically connected to it) has the potential to have a significant negative impact on water quality within the woodland. This could lead to a temporary loss of plant life (e.g. from toxic substances) or a change in ground flora (due to increased nutrients). Frequent and/or prolonged pollution events in the river system have the potential for significant long-term effects in the alluvial woodland. There will be no surface water discharge from the bridge or roads into the alluvial woodland. During the operational phase, surface water from the new road bridge will flow to the east (the deck will fall to the east) and be collected and combined with back of wall drainage and discharged through a petrol interceptor to the river to the north. The roundabout cut slope will be intercepted at the top of the slope and discharge to the north through the new outfall and to the south through the existing outfall or to the new northern outfall. These will also be utilised for pavement and cut slope drainage.

During construction a compound channel will be created along the River Slaney adjacent to the southern floodplain, to the west of the alluvial woodland. This has the potential to impact upon the hydrology of the alluvial woodland. The alluvial woodland receives tidal water and surface water runoff from the slope above to the east. Geotechnical investigations were carried out for the proposed scheme. These investigations noted that the soils in the southern floodplain (Bare Meadows) consist of clay and silt materials lying on sands and gravels. The groundwater level was found to be at the top of the gravel/sand layers in trial pits. This is at a depth of between 1.6 and 3m below existing ground level and the groundwater is generally below the river level. It can be concluded that the groundwater does not rise through the impermeable clay layer and the surface water in the field does not seep down through this impermeable clay at a significant rate. Therefore, the works in the river will not influence the surface water level in the field. During the operational phase, there will be no change to runoff from the slope to the east. The tidal water reaches the woodland via a drain, which flows north (upstream) with the rising tide. The river has a tidal range of c. 1.5m in this location. During neap tides, this will be c. 0.5m lower than at present but the drain that feeds the alluvial woodland will continue to get wet every tidal cycle. In extreme floods the depth of flooding will be reduced on the southern floodplain by between 50 and 240mm. It is the frequency and duration of flooding that is important in alluvial woodland, rather than the actual depth of water. Regular flooding is important to prevent species from drier woodland becoming dominant. However, alluvial woodlands are typically not submerged during at least the summer months. Prolonged flooding can lead to dieback of some species and nutrient enrichment. The ditch adjacent to the alluvial woodland currently supports standing water for all of the year, the woodland

regularly floods in winter and standing water continues to be present in at least May. Therefore, a slight decrease in the water levels from an extreme flooding event would not impact the woodland flora.

The new road bridge will shade a small area of the northern section of alluvial woodland. A shading study (Integrated Environmental Solutions Limited, 2016) shows that only a small area of woodland will be affected by shading and that all areas will still receive over 2 hours of sunlight per day during the growing season (spring and summer). This could lead to a slight local change in species composition. However, alluvial woodland will still be present, even if there is a change in woodland vegetation type. Alluvial woodland is dynamic and changeable and small changes in species composition would not cause the species composition condition assessment criteria to fail. For instance, even if half of the positive indicator species were lost, there would still be sufficient indicator species present to pass (Appendix N). The tree canopy would still be dominated by target species (Alnus glutinosa, Fraxinus excelsior, Salix cinerea or other Salix sp.), as the prolonged winter flooding does not favour other tree species. It may be that there would be a shift to dominance by the native willow Salix cinerea, as in the majority of the alluvial woodland at this site.

The field layer is dominated by tall herb species. These can grow in closed or open woodland and many can also persist outside of woodland e.g. in tall-herb swamp. Therefore, the cover and height of the field layer is unlikely to change in response to the tree pruning and slight bridge shading. Currently the cover of the field layer is 100% in this area, with a height of c.1m, but to pass this condition assessment it is only required to be ≥20% of plot and ≥20cm. A very large change in the field layer would be required for this target to fail and there is no reason why this would occur.

The shrub cover is currently very low in this area of the woodland (and fails the standard condition assessment criterion). Despite slight shading by the bridge, the pruning of canopy trees will increase the light reaching the shrub layer. In addition, some of the coppiced/pollarded trees will also form part of the shrub layer, increasing cover. Therefore, the lower, site-specific, target for alluvial woodland at this site should therefore continue to be met and may actually be increased (Appendix N).

Two non-native invasive species are present within the alluvial woodland on the southern floodplain area. There is a small area of Fallopia japonica to the east of the northern section and Impatiens glandulifera is established and locally frequent throughout the alluvial woodland in this area. During construction (and tree-pruning) there is the potential to facilitate the spread of Fallopia japonica, which is currently very localised and does not occur in the wet woodland area. Impatiens glandulifera is already established but disturbance to ground flora during pruning could potentially increase the local abundance of this species. Currently the site condition assessment for alluvial woodland (Appendix N) passes the criteria for cover of negative indicator species. An increase in the cover of non-native invasive species could cause this criterion to fail.

There will be no residual impacts of significance on air quality or climate from the construction or operation of the proposed development.

5.1.3.4 Overall Impact on Conservation Objectives

Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] (Maintain the favourable conservation condition)		
Habitat area	Hectares	There will be no direct habitat loss. No decline.
Habitat distribution	Occurrence	There will be no direct habitat loss. No decline.
Woodland size	Hectares	The area of wet woodland on the southern floodplain is c3ha, the recommended minimum for 'small' woods within the SAC. There will be no direct habitat loss. No decline.
Woodland structure:	Percentage	Coppicing will reduce the canopy height to 5m in a small

Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] (Maintain the favourable conservation condition)		
cover and height	and metres	area of the woodland. The tree cover will not be affected as the tree species present are adapted to coppicing and shading. The area impacted is c0.018% of the alluvial woodland at the site and 0.003% of the alluvial woodland within the SAC. This will not impact the site condition assessment and the alluvial woodland would still be given a 'Green' result for Structure and Function (Appendix N).
Woodland structure: community diversity and extent	Hectares	The area of woodland that will be impacted by pruning is <0.1% of the alluvial woodland at the site. The pruning and shading may cause a slight change in relative species composition in this area, but this will not affect the overall diversity and extent of community types at the site. No decline.
Woodland structure: natural regeneration	Seedling/ sapling: pole ratio	The tree pruning under the bridge may lead to an increase in regeneration as the canopy height is reduced. However, even if there was a negative impact on regeneration in this one location, there were sufficient size classes of trees and regeneration in the other three assessment plots to meet these criteria alone (Appendix N). Therefore, although there will still be a range of size classes and regeneration in the bridge location, this is not essential for the woodland to pass the condition assessment. No decline.
Hydrological regime: Flooding depth/height of water table	Metres	There will be no impacts to the hydrology of the woodland during construction or operation.
Woodland structure: dead wood	m^3 per hectare; number per hectare	Currently there is very low cover of dead wood (fallen and standing dead wood) habitat in the alluvial woodland and this criterion fails the condition assessment (Appendix N The wood removed during pruning of trees under the road bridge would add to the dead wood within the woodland if retained in situ therefore there will be an overall increase.
Woodland structure: veteran trees	Number per hectare	There are no veteran trees in the northern section of the woodland which will be topped. There are no other potential direct impacts to veteran trees.
Woodland structure: indicators of local distinctiveness	Occurrence	There were no indicators of local distinctiveness recorded from this area of alluvial woodland. No decline.
Vegetation composition: native tree cover	Percentage	A small area in the northern section of the woodland will be topped to 5m and shaded by the road bridge. Non-native willow is co-dominant with native species in this area. Alluvial woodland species in this area are adapted to coppicing and shading (Appendix N). As explained above (Section 5.1.3.1), this area would still pass a condition assessment. The area to be topped is <0.02% and >99% of the woodland will be unaffected and the alluvial woodland would still be given a 'Green' result for Structure and

Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] (Maintain the favourable conservation condition)		
		Function assessment. No decline.
Vegetation composition: typical species	Occurrence	Shading of a small area of the northern section would not lead to a loss of typical species as the species are tolerant of shading. The shrub layer, which currently fails the condition assessment, may increase under the altered conditions (Appendix N). Most of the woodland will be unaffected. No loss.
Vegetation composition: negative indicator species	Occurrence	Disturbance to the ground flora during pruning works could facilitate the spread of the non-native species Fallopia japonica and Impatiens glandulifera. This could lead to an increase.

5.1.4 Freshwater pearl mussel (Margaritifera margaritifera) [1029]

5.1.4.1 Habitat Loss, Fragmentation and Disturbance

The impact of the proposed works without mitigation would be negative, i.e. the loss of the species from the extent of the works area, which is the lowest part of their distribution in the Slaney Catchment. A total of 51 freshwater pearl mussels were found in the survey of the proposed works limits, but the majority of these mussels have been washed into the area from upstream, and into habitat that is not suitable for juvenile mussels. A small area of permanent juvenile and adult habitat (physical habitat that has the potential to support juvenile mussels) is present at the uppermost end of the scheme, and the few mussels here could potentially have been born there. This habitat will be lost through changes to the flow regime, and the larger area of river bed that currently supports adult mussels, but with no habitat to support juvenile recruitment, through changes to the flow and river bed structure from deepening.

The impact on the designated SAC sub-population in the Derreen River without mitigation would therefore be the current contribution of the 51 mussels to provide larvae that could attach to host fish travelling in an upstream direction into the Derreen River.

5.1.4.2 Habitat Degradation

During construction, if unmitigated, contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water could negatively affect any living Margaritifera that remained in the river bed in undisturbed areas during the construction process. The effects of short term pollution (minutes) can be severe stress and loss of sperm or glochidia larvae. A repeated or more prolonged pollution event can result in death to mussels through the inability to feed or through lack of oxygen from prolonged clamming.

Habitat degradation - hydrology (e.g. flow and flooding regime)

During construction, methodologies that temporarily change flow patterns (such as creating temporary barriers in the river), changes in flow can cause living mussels to be scoured out of their habitat and washed downstream where flows are increased, or to be subject to inappropriately low velocities impacting on oxygen and food availability where flow is temporarily lowered.

5.1.4.3 Disturbance/Displacement

Without mitigation, the disturbance to the mussels within their river bed habitat would result in the loss of the species from the extent of the works area, which is the lowest part of their distribution in

the Slaney Catchment, and thus their potential contribution to the encystment of larvae onto fish travelling upstream to the Derreen River.

5.1.4.4 Mortality Risk

Without mitigation, the loss of the species from the extent of the works area during construction is likely to be total. This would not be reversible without mitigation.

The overall significance of the construction impacts without mitigation would be negative.

5.1.4.5 Overall Impact on Conservation Objectives

The status of the freshwater pearl mussel (Margaritifera margaritifera) as a qualifying Annex II species for the Slaney River Valley SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species. Tentative conservation objectives are used for this assessment in the absence of extent of designation and site specific conservation objectives are considered for the designated sub-population of mussels in the Derreen River. They are taken from the site-specific conservation objectives of the Owenriff River Margaritifera population and are considered to be appropriate for the Derreen population.

The distribution of the species outside the area designated for Margaritifera will have a net loss in extent from the lowest part of their distribution in the Slaney Catchment, and without mitigation there would also be a net loss in adult mussel numbers and any contribution of larvae they produce that attach to fish travelling upstream into the Derreen River. None of the population size, structure, habitat, water or substratum quality is currently sufficient for the sustainable recruitment of new generations of Margaritifera.

Margaritifera margaritifera (Freshwater pearl mussel) [1029] (From Owenriff River www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000297.pdf)			
Distribution	Kilometres	Restore appropriate distribution.	No effect
Population size	Numbers	Restore appropriate population number.	
Population structure: recruitment	Percentage per class size	Restore to at least 20% of each population no more than 65mm in length; and at least 5% of each population no more than 30mm in length.	No effect
Population structure: adult mortality	Percentage positive survey sites	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution.	No effect
Suitable habitat: Extent	Kilometres	Restore as appropriate.	No effect
Suitable habitat: Condition	Kilometres	Restore condition of suitable habitat.	No effect
Water quality: macroinvertebrate and phytobenthos (diatoms)	EQR	Water quality - macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93.	No effect
Substratum quality:	Percentage	Substratum quality - filamentous algae: absent or trace (less than 5%);	No effect

Margaritifera margaritifera (Freshwater pearl mussel) [1029] (From Owenriff River www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000297.pdf)			
filamentous algae (macroalgae); macrophytes (rooted higher plants)		macrophytes: absent or trace (less than 5%).	
Substratum quality: Sediment	Occurrence	Substratum quality - stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment.	No effect
Substratum quality: Oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate.	No effect
Hydrological regime: flow variability	Metres per second	Maintain appropriate hydrological regime.	No effect
Host Fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae.	No effect
Fringing habitat: area and condition	Hectares	Restore the area and condition of fringing habitats necessary to support the population.	No effect
Barriers to connectivity	Number	No significant increase.	Genetic connectivity: Potential loss of fish with Slaney larvae moving up to Derreen

5.1.5 Sea lamprey

5.1.5.1 Physical Removal of Habitat

Extensive areas of juvenile lamprey habitat occur within the footprint of the proposed scheme. The main areas of habitat are upstream of the railway bridge. This habitat occurs at the sides of the river and also in the silty areas on the bed of the river. Sea Lamprey ammocoetes in particular will use the deeper areas. Lamprey ammocoetes are also present in the areas downstream of the railway bridge, but habitats here are sub-optimal. Suitable Sea lamprey spawning habitat also occurs immediately upstream of the railway bridge and in the upper area of the scheme at the island.

All the lamprey nursery and spawning habitat will be potentially removed as part of the proposed scheme. During the operation of the scheme, maintenance works at the sediment trap in the northern floodplain expected to be required approximately every 5 years, will result in the removal of lamprey nursey habitat. Indeed, it will be these very areas (silt deposits) which will be targeted by during the maintenance works. The proposal includes the creation of angling pools which have the potential to create suitable spawning habitat for Sea lamprey and therefore could be a positive impact.

5.1.5.2 Disturbance of Spawning Sites

Dredging will potentially include disturbance of spawning lampreys. Sea Lampreys were not recorded spawning within the footprint of the proposed scheme during the 2017 survey, but they

have spawned here in the past and could potentially do so again. Sea Lampreys can spawn as late as July so will not be protected by the statutory close season for instream works. Dredging works will also result in the mobilisation and deposition of river silts that may choke spawning gravels further downstream. The proposal includes the creation of angling pools which have the potential to create suitable spawning habitat for Sea lamprey and therefore could be a positive impact.

5.1.5.3 Physical Removal of Ammocoetes

Any Sea Lamprey ammocoetes living within the sediment of the river bed will be directly removed from the aquatic habitat during of the dredging process. This will result in direct species loss in the absence of mitigation. Due to the extent of instream works proposed there will be significant impacts on the lamprey populations within the footprint of the scheme. No Sea Lamprey ammocoetes were recorded during the 2017 survey; but they may be present within the footprint of the scheme at very low densities. Sea lamprey ammocoetes show a preference for deeper areas, and these could not be surveyed effectively. Lamprey translocation and salvage operations are not fully successful in relation to moving juvenile lampreys.

Lamprey ammocoetes are also very susceptible to injury (i.e. crushing) by using heavy machinery and impermeable barrier in the river.

5.1.5.4 Entrapment

Even after an ammocoete translocation/salvage operation, ammocoetes could potentially get trapped again behind the impermeable barrier if the piles were overtopped in a flood event. Adult lampreys could also get trapped behind the impermeable barrier required for the works.

5.1.5.5 Water Quality

Dredging will have an impact on water quality, involving the re-suspension of sediment. There is also the potential for other pollution, for example fuel/oil spillages from machinery. Adult and juvenile lampreys are likely to be affected by sedimentation and re-suspension, increases in turbidity and contamination.

As ammocoetes live in the substrate, sediment conditions are crucial to their success. Ammocoetes are not found in anoxic sediments, so maintaining suitable instream flows, reducing nutrient inputs, and limiting excess algal growth are critical to maintaining healthy ammocoete populations. Spawning sites of lampreys are very vulnerable to sedimentation and other water quality impacts which will impact on deposited ova.

Operations associated with the proposed development including river widening, dredging, and works to raise floodwalls adjacent to the river. These activities will all give rise to the re-suspension of silt and soil into the river. Increases in suspended sediment in a river can cause stress and affect the gills of fish, as well as cover important spawning gravels. Ammocetes burrowed into river silt will be very vulnerable to this impact. The insertion and removal of impermeable barrier can contribute to increased sediment entering the waterbody, as can bank destabilisation. Using an impermeable barrier (i.e. piling) and working in the dry will reduce the impacts but it will not be possible to control this type of pollution fully when working in a river.

The digging of sediment will result in increased levels of suspended sediments and the potential for associated dissolved oxygen reduction and release of natural and industrially-derived chemicals (Lasalle, 1990). Also, the fact that the dredging process often releases chemicals residing in benthic substrates will result in further water quality issues. The release of nutrients as a result of re-suspension can result in behavioural/physiological responses to enrichment (e.g. algal blooms). It can also result in high Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) levels which in turn affect species living in the aquatic environment. Fine particles re-suspended during the

dredging process can remain in the water column for many hours due to their low settling velocity (CEFAS, 2010).

The works which include excavation and re-grading will most likely result in the release of sediment into the water column, thus forming a sediment plume and affecting water quality in terms of suspended sediment concentrations and associated effects on the water's turbidity and transparency. While in-river works are temporary, they may still result in sediment plumes within the water column. Therefore, in the absence of mitigation, there will be direct negative impacts on water quality and significant indirect impacts on local aquatic life.

The release of sediment will result in an increase in turbidity within the aquatic environment. This can reduce light penetration and affect species living in the river. Natural processes that occur within a river system depend on light penetration to complete these processes, and when the river is contaminated with increased sediment, these processes are unable to occur. Turbidity can also affect fish migrating upstream, with a suspended solids plume potentially acting as a migration barrier. Increased turbidity can reduce food supply and feeding successes for lamprey ammocoetes in their burrows. Significant increases in water turbidity for long periods of time are likely to cause adverse effects on many aquatic organisms through reduced light attenuation through the water column, re-suspended silts and sediments could also increase BOD/COD resulting in reduced dissolved oxygen levels. The re-suspension of sediment will also cover suitable spawning areas. The effects described above can be significantly reduced by effectively managing the amount of silt entering the river. In the current case this will be achieved by working in the 'dry' behind an impermeable barrier and by implementing proven sediment and pollution control techniques, and an instream construction monitoring protocol developed as part of the Construction Environmental Management Plan (CEMP). This is likely to significantly reduce siltation, but it will not be possible to fully mitigate this impact.

Construction works could result in spillages and leakages entering the watercourse. Spills of construction materials may include concrete and cement, and leaks from construction equipment may include fuel, oil and lubricant. As machinery will be entering the river, even in the dry and behind impermeable barrier, there is a high potential for oil and fuel spillages to arise. Pollution prevention techniques to isolate, contain and clean-up any spillages or leakages will be applied in the occurrence of any such pollution event, as developed in the CEMP. Machinery operating within the aquatic environment, which is comprised of metal, can also contribute to heavy metals contaminating the river bed. This toxic contaminant becomes absorbed on and to re-suspended particles may partition to the water column and be transported distances downstream in dissolved form along with dissolved contaminants in the released pore water.

The construction process poses a potential risk to water quality in the area and further downstream. Any accidental spillage of construction materials could potentially affect water quality and, indirectly, the species present in the river. The significance of a pollution event due to an accidental spillage of construction materials is dependent on the materials involved, the scale of the spillage, the type of pollutants spilled, as well as the current levels of those pollutants already present within the watercourse.

The widening of the river and re-grading of lengths of the riverbed could result in the re-mobilisation of potentially contaminated material. However, it is noted that Ground Investigation (GI) testing did not note any substantial contaminated material in the channel. Chemically-contaminated material released during the reflooding of the works area could result in significant negative effects to the health of faunal species of all kinds within the river.

The risk of a significant spill and/or leak can be minimised by following standard good practice with regard to pollution prevention as part of the appointed contractor's CEMP. Providing that pollution prevention guidelines are adhered to any risk of accidental spillages can be minimised and should result in no impact.

5.1.5.6 Migration barriers

Migrating lampreys could potentially become trapped behind an impermeable barrier (i.e. sheet piling) during the construction phase. The piling works will also increase flow velocities and narrow the river channel while works are taking place. Although works will be undertaken during the summer months when flows are low, during flood conditions velocities will be increased on the opposite side of the river to the barrier. However, flood conditions during the summer months would be infrequent and short-term as noted in Chapter 7 of the EIAR 'Hydrology'. Turbidity can also affect fish migrating upstream, with a suspended solids plume potentially acting as a migration barrier.

Downstream migrating juvenile lamprey (macrophthalmia) at the end of the summer will also very vulnerable to impacts. All the juvenile lamprey migrating downstream to the estuary from elsewhere in the Slaney catchment will encounter the barrier of the construction works and therefore will be susceptible to impacts.

5.1.5.7 Hydromorphology changes

As dredging results in changes in channel shape and dimensions, this can also affect hydrodynamics and sediment regimes. The hydromorphology of the river changes, in relation to the processes of erosion and deposition of sediment and the way the river flows. Pools, riffles and glides within the river are also changed as a result of this process. Changes in flow and channel characteristics will alter the structure of the river and influence how dynamic lamprey habitats will recover. The creation of angling pools has the potential to create suitable spawning habitat for Sea lamprey and therefore would be a positive impact.

5.1.5.8 Noise and vibration

All fish can be affected by the underwater dredging sounds. The ways in which fish can be affected include behavioural responses, masking, stress and physiological responses, hearing loss and damage to auditory tissues, structural and cellular damage of non-auditory tissues and total mortality, impairment of lateral line functions and particle motion-based effects on eggs and larvae. This will however be a localised effect and the impact will be reduced by working outside of the times when fish are spawning. Lampreys will be less vulnerable to this impact than teleost fish (e.g. salmon).

5.1.5.9 Overall Impact on Conservation Objectives

Petromyzon marinus (Sea Lamprey) [1095]		
Distribution: extent of anadromy	% of river accessible	During the construction works, the percentage of the river accessible to lampreys will be reduced and works in the river could act as a barrier to migration. However, as the works will take place on one side of the river at a time, with the river flowing normally on the adjacent side, the impact is not considered to be at an extent that would substantially reduce the percentage of river accessible for migration.

Petromyzon marinus (Sea Lamprey) [1095]		
		Although works will be undertaken during the summer months when flows are low, during flood conditions velocities will be increased on the opposite side of the river to the impermeable barrier, However, flood conditions during the summer months would be infrequent and short-term as noted in Chapter 7 of the EIAR 'Hydrology'. These works will be relatively short-term, and following completion of construction, the percentage of river accessible will return to its original status. The footprint of the proposed scheme is also a minor percentage of the entire SAC, with Sea Lamprey having access as far upstream as Clohamon Weir. It is also noted that no evidence of Sea Lamprey spawning was found during the current survey.
Population structure of juveniles	Number of age/size groups	With a reduction of spawning habitat area by dredging, and works acting as a barrier to migration further upstream, this may impact juvenile Sea Lamprey production. However, no evidence of Sea lampreys spawning was found during current surveys. It is noted in Chapter 7 of the EIAR 'Hydrology' that the works will be undertaken in the summer months when flows are low, and although during flood conditions velocities on the opposite side of the river to the impermeable barrier will be increased, these conditions would be infrequent and short-term – therefore would be unlikely to create a barrier effect to migration that would affect the integrity of the SAC population.
Juvenile density in fine sediment	Juveniles/m²	With a reduction of spawning habitat area by dredging, and works potentially acting as a barrier to migration further upstream, this will impact juvenile Sea Lamprey production. No evidence of Sea lamprey spawning was found during current surveys and according to the Hydrology chapter of the EIAR, flows will be low in the summer months when the works are undertaken, and although during flood conditions velocities on the opposite side of the river to the impermeable barrier will be increased, these conditions would be infrequent and short-term – therefore would be unlikely to create a barrier effect to migration that would affect the integrity of the SAC population. Physical habitat removal

Petromyzon marinus (Sea Lamprey) [1095]		
		by dredging will also result in physical removal of juvenile Sea Lampreys in fine sediment in this section of the river channel. The footprint of the scheme is a very minor percentage of the entire SAC and therefore the reduction of juvenile density in the fine sediment within this small area would not be at a level that would affect the integrity of the SAC population
Extent and distribution of spawning habitat	m² and occurrence	Dredging will result in direct removal of spawning habitat, therefore reducing the m².
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	Physical habitat removal by dredging will result in physical removal of juvenile Sea Lamprey habitat in this section of the river channel. The footprint of the scheme, and therefore the area of available juvenile habitat affected, is a very minor percentage of the entire SAC juvenile lamprey habitat, and therefore would not affect the integrity of the SAC population

5.1.6 Brook lamprey (Lamptera planeri) [1096]

5.1.6.1 Physical removal of habitat

This will be the same as Sea Lamprey as described in sections above. Brook lampreys were recorded in the 2016 survey and a substantial population of larvae is thought to be present within the footprint of the proposed scheme.

5.1.6.2 Disturbance of spawning sites

This will be the same as Sea Lamprey as described in sections above. Brook lampreys were recorded spawning in the affected area during the 2016 survey.

5.1.6.3 Physical removal of ammocoetes

This will be the same as Sea Lamprey as described in sections above. Brook lampreys were recorded in the 2016 survey and a substantial population of larvae is thought to be present within the footprint of the proposed scheme.

5.1.6.4 Water quality

This will be the same as Sea Lamprey as described in sections above.

5.1.6.5 Migration barriers

This is a not a major issue for Brook lamprey as they are generally non-migratory.

5.1.6.6 Changes in flow regimes

This will be the same as Sea Lamprey as described in sections above.

5.1.6.7 Overall Impact on Conservation Objectives

Lampetra planeri (Brook Lamprey) [1096]		
Distribution	% of river accessible	During the construction works, the percentage of the river accessible to lampreys will be reduced. However, as the works will take place on one side of the river at a time, with the river flowing normally on the adjacent side, the impact is not considered to be at an extent that would substantially reduce the percentage of river accessible to Brook lampreys. Additionally, Brook lampreys are non-migratory. The scheme will not affect the upstream populations of Brook lamprey in the SAC or their distribution. The potential barrier effect will be unlikely to affect Brook lampreys. The direct footprint of the scheme and potential downstream populations of Brook lamprey that may be affected are still a very minor percentage of the distribution of lamprey in the entire SAC and catchment. Therefore, there is no potential for integrity level impacts on the distribution of Brook lampreys within the SAC. The works will also be relatively short-term, and following completion of construction, the percentage of the river accessible will return to its original status.
Population structure of juveniles	Number of age/size groups	With a reduction of spawning habitat area by dredging, this will impact juvenile Brook Lamprey production. However, the area of spawning habitat affected by the footprint of the scheme is a very minor percentage of the total available spawning habitat for Brook lampreys within the SAC. This impact would not affect the population structure of brook lamprey juveniles in the entire SAC population and therefore would not impact the integrity of the SAC.
Juvenile density in fine sediment	Juveniles/m²	With a reduction of spawning habitat area by dredging, this will impact juvenile Brook Lamprey production. Physical habitat removal by dredging will also result in physical removal of juvenile Brook Lampreys in fine sediment in this section of the river channel. However, the footprint of the scheme is a very minor percentage of the entire SAC and therefore the reduction of juvenile brook lamprey density in the fine sediment within this small area would not be

Lampetra planeri (Brook Lamprey) [1096]		
		at a level that would affect the integrity of the SAC population.
Extent and distribution of spawning habitat	m² and occurrence	Dredging will result in direct removal of spawning habitat, therefore reducing the area and occurrence. This habitat will redevelop following completion of the dredging works. Additionally, the footprint of the scheme is a very minor percentage of the entire SAC, therefore the extent of spawning habitat loss will be minor and will not affect the integrity of the SAC population.
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	Physical habitat removal by dredging will result in physical removal of juvenile Brook Lamprey habitat in this section of the river channel. The footprint of the scheme, and therefore the area of available juvenile habitat affected, is a very minor percentage of the entire SAC juvenile lamprey habitat, and therefore would not affect the integrity of the SAC population.

5.1.7 River lamprey (Lampetra fluviatilis) [1099]

5.1.7.1 Physical removal of habitat

This will be the same as Sea Lamprey as described in sections above. River lampreys were recorded in the 2016 survey and a substantial population of larvae is thought to be present within the footprint of the proposed scheme. River lampreys are the dominant lamprey species in the scheme area.

5.1.7.2 Disturbance of spawning sites

This will be the same as Sea Lamprey as described in sections above. Large numbers of River lampreys were recorded spawning in the affected area during the 2016 survey. They were only recorded spawning upstream of the railway bridge.

5.1.7.3 Physical removal of ammocoetes

This will be the same as Sea Lamprey as described in sections above. Brook lampreys were recorded in the 2016 survey and a substantial population of larvae is thought to be present within the footprint of the proposed scheme.

5.1.7.4 Water quality

This will be the same as Sea Lamprey as described in sections above.

5.1.7.5 Migration barriers

This will be the same as Sea Lamprey as described in sections above.

5.1.7.6 Changes in flow regimes

This will be the same as Sea Lamprey as described in sections above.

5.1.7.7 Overall Impact on Conservation Objectives

Lampetra fluviatilis (River Lamprey) [1099]		
Distribution: extent of anadromy	% of river accessible	During the construction works, the percentage of the river accessible to lamprey will be reduced and works in the river could act as a barrier to migration. However, as the works will take place on one side of the river at a time, with the river flowing normally on the adjacent side, the impact is not considered to be at an extent that would substantially reduce the percentage of river accessible for migration. Although works will be undertaken during the summer months when flows are low, during flood conditions velocities will be increased on the opposite side of the river to the impermeable barrier, However, flood conditions during the summer months would be infrequent and short-term as noted in Chapter 7 of the EIAR 'Hydrology'. These works will be relatively short-term, and following completion of construction, the percentage of river accessible will return to its original status. The footprint of the scheme is also a minor percentage of the entire SAC, with River lampreys having access as far upstream as Clohamon weir. Water quality pollution occurring downstream in the estuary as a result of the works could also impact migration, although if mitigation measures to protect water quality are adhered to this impact would not be significant or at a level that could affect the integrity of the SAC population.
Population structure of juveniles	Number of age/size groups	With a reduction of spawning habitat area by dredging, and works acting as a barrier to migration further upstream, this will impact juvenile River Lamprey production. It is noted in Chapter 7 of the EIAR 'Hydrology' that the works will be undertaken in the summer months when flows are low, and although during flood conditions velocities on the opposite side of the river to the impermeable barrier will be increased, these conditions would be infrequent and short-term – therefore would be unlikely to create a barrier effect to migration. Again, water quality pollution occurring downstream in the estuary as a result of the works could also impact migration, although if mitigation measures to protect water quality are

		adhered to this impact would not be significant or at a level that could affect the integrity of the SAC population. Additionally, the area of spawning habitat affected is a very minor percentage in the context of the total available spawning habitat within the entire SAC and therefore would not affect the integrity of the SAC population. River lampreys could also get trapped behind the impermeable barrier which would also affect the percentage of river accessible to lampreys. If method statements and mitigation measures are adhered to this is unlikely to be a significant impact and would not affect the integrity of the SAC.
Juvenile density in fine sediment	Juveniles/m²	With a reduction of spawning habitat area by dredging, and works potentially acting as a barrier to migration further upstream, this will impact juvenile River Lamprey production. According to the Hydrology Chapter of the EIAR, flows will be low in the summer months when the works are undertaken, and although during flood conditions velocities on the opposite side of the river to the impermeable barrier will be increased, these conditions would be infrequent and short-term – therefore would be unlikely to create a barrier effect to migration that would affect the integrity of the SAC population. Water quality pollution occurring downstream in the estuary as a result of the works could also impact migration, although if mitigation measures to protect water quality are adhered to this impact would not be significant or at a level that could affect the integrity of the SAC population. River lampreys could also get trapped behind the impermeable barrier, which would also affect juvenile density by acting as a barrier to migration. If method statements and mitigation measures are adhered to this is unlikely to be a significant impact and would not affect the integrity of the SAC. Physical habitat removal by dredging will also result in physical removal of juvenile River Lampreys in fine sediment in this section of the river channel. The footprint of the scheme is a very minor percentage of the entire SAC and therefore the reduction of juvenile density in the fine sediment within this small area would not be

		at a level that would affect the integrity of the SAC population.
Extent and distribution of spawning habitat	m² and occurrence	Dredging will result in direct removal of spawning habitat, therefore reducing the area. This habitat will likely redevelop following the dredging works. Additionally, the footprint of the scheme is a very minor percentage of the entire SAC; therefore, the extent of spawning habitat loss will be minor and will not affect the integrity of the SAC population.
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	Physical habitat removal by dredging will result in physical removal of juvenile River Lamprey habitat in this section of the river channel. The footprint of the scheme, and therefore the area of available juvenile habitat affected, is a very minor percentage of the entire SAC juvenile lamprey habitat, and therefore would not affect the integrity of the SAC population.

5.1.8 Twaite shad (Alosa fallax fallax) [1103]

5.1.8.1 Physical removal of habitat

It is not clear if Twaite Shad regularly occur in the River Slaney anymore. During a fish salvage operation in the tailrace of Clohamon hydroelectric scheme in 2016, one specimen was found. However, this appears to be the only recent record as none were recorded during the 2017 survey. If they still occur, it is likely that they migrate further up the River Slaney to spawn – with unhindered access and better potential spawning areas all the way up to Clohamon.

5.1.8.2 Disturbance of spawning sites

It is unlikely that Twaite Shad spawn in the proposed scheme area.

5.1.8.3 Entrapment

Adult shad migrating upstream could potentially get trapped when the impermeable barrier is being installed.

5.1.8.4 Water quality

Water quality impacts from dredging could affect all species and could have indirect effects a significant distance downstream from the scheme affecting Shad living in the estuary.

5.1.8.5 Migration barriers

This will be the same as Sea Lampreys as described in sections above.

5.1.8.6 Overall Impact on Conservation Objectives

Alosa fallax fallax (Twaite Shad) [1103]		
Distribution: extent of anadromy	% of river accessible	During the construction works, the percentage of the river accessible to Twaite Shad will be reduced and works in the river

		could act as a barrier to migration. However, as the works will take place on one side of the river at a time, with the river flowing normally on the adjacent side, the impact is not considered to be at an extent that would substantially reduce the percentage of river accessible for migration. Although works will be undertaken during the summer months when flows are low, during flood conditions velocities will be increased on the opposite side of the river to the impermeable barrier, However, flood conditions during the summer months would be infrequent and short-term as noted in Chapter 7 of the EIAR 'Hydrology'. These works will be relatively short-term, and following completion of construction, the percentage of river accessible will return to its original status. It is also noted that it is not clear if twaite shad occur in the River Slaney anymore.
Population structure- age classes	Number of age classes	Twaite Shad could be affected by a reduction in spawning habitat area, which would mean a reduction in Twaite Shad production. However, Twaite Shad are considered unlikely to be affected by this, as even if they occur in low numbers in the Slaney, they would have free access up as far as Clohamon Weir so could spawn anywhere along this stretch. The footprint of the scheme is a very minor percentage of the spawning habitat that would be available to twaite shad if they are present here. This impact is not considered to have the potential to be significant.
Extent and distribution of spawning habitat	m^2 and occurrence	Twaite Shad could be affected by a reduction in spawning habitat; however, this is considered to be unlikely as even if they occur in low numbers in the Slaney, they would have unhindered access up as far as Clohamon weir so could spawn anywhere along this stretch. Although this impact is not considered to have the potential to be significant, the area and occurrence of spawning habitat could be reduced by dredging. However, this would be temporary as the spawning habitat would redevelop here following the completion of the dredging works.
Water quality- oxygen levels	Milligrams per litre	Water quality impacts from dredging such as siltation could result in a reduction in oxygen levels. Provided water quality mitigation

		measures are strictly adhered to, this impact would not be at a level that would affect oxygen levels significantly or affect the integrity of the SAC population.
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Occurrence	Water quality impacts arising from the dredging process could impact on spawning habitat quality either at the site or a significant distance downstream.

5.1.9 Salmon (Salmo salar) [1106]

5.1.9.1 Physical removal of habitat

Juvenile salmon are present throughout the scheme area and the dredging will result in the loss of their habitat. However, the habitats are sub-optimal and no Young-of-the-year (YOY) salmon were found during the 2017 survey. Potential salmon spawning habitat is present upstream of the railway bridge, and also at the island at the upper end of the scheme. Adult salmon using the scheme area and were observed during the 2017 survey.

The proposal also includes the creation of 5 no. angling pools. This would create suitable resting habitat for Salmon in the urban area of Enniscorthy which currently does not exist. However, this would also open up the species to angling impacts (adults) and predation from birds (smolts).

5.1.9.2 Disturbance of spawning sites

The scheme footprint is not an important salmon spawning area and works will take place outside the salmon spawning season. Therefore, disturbance of salmon spawning sites will not be significant. Salmon use almost the entire River Slaney catchment.

5.1.9.3 Entrapment

Adult salmon and juvenile salmon are likely to become trapped behind the impermeable barrier during the construction works.

5.1.9.4 Water quality

Water quality impacts from dredging could affect all species, including salmon which are very sensitive to siltation and other pollution form dredging works.

5.1.9.5 Migration barriers

This will be the same as Sea Lampreys as described in sections above.

5.1.9.6 Changes in flow regimes

As dredging results in changes in channel shape and dimensions, this can also affect hydrodynamics and sediment deposition regimes. The hydromorphology of the river changes, in relation to the processes of erosion and deposition of sediment and the way the river flows. Pools, riffles and glides within the river are also changed as a result of this process. Changes in flow and channel characteristics can alter the structure of aquatic plant communities that recolonise. The creation of angling pools which would create suitable resting habitat for Salmon. However, it would also give rise to angling pressures and increased predation.

5.1.9.7 Noise and vibration

Fish can be affected by underwater dredging sounds. The ways in which fish can be affected include behavioural responses, masking, stress and physiological responses, hearing loss and damage to auditory tissues, structural and cellular damage of non-auditory tissues and total mortality, impairment of lateral line functions and particle motion-based effects on eggs and larvae. This will however be a localised effect and the impact will be reduced by working outside of the times when fish are spawning.

5.1.9.8 Overall Impact on Conservation Objectives

Salmo salar (Salmon) [1106]		
Distribution: extent of anadromy	% of river accessible	During the construction works, the percentage of the river accessible to Atlantic Salmon will be reduced and works in the river could act as a barrier to migration. However, as the works will take place on one side of the river at a time, with the river flowing normally on the adjacent side, the impact is not considered to be at an extent that would substantially reduce the percentage of river accessible for migration. Although works will be undertaken during the summer months when flows are low, during flood conditions velocities will be increased on the opposite side of the river to the impermeable barrier. However, flood conditions during the summer months would be infrequent and short-term as noted in Chapter 7 of the EIAR 'Hydrology'. These works will be relatively short-term, and following completion of construction, the percentage of river accessible will return to its original status.
Adult spawning fish	Number	With a reduction of spawning habitat area by dredging, and works potentially acting as a barrier to migration further upstream, this will impact the numbers of adult spawning fish. However, the area of spawning habitat affected by the footprint of the scheme is a very minor percentage of the total available spawning habitat for Salmon within the SAC. This impact would not significantly affect the numbers of adult spawning fish and therefore would not affect the integrity of the SAC. Again, the works will be undertaken in the summer months when flows are low, and although velocities will be increased on the opposite side of the river to the impermeable barrier during flood events potentially creating a barrier to migration upstream, the Hydrology Chapter of the EIAR

Salmo salar (Salmon) [1106]		
		noted that this would be infrequent and short term.
Salmon fry abundance	Number of fry/5 minutes electrofishing	With a reduction of spawning habitat area by dredging, and works potentially acting as a barrier to migration further upstream, this will impact salmon production and therefore salmon fry abundance. However, the area of spawning habitat affected by the footprint of the scheme is a very minor percentage of the total available spawning habitat for Salmon within the SAC. This impact would not significantly affect the salmon fry abundance and therefore would not affect the integrity of the SAC. Again, the works will be undertaken in the summer months when flows are low, and although velocities will be increased on the opposite side of the river to the impermeable barrier during flood events potentially creating a barrier to migration upstream, the Hydrology Chapter of the EIAR noted that this would be infrequent and short term.
Out-migrating smolt abundance	Number	With a reduction of spawning habitat area by dredging, and potentially works acting as a barrier to migration further upstream, this will impact salmon production and therefore out-migrating smolt abundance. However, the area of spawning habitat affected by the footprint of the scheme is a very minor percentage of the total available spawning habitat for Salmon within the SAC. This impact would not significantly affect the numbers of out-migrating smolts and therefore would not affect the integrity of the SAC. Again, the works will be undertaken in the summer months when flows are low, and although velocities will be increased on the opposite side of the river to the impermeable barrier during flood events potentially creating a barrier to migration upstream, the Hydrology Chapter of the EIAR noted that this would be infrequent and short term.
Number and distribution of redds	Number and occurrence	Dredging will involve direct removal of spawning habitat at this site on the River Slaney and therefore will potentially affect the number and distribution of redds. However, the area of spawning habitat affect by the footprint of the scheme is a very

Salmo salar (Salmon) [1106]		
		minor percentage of the total available spawning habitat for salmon within the SAC. Additionally, the spawning habitat will redevelop following completion of the dredging works.
Water quality	EPA Q Value	Water quality impacts from dredging such as siltation could result in lower EPA Q Values for the River Slaney. Provided mitigation measures for water quality protection are adhered to, water quality impacts arising from the scheme would be minor and short-term and not at an integrity level.

5.1.10 Otter (Lutra lutra) [1355]

The overall assessment of otter population in Ireland is "favourable" this status accounts for assessment of range, population, habitat and future prospects (NPWS 2013b). The conservation objective for otter is to restore the favourable conservation condition of otter in the Slaney River Valley SAC, which is defined by the list of attributes and targets in Table 7. The attributes and targets of SSCOs that the proposed scheme has the potential to adversely affect are; distribution, extent of terrestrial habitat (i.e. river bank) or freshwater (river) habitat, couching sites and holts, fish biomass available, and barriers to connectivity.

5.1.10.1 Disturbance/Displacement

Signs of otter were recorded throughout the scheme. The proposed scheme has the potential to temporarily impact the distribution of otter within the scheme extent during construction works arising from associated disturbance and displacement. It is possible that otter would avoid the scheme extent during periods of high construction activity when disturbance is greatest and would continue to use the scheme area during periods of low activity. Otter are crepuscular mammals meaning activity peaks at dawn and dusk, times of day which coincide with low construction activity and disturbance. Therefore, although the construction works will temporarily alter otter distribution within the scheme area, they will not avoid the entire scheme during the construction period. Otter currently occupy the stretch of the River Slaney within Enniscorthy town and are exposed to current levels of disturbance, these baseline disturbance conditions are expected to return post-construction. Disturbance occurring during sporadic maintenance works carried out post-construction when required at the silt deposition trap and debris trap in the north of the scheme, will not be of such magnitude to cause a change in the distribution of otter within the River Slaney. Temporary alteration in otter distribution is possible during times of high disturbance, however a long-term change or decline in the distribution of otter within the scheme extent and wider River Slaney will not occur as a result of the proposed works.

5.1.10.2 Habitat Loss

Due to the nature of the proposed works and design of the scheme, a temporary change in the extent of freshwater (river) habitat and a temporary change in the extent of terrestrial habitat will occur, both listed as attributes of the conservation objective. The proposed scheme will result in the loss of 1.8ha of terrestrial river bank habitat as a result of the scheme's flood walls (this was calculated using the total length of flood walls, c. 1,824m, and assuming a 10m riparian buffer of a river bank considered as part of otter habitat (NPWS 2009)). Existing riparian habitat occurring within Enniscorthy town is of an urban and modified nature. Although otter field signs were recorded throughout the scheme area, the flood walls will result in the loss of modified riparian

habitat which is not considered to represent critical habitat for otters as it does not provide vegetative cover or opportunities for safe resting place, nor for breeding (NPWS, 2013b). Additionally, 1.8ha represents 0.4% of the total extent terrestrial river bank habitat within the SAC (453.4ha). Considering the above there will be no significant decline in the extent of terrestrial river bank habitat critical to otter within the Slaney River Valley SAC.

The scheme will not result in a long-term change in the extent of freshwater (river) habitat available to otter. The proposed instream works will temporarily reduce the river channel to half of its normal width within the scheme extent, however the width will be fully restored on the removal of the impermeable barrier (e.g. sheet piling). At worst case the total length of the scheme's instream works area, circa 2.9km in length, may become temporarily unavailable to otter due to disturbance associated with construction activities, however this is considered unlikely as otter are crepuscular mammals with peak activity at dawn and dusk, times of day which coincide with low construction activity and disturbance. The total length of the scheme represents c. 1% of 264.1km. A 1% temporary decline in the extent of freshwater (river) habitat within the River Slaney Valley SAC, during instream works carried out over a 4month period (July-October) in year 1 and year 2 of the construction phase, is not a permanent or significant decline.

The proposal includes the restoration of the back channel in the North Island which has the potential to create suitable semi-natural riparian habitat for otter and therefore could be a positive impact.

5.1.10.3 Loss of Resting Sites

Four potential holts and one couching (resting) site were recorded within the extent of the scheme. OH4 and the couching site both in the northern floodplain will be removed to accommodate the restored North Island back channel and silt deposition area and river widening. Activity was recorded intermittently at OH4 during the monitoring period with otter recorded on two occasions and no signs of otter evidence (spraint or prints) recorded in the vicinity. The couching site was considered active at the time of surveys as recent digging signs and otter prints were recorded at this location. An additional three potential holts (OH1, OH2 and OH3) and one couching site were identified south of the southern floodplain and will not be removed as a result of the scheme, although may be affected by disturbance during the construction phase.

Otters maintain a number of holts and couching sites within their territory and evidence has shown that they can use these on a transient basis (NPWS 2009), however are more likely to show faithful year-to-year use of breeding holts. OH4 is not considered to be a breeding holt due to the lack of otter activity recorded and absence of signs that would indicate a breeding site (Liles, 2003). The loss of one non-breeding holt, occasionally used over four months of monitoring, and one couching site within the extent of the scheme and in the context of the River Slaney otter population are not considered to result in a significant decline in number of couching sites and holts within the River Slaney Valley SAC.

The proposal includes the restoration of the back channel in the North Island which has the potential to create semi-natural riparian habitat suitable for otter holts and therefore could have a positive impact.

5.1.10.4 Prey Availability

Instream works associated with the scheme have the potential to cause a temporary decline in fish (prey) biomass available to otter. Instream dry works areas, dredging works and siltation within and downstream of the scheme extent have the potential to temporarily affect fish stocks reducing the available food source for otter. Otter are predominantly piscivorous feeding on salmonids (salmon and trout) and to a lesser extent smaller fish species such as stickleback and will also forage on other prey items such as amphibians and invertebrates. The scheme's instream works although are expected to cause a temporary decline in the available prey biomass, when considering the entirety

of the River Slaney Valley SAC this temporary decline is not expected to cause a significant effect in the available fish biomass available.

5.1.10.5 Habitat Severance/Barrier Effect

The proposed works will not create a barrier effect within the main channel of the River Slaney. Instream dry working areas will utilise at maximum half of the main channel width for a maximum length of c. 1.2km at any one time. At no point will a physical barrier be installed to impede movement of otter upstream or downstream of the scheme extent. The dry works areas will not block any connectivity to tributaries of the River Slaney. Where installed they will limit connectivity between the main channel and riparian/terrestrial habitat, although this restriction to riverbank habitat will be temporary and dry works areas will only be in place one side of the river channel at a time. Riparian/terrestrial habitat within Enniscorthy is largely urban and for a large part is not optimal for otter. The design of the scheme does include a debris trap, however this structure will not impede movement up or downstream of the River Slaney and consists of widely spaced poles to capture any large floating items within the main channel. It is therefore considered that the scheme and its works will not significantly increase barriers to connectivity within the River Slaney.

5.1.10.6 Overall Impact on Conservation Objectives

Lutra lutra (Otter) [1355] (Restore the favourable conservation condition)		
Distribution	Percentage positive survey sites	Temporary change in distribution within the extent of the scheme is possible due to disturbance, however otter activity peaks at dawn and dusk during times of low construction activity, and otter occupying Enniscorthy area are exposed to existing levels of disturbance. No significant decline in distribution is expected as a result of the proposed scheme.
Extent of terrestrial habitat	Hectares	The proposed scheme will result in the loss of 1.8ha of urban river bank habitat, which represents 0.4% of the total 453.4ha extent of terrestrial river bank habitat within the SAC and due to its urban, modified nature is not considered to be critical to otter (NPWS, 2013b). There will be no significant decline in extent of terrestrial habitat.
Extent of marine habitat	Hectares	No significant decline.
Extent of freshwater (river) habitat	Kilometres	The instream works area will temporarily reduce the river channel to half of its width within the scheme extent, however the full width of the channel will be fully restored on completion of the proposed works and removal of impermeable barrier. There will be no significant decline in extent of freshwater (river) habitat.
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline.
Couching sites and	Number	One holt and one couch will be lost as a

Lutra lutra (Otter) [1355] (Restore the favourable conservation condition)		
holts		result of the proposed works.
Fish biomass available	Kilograms	Instream dry works areas, dredging works and siltation within and downstream of the scheme extent have the potential to temporarily affect fish biomass available as prey for otter. However, when considering the entirety of the River Slaney Valley SAC, the scheme's instream works although expected to cause a temporary decline in the available fish biomass, this temporary effect is not expected to cause a significant decline.
Barriers to connectivity	Number	The proposed instream works will not create a barrier effect within the main channel. The Instream dry works area will utilise half of the main channel width for a maximum length of c. 1.2km at any one time. At no point will a physical barrier be installed to impede movement of otter upstream or downstream of the scheme extent. The dry works areas will not block any connectivity to tributaries of the River Slaney. The scheme design does include a debris trap that will not impede movement up or downstream of its location. The proposed works or scheme will result in no significant increase.

5.2 WEXFORD HARBOUR AND SLOBS SPA

5.2.1 Overview of Potential Impacts on Waterbirds

Enniscorthy scheme area supports a high diversity of waterbird species, with a total of 25 species recorded including wintering, passage and resident breeding species. Waterbird species diversity compares favourably with other parts of Wexford Harbour and Slobs SPA, in which the North Slob is the only area supporting a higher diversity of waterbirds at 31 species. The key habitat features supporting these populations at Enniscorthy are the wetland habitats in the southern floodplain at the Bare Meadow Killagoley that are supported by tidal and fluvial flooding of the River Slaney. Duck and waders feed and roost overnight in the core wetland swamp habitat mosaic area, where a small area of standing water/Mesotrophic ponds was retained among exposed muddy banks and tall swamp vegetation throughout the baseline survey year, with daytime dispersion through wet grassland within the Bare Meadow, on the southern floodplain at Motabeg, and to river channel and river margin habitats throughout the scheme area, including the northern floodplain. This core wetland on the Bare Meadow is used as a roost throughout the year by Grey Herons, including adults, juveniles and fledglings. Twenty-three waterbird species were recorded at and in the immediate vicinity of this wetland area.

The proposed Enniscorthy Flood Defence Scheme involves a series of works in all parts of the scheme area, giving rise to potential impacts arising from different work elements in different areas at different times during the construction phase. Potential impacts arise principally from channel widening and dredging works, and from the construction and operation of the proposed new road bridge. These impacts will potentially affect wintering, passage and resident breeding species, some of which move within and use the entire scheme area, so that the same birds and populations will be subject to multiple potential impacts during the 3-year construction phase.

The natural raised edge of the southern floodplain parallel to the east bank will be removed during the construction of the compound channel. This higher ground provides visual screening to waterbirds on the Bare Meadow from human activity on the promenade, including construction activity in the river channel, and also from recreational activity such as boating and canoeing on the river, particularly in the hours around high tide when water levels are high.

The removal of the natural raised edge of the southern floodplain parallel to the east bank in the southern floodplain arising from channel widening works will change the characteristics of river bank overtopping as fluvial flood levels rise and fall, by reducing the flood impoundment provided by the existing raised edge, and will have a potential to reduce the duration of flooding in the Bare Meadow. There may be potential negative consequences for the existing waterbird diversity and peak numbers on the Bare Meadow in the absence of mitigation. Similarly, any excavation into the impermeable clay underlying the wetland habitats in the Bare Meadow has a potential to facilitate drainage, with negative long-term impacts of national significance on existing waterbird diversity and peak numbers on the Bare Meadow, in the absence of mitigation.

The Bare Meadow is currently grazed seasonally by horses. Seasonal grazing by horses at the current stocking densities is considered beneficial to waterbirds because is maintains a sward of varying height, tends to reduce Rush (Juncus spp.) cover, and provides significant, though not total, control of the invasive plant species Himalayan Balsam (Impatiens glandulifera). Exclusion of horse grazing during the construction and operational phases would allow a dense, tall vegetation to develop that would tend to exclude waterbirds, with negative impacts for waterbird species diversity and numbers.

Because there are existing footpaths and less formal walking routes along the western bank of the Slaney in both the northern and southern floodplain, there are existing disturbance impacts that affect the distribution of waterbirds using the scheme area, and waterbird feeding use of the river

corridor is concentrated along the eastern side of the river channel, where more extensive impacts on habitats will arise during construction.

The installation of dry working areas from mid channel to the channel margin to facilitate dredging, compound channel excavation, and channel realignment fill areas, is proposed to occur over a period of three years. An indiciative construction programme is provided in Section 2.2.2.

The following assessments assume that an impermeable barrier used to provide individual dry working areas will be installed immediately prior to works, and removed immediately on completion of works and re-watering in individual areas:

All potential impacts have been addressed by mitigation measures detailed in Section 6.

5.2.2 Grey Heron (Ardea cinerea) [A028] and other SCI waterbird species

5.2.2.1 Construction Impacts

Habitat degradation - hydrology (e.g. flow and flooding regime) on the southern floodplain

The existing ground level in the Bare Meadows ranges from 0.3-3.2mOD. The lowest point in the floodplain is in the centre, where there is standing water year-round, arising principally from tidal flooding via the existing channel along the eastern margin of the Bare Meadows. The ground level rises to the east and west from the centre of the floodplain. At the existing River Slaney bank the levels varies between 1.8m and 2.5mOD. The predicted flood level at the Bare Meadows for the existing scenario for the 1 in 1 flood year event at this floodplain is approximately 2.2mOD. When the water level in the River Slaney rises during a flood event, water flows back up the drainage channel into the Bare Meadows and floods out into the Bare Meadows outwards from the low point in the centre of the floodplain. An impermeable clay layer deposited in the Bare Meadow, that overlies alluvial sands and gravels, may arise from both tidal and fluvial flooding; the Bare Meadow effectively functions as a sediment trap, facilitated by the natural raised edge of the southern floodplain along the east bank of the Slaney.

Following the completion of works the predicted water levels in the Bare Meadows during a 1 in 1-year flood event will reduce by 40mm. This would equate in terms of the reduction in the width of the cross section that will be flooded in the Bare Meadows to approximately 1.5m out of the total wetted cross section length of approximately 200m. This is expected to be approximately 0.75% of the flood plain width.

Following the completion of the scheme the predicted 1 in 100-year flood event the flood levels are predicted to reach approximately 4.2m. That is post-works, the flood levels will be approximately 200mm lower in the Bare Meadows. At the lowest point of the Bare Meadows this would lower the depth of flooding from approximately 4.2m in the current scenario to 4.0m post works.

The removal of the natural raised edge of the southern floodplain arising from channel widening works will potentially change the characteristics of river bank overtopping as fluvial flood levels rise and fall, by reducing the flood impoundment provided by the existing natural raised edge of the southern floodplain, and will have a potential to reduce the duration of flooding in the Bare Meadow, with potential negative consequences for the existing waterbird diversity and peak numbers on the Bare Meadow in the absence of mitigation. Similarly, any excavation into the impermeable clay underlying the wetland habitats in the Bare Meadow has a potential to facilitate drainage, with negative long-term impacts of national significance on existing waterbird diversity and peak numbers on the Bare Meadow, in the absence of mitigation. Wexford Harbour and Slobs SPA SCI waterbird species potentially impacted by permanent displacement arising from habitat degradation of the core wetland habitat in the scheme area are as follows:

SCI species	Peak count numbers recorded using the core wetland area	Estimated percentage of SPA population supported by the core wetland habitat at the Bare Meadow
Grey Heron	21	75%
Wigeon	51	3%
Teal	174	13%
Mallard	58	5%
Lapwing	376	7%
Redshank	26	7%

All potential habitat degradation relating to hydrology impacts have been addressed by mitigation measures detailed in Section 6.

Dredging and compound channel works

It is anticipated that most waterbirds will be displaced from each of the three individual channel-widening and dredging working areas during construction, to be scheduled as indicated above. As river flows will be confined to 50% of the existing channel width within the individual working areas, water depth and velocity will increase, reducing the suitability of the river for feeding birds; more energy expenditure will be required for birds to maintain a feeding location and this will reduce foraging efficiency. Disturbance impacts also arise. The principal SCI waterbird species impacted are Grey Heron, Cormorant, Mallard, and Teal.

This proposed schedule is expected to result in partial displacement of waterbirds within the scheme area during channel widening and dredging works, while works are in progress in the three individual works areas. The full length of the Slaney River channel within the scheme area will be available to waterbirds from October to May in each year of the construction phase.

However, feeding opportunities for waterbirds will be limited initially and will depend on the successful establishment of suitable vegetation within the newly created compound channel, including the berm which will be subject to tidal flooding, and on recolonisation by fish prey taken by Grey Heron and Cormorant in the river channel.

There is some potential for reduced productivity in the Grey Heron breeding colony, since, if the birds remain and breed in the area at the existing nest sites during construction, they may have to travel further to feeding areas outside the scheme area until habitats recover, resulting in increased energy expenditure by foraging birds and potentially reduced frequency of provisioning of chicks. Less frequent attendance of adults at nests potentially increases predation risks to chicks. In the absence of mitigation, the impact is assessed as negative, temporary, and with a potential to reduce the population trend for this species within the SPA in the short term.

Disturbance/displacement, including Machinery movement and operation, and scheme design (fish pools and deflectors)

The key habitat features supporting waterbird populations in the scheme area are the wetland habitats in the southern floodplain at the Bare Meadow that are supported by tidal and fluvial flooding. Disturbance arising from the proposed works on and adjoining the southern floodplain has the potential to displace all waterbirds from the scheme area thus potentially reducing their distribution within the SPA, including the following regularly occurring waterbird species listed as qualifying SCI populations of Wexford Harbour and Slobs SPA:

- Cormorant
- Grey Heron

- Wigeon
- Teal
- Mallard
- Lapwing
- Redshank

The responses of waterbirds to various sources of anthropogenic disturbance have been studied in a number of different habitat contexts. Data have been recorded in relation of Alert Distance, at which waterbirds exhibit altered behaviour in response to an approaching perceived threat (ceasing to feed, alert 'head up' posture, vocalisation, etc.) and Escape Distance or Flight Initiation Distance, at which waterbirds either move away within the site or leave the site area. Responses to disturbance tend to be site-specific, and to vary with the species mix present, the body mass of individual species (smaller species tend to leave at a greater escape distance), and exposure of waterbirds to hunting. Manipulative experiments carried out by pedestrian observers who provided the source of the disturbance and measured escape distances showed species-specific responses in escape distances, including effects of body mass, flock size, flock composition, visibility of the stimulus to the birds and season (Bregnballe et al, 2009). Mean escape distances increased with the mean body mass recorded for each species, although Wigeon flushed at greater distances than expected for their size. Birds in mixed flocks of Mallard and Teal reacted at longer distances than those in single species flocks for either species. Grey Heron escape distances increased through the autumn.

In the Enniscorthy scheme area, escape distances were recorded where possible, during walk-over surveys. No site-specific escape distance data relating to operating machinery were recorded. While machinery can in some circumstances be less disturbing to birds than pedestrians/personnel on the ground, since both will be present during construction, it is considered appropriate to refer to waterbird escape distance to pedestrians recorded in the scheme area when assessing impacts and providing mitigation.

Grey Herons were the most frequently recorded, and observations were recorded throughout the year. Escape distances were observed to vary according to location within the scheme area. In the northern floodplain, Grey Herons feeding at the gravel bank located in the river between CH 6600 and 6700 left the area at escape distances of 120m to 150m. In the southern floodplain at the Bare Meadows, Grey Herons left roost sites at the core wetland area at escape distances of 50m to 90m, sometimes they moved within the Bare Meadow initially, and then left the area if the observer continued to approach directly. There was a single observation of 2 adult Grey Herons arriving to two separate nests in Scot's Pine trees to the east of the Bare Meadow with well grown chicks while 2 observers were present on the Bare Meadow at distances of approximately 50m and 150m from the nests; the adults attended the nests briefly and then left the area.

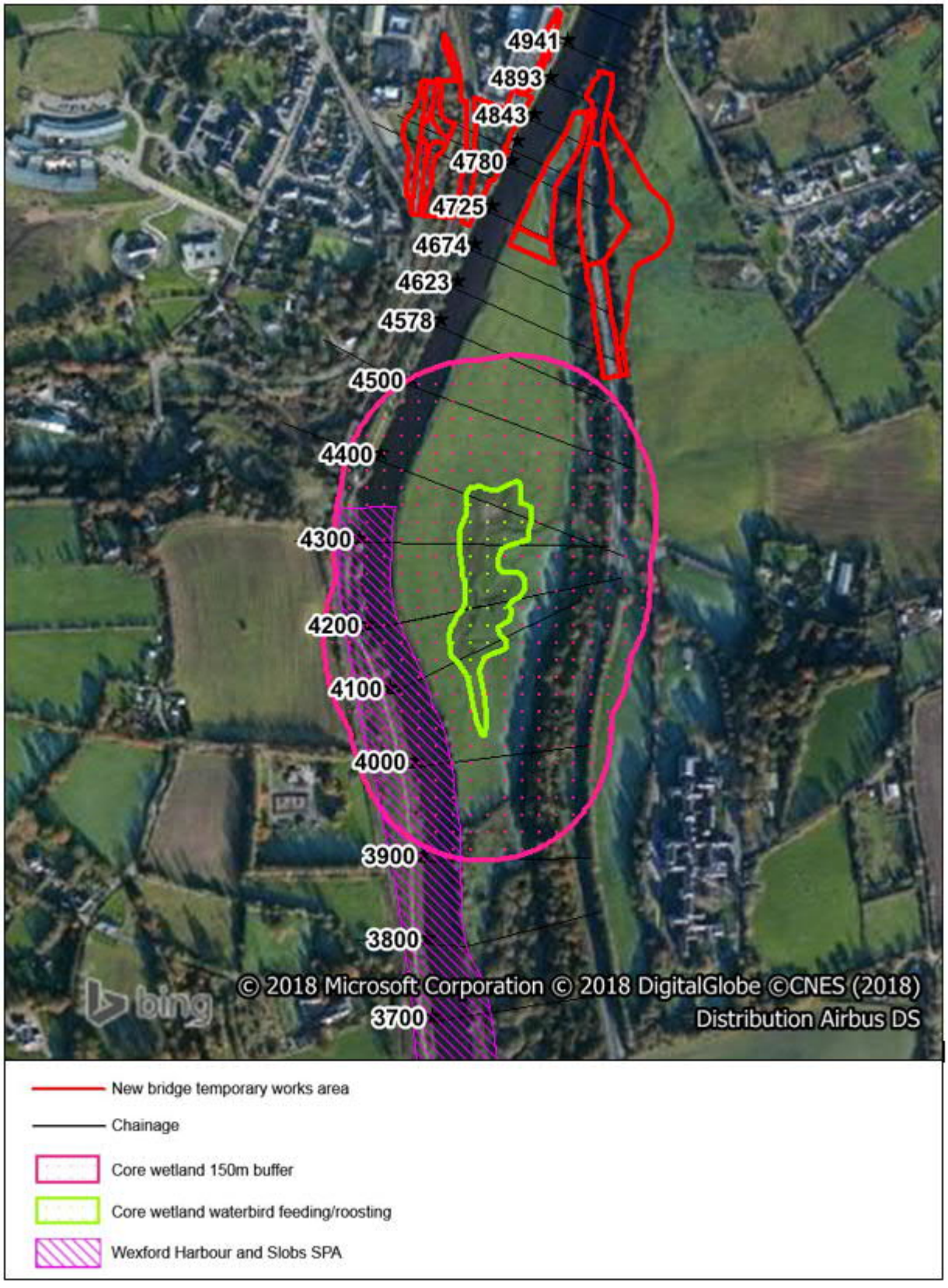
Escape distances for mixed flocks of duck and waders Wigeon, Teal, Mallard, Lapwing, and Redshank disturbed on the Bare Meadow during walk over surveys were approximately 150m (observers approaching out of tall vegetation to the south in March and April 2016); all duck and waders left the area. Escape distances recorded for Mallard later in the spring and summer varied with context; escape distances of approximately 100m were observed on two occasions, while female Mallard performed distraction displays and remained in the core wetland area with their (usually concealed) brood.

Escape distances of duck (Wigeon, Teal and Mallard) on the southern floodplain at Motabeg appeared to be greater than at the Bare Meadow but were not recorded accurately.

Since channel widening and dredging works are proposed to be carried out during June, July, August and September, resident SCI waterbird species, Grey Heron and Mallard will be present in the Bare Meadow and adjoining wetland habitats including the Slaney River Channel during works. Migratory

Teal start to arrive on the Bare Meadow in August and can be expected to be present in this area and in adjoining wetland habitats including the Slaney River Channel during works. In the absence of mitigation, temporary negative displacement impacts affecting the distribution within the SPA will arise to Grey Heron, Mallard, and Teal, particularly where works take place within 150m of the core wetland area on the Bare Meadow (Figure 6). Cormorant, Wigeon, Lapwing and Redshank are not likely to be displaced, since significant numbers are not expected to be present during the scheduled channel widening and dredging works.

Figure 6: Core wetland area used by roosting and feeding waterbirds at the Bare Meadow, shown with a 90m and a 150m buffer, indicating Escape Distances from pedestrian observers for Grey Herons and for wintering duck and waders respectively.



Noise

The sources of construction phase disturbance will include noise associated with pile driving. Augured pile driving will be used in the construction of the proposed new road bridge pier foundation works, as detailed in the EIAR. This method is not expected to cause disturbance to waterbirds in the vicinity of these works.

The creation of dry works areas will require the insertion of sheet-piles by pile driving into the bed of the River Slaney from the River Urrin inflow to the northern floodplain. The design team have confirmed that a low-vibration piling method will be used.

This method is not expected to cause disturbance to waterbirds additional to the 150m displacement distance expected in the vicinity of these works.

Potential changes in land use during construction

The Bare Meadow is currently grazed seasonally by horses. Seasonal grazing by horses at the current stocking densities is considered beneficial to waterbirds because is maintains a sward of varying height, tends to reduce Rush (Juncus spp.) cover, and provides significant, though not total, control of the invasive plant species Himalayan Balsam Impatiens glandulifera. Exclusion of horse grazing during construction would allow a dense, tall vegetation to develop that would tend to exclude waterbirds, with potentially negative impacts for waterbird species diversity and numbers.

Construction phase impacts at the proposed new road bridge

The construction of the proposed new road bridge and the associated approach roads is scheduled to take a full year, commencing in late January 2019. Temporary construction areas will be required on both sides of the River Slaney. The construction area on the east bank of the Slaney at the northern end of the Bare Meadow is c. 100m away from the 150m disturbance displacement buffer zone around the core wetland area used by feeding and roosting waterbirds. Waterbirds do make some feeding use of wet grassland habitats near the temporary bridge construction area, and in the absence of mitigation it is expected that there will be local displacement of Mallard and Grey Heron, assessed as being a negative, temporary, impact reducing the distribution of Grey Heron population, during construction. One or two Grey Herons occasionally roost in trees in the alluvial woodland impacted by the bridge, and occasionally feed in the drainage channel that flows through and supports this woodland hydrologically, thus there will be displacement from the works area.

A number of waterbird species commute along the Slaney River corridor, through the bridge area, as birds move between feeding and roosting areas, giving rise to the risk of collision with the bridge structure. Detailed data are included in Section 4 of Appendix H, summary flight height data are included in Table 9 of this NIS for SCI waterbird species. Recorded waterbird flight height data are given in Table 9. This table includes calculation of the percentage of all flights through the bridge corridor that were below, and within 5m above the deck level of the proposed bridge for each species, since the 4m bridge structure lies within these height bands and the principal collision risk with the proposed bridge structure arises within these combined flight height bands.

With regard to Grey Herons, 75% of all flights recorded were within 5m of the bridge deck level, with 84 recorded flights below deck level and 43 recorded flights between deck level and 5m above deck level (0-5m height category). Many of the Grey Heron flights recorded at the proposed bridge location were short movement flights between feeding sites on the river bank and channel or in the drainage channel to the east of the southern floodplain. These flight heights were usually low, below the base of the proposed bridge deck and within 2m of river bank level, for example at mid tide as feeding areas in the vicinity of the proposed bridge became available, and peak heron movement rates were recorded at mid tide. Grey Heron flights close to bridge structure level at the bridge corridor (both above and below deck level) included movement flights at dawn and dusk to and from

tree roosts in and near the alluvial woodland at the proposed bridge location, tree roosts in the woodland to the east of the N11, and flights between feeding areas and the wetland roost at the Bare Meadow in the southern floodplain, where most of the daytime Grey Heron roosting occurred (see Appendix H, Section 3.2.1, Figure 11, and Tables 20 and 21). At the proposed bridge corridor, 25% of Grey Heron flights were more than 5m above deck level, these included movement flights to and from tree roosts, and also longer distance flights within and outside the scheme area. Only three Grey Heron flights of more than 30m above deck level were recorded; two of these were birds gaining height to fly east and north east above the woodland east of the N11.

Cormorant flight activity included commuting flights to and from overnight roosts, as well as local movements of feeding birds; 47% of all flights were within the principal collision risk height band, and 53% of flights were above the principal collision risk height band.

Most Mallard flew along the Slaney river corridor, 84% of records were of flying duck and 16% of swimming birds. Flying Mallard were mostly close to deck height, with 77% of recorded flights below deck height and up to 5m above deck height, many of which were close to deck height. All recorded Teal flights were below bridge deck level (Table 9).

With regard to waders, there was one record of a flock of 60 Lapwing milling above and below deck level at the bridge location, and three records of flocks flying to and from the ponds on the southern floodplain crossing the bridge corridor at heights of at least 10m above deck height (Table 9). A single record of a Redshank recorded flight below deck level at the bridge location.

Gull flight heights ranged from below deck level to more than 30m above deck level at the bridge location. Black-headed Gulls are the dominant gull species using the scheme area and commuting daily from estuarine/coastal overnight roosts. Recorded flight height peaked below deck height and at more than 30m above deck height, with 35% of all recorded flights below deck height and up to 5m above deck height (Table 9).

Lesser Black-backed Gulls recorded flying downstream during dusk watches in September and October 2016 were recorded at heights of more than 20m and mostly more than 30m above proposed bridge deck height, moving along the oak woodland and ridge along the eastern side of the river corridor towards the south east. This species typically commutes along topographic ridges, though it does occur in small numbers through the FDS area throughout the year and this is reflected in 7% of recorded flights being below deck height and up to 5m above deck height (Table 9).

Table 9: Total number of recorded movements of each SCI waterbird species recorded moving through the proposed new bridge corridor at Enniscorthy, and flight height relative to proposed bridge deck level.

Species	Total movements	On water swimming	Height of flight relative to proposed bridge deck level							% below to 5m above deck height (principal collision risk height band)
			Below bridge deck	Above 0-5m	Above 5-10m	Above 10-20m	Above 20-30m	Above 30m	Above / below	
Cormorant	224	9	74	24	29	37	32	10	3	47%
Grey Heron	172	0	84	43	17	11	5	3	6	75%
Teal	35	23	12	0	0	0	0	0	0	100%
Mallard	263	37	70	81	23	6	6	2	9	77%
Lapwing	240	0	0	0	0	80	0	100	60	25%
Redshank			1							
Black-headed Gull	5,997	2	1,228	835	571	557	623	1,541	528	35%
Lesser Black-backed Gull	789	0	7	48	40	59	103	529	6	7%

Notes: Records include swimming waterbirds feeding within the bridge corridor in a few instances, e.g. Cormorant, Teal. Above/below refers to records during which the height of flight changed as a bird moved through the bridge corridor.

The dimensions and detailed design of the proposed new road bridge over the Slaney are shown in Figure Option 7A-001-007.pdf. The road element of the bridge is single carriageway, with a segregated cycleway and pedestrian way on each side, with spiral stairway connections to the promenade along the west bank of the River Slaney. The vertical distance between soffit (base of the deck of the bridge) and the top of the pedestrian guardrail of is approximately 4m. The distance from the top of the deck to the top of the pedestrian guardrail is 1.4m. The soffit level is 6.5m above the Bare Meadows. Clearance between the base of the bridge and the Slaney River will vary with tidal and fluvial flows, and apart from high fluvial floods will be in excess of 6.5m. The proposed pedestrian guardrail is 1.4m high. The detailed drawings show 4 no. guardrail types to be used at different sections along the bridge. These include options for the use of stainless steel or painted steel. Parapet type 3 is proposed for use above the River Slaney; this type comprises horizontal tensioned steel 9mm cables at 10cm centres inserted through steel plate uprights and includes a 50mm diameter rail incorporating lighting at the top of the guardrail.

The spiral stairway access from the bridge to the west bank of the Slaney will each be lit by a 25m-high stainless steel lighting mast. The eastern end of the bridge, over the eastern river bank and existing N11, will be lit by 7 No. 8m high standard light columns; no light column is provided over the alluvial woodland on the southern side of the bridge, as a mitigation measure for bats.

During construction, 2m high security fencing will be provided around the temporary construction compounds required during bridge construction. Tall machinery expected to be required during construction will include piling rigs for augured pile driving, cranes, and mobile elevated work platforms.

In the absence of mitigation, during the construction phase there will be a potential for waterbirds flying in poor light conditions and during the hours of darkness to collide with temporary security fencing, tall machinery, and structures under construction. Grey Herons are the main risk species, since they feed and move between feeding sites at all times during the day and night, and 75% of all recorded flight heights fall within the risk area of below bridge deck height to 5m above deck height. While resident waterbirds tend to habituate to obstacles in their environment, during construction high machinery will move within construction areas, and risks arise with regard to juvenile Grey Herons as well as adults. In the absence of mitigation, potential impacts during construction are assessed as negative, since there is a potential for mortality to arise from collisions.

Other SCI species at risk from collision during the construction phase are Cormorant, Mallard, Teal, and Black-headed Gull. Cormorant and Black-headed Gull commute to overnight roosts in Wexford Harbour and are generally absent during the hours of darkness and thus collision risk is assessed as moderate negative. Collision risk is assessed as relatively low for Teal, most movements recorded through the bridge corridor were of swimming birds, and the few records of Teal in flight were of birds close to water level. Collision risks for Mallard are assessed as moderate, because as a breeding species, juveniles will be present seasonally.

5.2.2.2 Operational Impacts

Habitat degradation - hydrology (e.g. flow and flooding regime) on the southern floodplain

As discussed in section above, negative long-term impacts on existing waterbird diversity and peak numbers on the Bare Meadow may potentially arise, in the absence of mitigation.

Habitat change

During the operational phase, aquatic and marginal vegetation and habitat is expected to become established in compound channels throughout the scheme area, potentially including native species, non-native and invasive plant species. Vegetation and habitat recovery is expected to take place within a 3-5 year time frame. Invertebrate and fish fauna will re-establish populations within the scheme area, subject to the success of habitat restoration measures undertaken as mitigation for aquatic flora, fauna and habitats as discussed elsewhere in this NIS. Aquatic and marginal habitats along the River Slaney are expected to be more accessible to Grey Herons during the operational phase, arising from the compound channel included in the design. There is an element of uncertainty regarding the types of vegetation, habitats, and associated fauna that will develop in the scheme area, because of hydro-morphological change, altered flow and sedimentation patterns, and the potential for river bank slumping to occur following dredging works, as discussed elsewhere in this NIS.

Fish Pools and deflectors

A series of 5 No. fish pools and deflectors are proposed for inclusion in the River Slaney channel to create diversity within the scheme extent post works. Indicative locations include immediately downstream of the Railway Bridge, the next is downstream of Enniscorthy Bridge, two are located between the existing Seamus Rafter Bridge and the proposed new road bridge, and the southernmost fish pool is proposed to be located immediately upstream of the River Urrin inflow. Deflectors will facilitate regeneration of fish habitats within the scheme extent to enable quicker recovery of fish populations, which may benefit Grey Heron and Cormorant. The primary purpose of the fish pools and deflectors is to provide fish habitat, but is also likely to facilitate angling, and this element of the design gives rise to a conflict with the requirement to avoid disturbance to bird species listed as Special Conservation Interests for Wexford Harbour and Slobs SPA. Since the southernmost proposed fish pool is located within the Bare Meadow core wetland 150m buffer, this feature has been removed from the proposed scheme design, and no part of any fish pool and deflector will be located downstream of CH 4750.

Potential changes in land use during the operational phase

The Bare Meadow is currently grazed seasonally by horses, and is not expected to change as a result of the scheme. Seasonal grazing by horses at the current stocking densities is considered beneficial to waterbirds because is maintains a sward of varying height, tends to reduce Rush (Juncus spp.) cover, and provides significant, though not total, control of the invasive plant species Himalayan Balsam (Impatiens glandulifera).

Operational phase impacts at the proposed new road bridge

In the absence of mitigation, during the operational phase there will be a potential for waterbirds flying in poor light conditions and during the hours of darkness to collide with the proposed road bridge. Grey Herons are the main risk species, since they feed and move between feeding sites at all times during the day and night, and 75% of all recorded flight heights fall within the risk area of below bridge deck height to 5m above deck height. While resident waterbirds tend to habituate to obstacles in their environment, risks arise with regard to juvenile Grey Herons as well as adults. In the absence of mitigation, potential impacts during operation are assessed as negative, since there is a potential for mortality to arise from collisions, with potential reduction in population trend towards unfavourable within the SPA.

Other SCI species at risk from collision during the operational phase are Cormorant, Mallard, Teal, and Black-headed Gull. Cormorant and Black-headed Gull commute to overnight roosts in Wexford Harbour and are generally absent during the hours of darkness and thus collision risk is assessed as moderate negative. Collision risk is assessed as relatively low for Teal, most movements recorded

through the bridge corridor were of swimming birds, and the few records of Teal in flight were of birds close to water level. Collision risks for Mallard are assessed as moderate, because as a breeding species, juveniles will be present seasonally.

6 MITIGATION MEASURES TO ENSURE NO ADVERSE EFFECTS ON THE INTEGRITY OF EUROPEAN SITES

Mitigation measures listed in this section address the potential to impact SSCOs of QIs and SCIs identified and discussed above and removes any possibility of an adverse effect on this target.

6.1 RIVER SLANEY VALLEY SAC

6.1.1 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]

- A final Floating River Vegetation mitigation plan will be created by an experienced macrophyte ecologist once contractors are appointed (and construction plan finalised). The outline of what this plan must include as a minimum is as follows in the points below:

  1) Identification of areas where macrophyte vegetation can be protected during construction works, e.g. 'buffer' zones' at edge of channel where no widening/dredging is to be undertaken (to facilitate recolonisation post construction);

  2) Areas with low cover of Elodea species (less than 5% cover) where the top level of sediment can be removed and stored dry for replacement post-dredging,

  3) Any other relevant measures. This will be undertaken by specialist macrophyte ecologist.

- The top 10cm sediment will be removed from selected areas pre-dredging. These areas will be identified during pre-construction surveys. Sediment will only be removed from areas with less than 5% cover of Elodea species (as identified by grapnel or other suitable survey method undertaken by an experienced macrophyte ecologist). Sediment will be stored dry and away from the riverbank. Post-dredging, this will be replaced in dry works areas which will be dredged to a depth of greater than 10cm. The 'source' sediment areas and 'recipient' areas will be clearly identified in the Floating River Vegetation mitigation plan.
- In the southern floodplain macrophyte area, a buffer (100m length, 2-3m wide) of FRV on the western bank will be protected (where no dredging is to occur). This will protect the rare pondweed Potamogeton x cooperi in this location and the protected macrophyte populations will assist FRV recolonisation in the adjacent channel and downstream.
- In-stream works will be undertaken from July to December each year (Table 3). As the period of July to September is during the main growing season for FRV, some works will be undertaken in the growing season. However, as all aquatic plant material will be removed from each dry works areas and regeneration will be from the propagule bank and recolonisation from sediment and upstream/adjacent areas (once the central barrier is removed), this will not impact vegetation recolonisation. Growth of aquatic macrophytes in the early growing season (May to June) will ensure that there is recent vegetative material in the sediment of each dry works area, prior to works. As only half the channel will be disturbed at any one time, there will always be some FRV regeneration during the construction period.
- The top layer of sediment and any macrophytes present in each dry works section is to be removed and stored away from the river. Sediment from areas with low Elodea cover will be stored dry and replaced post-dredging as outlined above. All other sediment will be disposed of away from the river. This is to prevent sediment and fragments of invasive macrophyte species being transported downstream to Callitriche truncata sites.

This habitat will also be the subject of monitoring measures described in Section 7.

6.1.2 Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]

- The Annex I habitat will be fenced prior to construction to protect the remaining habitat (91A0 exclusion area). This must be undertaken under supervision by a woodland ecologist who can identify the 91A0-type habitat area. The fence should remain in place during operation to prevent recreational disturbance within the woodland;
- No construction work, storage or dumping of material, to be undertaken in the 91A0 exclusion area;
- No landscape planting within or adjacent to woodland.

This habitat will also be the subject of monitoring measures described in Section 7.

6.1.3 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-padion, Alnion incanae, Salicion albae) [91E0]

- The bridge will span an area of Annex I priority habitat 91E0 alluvial woodland. The construction area to be marked out prior to construction under supervision of a woodland ecologist. Any fencing should not cause damage to install (temporary fencing may be best). The fencing should include a wet ditch adjacent on the western side of the woodland;
- Other than the works specified in the project design, no construction work, storage or dumping of material will be undertaken in the 91E0 exclusion area;
- Tree pruning will be undertaken in late winter/early spring (November to March) under supervision of a woodland ecologist. This includes the initial tree-pruning during construction and maintenance pruning works post construction;
- Measures will be taken during tree pruning (during construction and ongoing maintenance) to ensure that there is minimal disturbance to the ground, field and shrub layers in the 91E0 woodland by the contractor. Work to be supervised by a woodland ecologist;
- During construction work, dead wood will not be removed from site. Branches and wood removed during pruning activity (during construction and ongoing maintenance) will be placed in various locations within the woodland (as advised by a woodland ecologist) to increase the dead wood present;
- No landscape planting within or adjacent to woodland;
- Area of woodland along the eastern bank will be removed. This is adjacent to an area of Annex I priority habitat 91E0 alluvial woodland. The alluvial woodland will be protected during construction and will need temporary fencing which will be erected under supervision of woodland ecologist; and
- No construction work, storage or dumping of material will be undertaken in the 91E0 exclusion area.

This habitat will also be the subject of monitoring measures described in Section 7

6.1.1 Freshwater pearl mussel (Margaritifera margaritifera) [1029]

6.1.1.1 Mussel Translocation

As the proposed works are likely to be incompatible with FPM survival, mitigation for the mussels currently living within the works area involves translocation to FPM permanent habitat upstream.

Translocation is a last resort method of mitigation that has a high risk of failure but is the only option for the mussels in these locations. There is strong potential for failure to occur due to circumstances linked to the effects of chronic stress during translocation and establishment phase (Dickens et al.

2010, Teixerra et al. 2007, Killeen & Moorkens, 2016). A protocol for translocation and monitoring is provided in Appendix O, additionally an assessment of potential translocation receptor sites has been carried out and results are presented in Appendix P and Q. An additional stage in the translocation process proposed is could be to captive breed a cohort of juvenile mussels from the translocation animals according to the technique of Moorkens (2017). Translocating a higher number of individuals, both juvenile and adult, ensures that the resulting receptor population is significantly higher than the group of donor mussels used. A survey of the potential receptor site has demonstrated its suitability for the translocation of adult and captive bred juvenile mussels. The study for the receptor site suitability is provided in Appendix P and Q. A previous study (Appendix I) found good quantities of young trout and salmon are present, and thus available as host fish. The captive breeding aspect can only be achieved if the translocated mussels are still fertile.

6.1.1.2 How the mitigation measures address the conservation objectives for the species in this SAC

The River Slaney Valley SAC conservation objectives for Margaritifera are currently under review. However, it has been demonstrated that the only potential for negatively affecting the Derreen River sub-population designated for this SAC would be in decreasing the potential for movement of host salmonid fish travelling upstream to the Derreen River and providing genetic exchange. The proposed mitigation measures would address this through the combination of very careful selection of the best possible translocation area, and the added benefit of short-term captive breeding (if the mussels being translocated are still fertile). This would result in a net benefit to the size and condition of the population in the Lower Slaney Valley, and thus an increased chance of encysting mussel larvae on host fish that may travel upstream to the Derreen River SAC population and contribute genetic material. The success of the translocation with captive breeding program will be dependent on the reproductive quality of the mussels to be translocated. If the female cohort of these mussels are brooding, then the number of individuals introduced will greatly exceed the number removed from the system. If some of the female or male cohort of these mussels are no longer reproductively viable, then they are no longer contributing to the non-SAC population, and have no potential to contribute to the Derreen SAC population and thus the loss of these surviving numbers would not affect the conservation objectives of the SAC for Margaritifera.

6.1.2 Sea lamprey (Petromyzon marinus) [1095]

Provided the mitigation measures listed below are adhered to in full, there will be no adverse effect on Sea Lampreys within the SAC; nor would the integrity of the SAC be affected.

6.1.2.1 Timing of works

It is possible that Sea Lamprey will not spawn until June/July so will not be fully protected by this window. However, Sea Lamprey were not recorded spawning in the study area during the 2016 survey. If during construction time any Sea Lamprey are spawning in the area, the instream works may have to be delayed. The Environmental Clerk of Works (EnCoW) will be advised and assisted by a specialist aquatic ecologist to ensure that any spawning activity is detected prior to commencing instream works.

6.1.2.2 Water quality protection

Works will be carried out in the dry and behind an impermeable barrier (i.e. sheet pilling), which will minimise the potential for significant water quality impacts involving sedimentation. The works will be carried out in dry sections on one side of the river behind an impermeable barrier, with the other side of the river being allowed to flow normally. The impermeable barrier will then be moved to the next section when appropriate and when work on one section of the river is completed, as per the method statement in Appendix B. Proven sediment control measures and instream monitoring

during construction will be developed as part of a Sediment Management Plan included within the CEMP and implemented accordingly during the works to minimise and contain any silt plumes.

To minimise the risk of significant spills and/or leaks, standard good practice will be followed with regard to pollution prevention as part of the appointed contractor's CEMP. Any concrete pouring and filling works will be monitored, and spill prevention and remediation measures must be in place to minimise the risk and extent of spills and to rapidly deploy clean up equipment. Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles/equipment will take place in designated bunded areas within the temporary storage yard, where possible, and not on-site. All waste oil, empty oil containers and other hazardous wastes will be disposed of in conjunction with the requirements of the Waste Management Acts 1996, as amended. All the construction machinery operating near any watercourse will be systematically checked in order to avoid leaks of oils, hydraulic fluids and fuels.

Spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. A visual inspection of all watercourses, downstream of the works areas will be conducted daily. The risk of pollution of the watercourses from losses of mortar and concrete must be managed and controlled in accordance with relevant guidelines.

Any stockpiling of material, top soil or spoil will be within the proposed site compound. All storage and stockpiling of material must be at a minimum of 10m from any surface water drainage on the site. Oil booms will be installed around the dredging area to avoid oil/fuel spillages to enter the aquatic environment. Waste management procedures will be employed to reduce the potential for construction waste to enter the aquatic environment.

6.1.2.3 Ammocoete translocation

An outline method statement for the translocation of lampreys has been prepared, see Appendix R. This will need to be completed over the entire footprint of the scheme upstream of the railway bridge. This will be completed using electrical fishing following standard lamprey survey effort - 1 min per m^2. It will not be possible to translocate all the lamprey. Captured lamprey will need to be held in oxygenated bins and then transported upstream for release (e.g. areas around Scarawalsh).

There will also have to be lamprey salvage undertaken. This will involve checking dredged spoil for the remaining lamprey and removing them by hand. This should be carried out by a specialist aquatic ecologist and EnCoW.

6.1.2.4 River rehabilitation

An instream rehabilitation plan will also be prepared to re-establish nursery and spawning areas for lamprey on the main channel, to be agreed with Inland Fisheries Ireland prior to the commencement of the Scheme. The key habitat creation is the creation of a back channel/distributary channel upstream of the town (see NIS Appendix C). However, this is expected to only assist River and Brook lamprey.

It is also recommended to re-grade banks to reduce slopes. Other features should be placed all along the river as habitat restoration/improvement features. Engineered wood structures can promote sediment deposition that helps create attractive habitat for ammocoetes. Some examples of the types of features that would be included to enhance juvenile lamprey habitats are as follows.

- Root wads
- Brushwood mattresses
- Tree crucifixes
- Deflector boards

Such features would be inserted along the channel wherever possible, most importantly upstream of the railway bridge. These are also suitable for the tidal reach. The deflectors that are proposed in consultation with the Inland Fisheries Ireland leave space on the downstream end to allow silt (ammocoete habitat) to develop. Small piles of boulders could also be placed into the river at intervals to provide daytime refuge areas. This would also create habitat for salmonids.

6.1.2.5 Maintenance plan

A site-specific maintenance plan will be drawn up to assess the requirements of lamprey and will be agreed with Inland Fisheries Ireland prior to the commencement of the Scheme. Maintenance of the sediment trap during construction works will be carried out in the dry works area. Site-specific protocols for the management of lamprey will be put in place for drainage maintenance. Maintenance works will need to be balanced with an instream rehabilitation plan.

6.1.3 Brook lamprey (Lamptera planeri) [1096]

Provided the mitigation measures listed below are adhered to in full, there will be no adverse effect on Brook lamprey within the SAC; nor would the integrity of the SAC be affected.

6.1.3.1 Timing of works

Instream works will not be undertaken during the times when fish are spawning. The most sensitive period for River/Brook lamprey is the period October to March when they are migrating, and April to June when they are spawning/ova are developing. Lamprey have only been recorded spawning in the upper section of the scheme area (upstream of the existing railway bridge).

It is possible that Sea lamprey will not spawn until June/July so will not be fully protected by this window. However, Sea lamprey were not recorded spawning in the study area during the 2016 survey. If at any time during the construction phase Sea lamprey are observed, instream works may be delayed. The role of the EnCoW is of importance here to ensure that any spawning activity is detected prior to commencing instream works.

6.1.3.2 Water quality protection

As for Sea lamprey see section above.

6.1.3.3 Ammocoete translocation

As for Sea lamprey see section above.

6.1.3.4 River rehabilitation

As for Sea lamprey see section above.

6.1.3.5 Maintenance plan

As for Sea lamprey see section above.

6.1.4 River lamprey (Lamptera fluviatilis) [1099]

Provided the mitigation measures listed below are adhered to in full, there will be no adverse effect on River lamprey within the SAC; nor would the integrity of the SAC be affected.

6.1.4.1 Timing of works

Instream works will not be undertaken during the times when fish are spawning. The most sensitive period for River/Brook lamprey is the period October to March when they are migrating, and April to

June when they are spawning/ova are developing. Lamprey have only been recorded spawning in the upper section of the scheme area (upstream of the existing railway bridge).

6.1.4.2 Water quality protection

As for Sea lamprey see section above.

6.1.4.3 Ammocoete translocation

As for Sea lamprey see section above.

6.1.4.4 River rehabilitation

As for Sea lamprey see section above.

6.1.4.5 Maintenance plan

As for Sea lamprey see section above.

6.1.5 Twaite shad (Alosa fallax fallax) [1103]

Provided the mitigation measures listed below are adhered to in full, there will be no adverse effect on Twaite shad within the SAC; nor would the integrity of the SAC be affected.

6.1.5.1 Timing of works

Instream works will not be undertaken during fish spawning season.

6.1.5.2 Water quality protection

As for Sea lamprey see section above.

6.1.5.3 Prevention of entrapment

Areas behind the impermeable barrier will need to be checked for the presence of shad. Any juvenile or adult shad will be removed as part of the fish translocation/salvage programme.

6.1.5.4 River rehabilitation

As for Sea lamprey see section above.

6.1.5.5 Maintenance plan

As for Sea lamprey see section above.

6.1.6 Salmon (Salmo salar) [1106]

Provided the mitigation measures listed below are adhered to in full, there will be no adverse effect on salmon within the SAC; nor would the integrity of the SAC be affected.

6.1.6.1 Timing of works

Instream works will not be undertaken during fish spawning season. Salmonids can be expected to spawn during the period November to January, with fry not emerging until the following May.

6.1.6.2 Water quality protection

As for Sea lamprey see section above.

6.1.6.3 Prevention of entrapment

Areas behind the impermeable barrier will need to be checked for the presence of salmon. Any juvenile or adult salmon will be removed as part of the fish translocation/salvage programme.

6.1.6.4 River rehabilitation

As for Sea lamprey see section above.

6.1.6.5 Maintenance plan

As for Sea lamprey see section above.

6.1.7 Otter (Lutra lutra) [1355]

Provided the mitigation measures listed below are adhered to in full, there will be no adverse effect on otter within the SAC; nor will the integrity of the SAC be affected.

6.1.7.1 Mitigation to improve riparian habitat

The proposed North Island back channel will be c. 945m in length and will create 1.89ha of semi-natural riparian habitat (this was calculated using the total length of the back channel and assuming a 10m riparian buffer of a river bank on either side of the channel considered as part of otter habitat (NPWS 2009)) suitable for use by otter.

6.1.7.2 Mitigation for the provision of an otter holt

The North Island back channel restoration will also include the provision of an artificial otter holt for the provision of the loss of OH4 as part of the proposed scheme. Full details of the North Island back channel are included in Appendix C.

6.1.7.3 Pre-construction Surveys

Pre-construction surveys of the resting place and holt (OH4) in the northern floodplain will be carried out to identify if they are active. If deemed active, a derogation licence will be sought from NPWS and will include the provision of an artificial holt along the proposed back channel in the northern floodplain. The installation of the artificial holt will follow best practice guidance for construction of the new structure using tried and tested methodology proven to have successful uptake by otter.

Full implementation of the above mitigation measures will ensure there will be no adverse effects on the site integrity of the River Slaney Valley SAC.

6.2 WEXFORD HARBOUR AND SLOBS SPA

6.2.1 Grey Heron (Ardea cinerea) [A028] and other waterbird SCI species

6.2.1.1 Mitigation measures to clarify and minimise impacts on wetland habitats important Grey Heron and other SCI waterbirds on the Bare Meadow

The compound channel in the Bare Meadow has been designed so that the existing profile of the riparian edge and existing soils profile is recreated. The design of the bankside will concern dimensions and vegetation cover of the existing riparian edge and will be replicated as part of the construction works following consultation with EnCoW and NPWS. This mitigation measure will also ensure the retention of existing visual screening of waterbirds from disturbance arising from recreational boating and canoeing on the River Slaney.

6.2.1.2 Mitigation measures to minimise disturbance to SCI waterbirds in the southern floodplain

Bridge works area

The bridge works area will be fenced off during construction of this temporary works area, and no construction machinery will be permitted to enter the Bare Meadow (see Figure 6).

River dredging and compound channel works

Restriction of works in the southern floodplain between October-May inclusive will facilitate the protection of waterbirds using the wetland habitats during the winter and nesting Grey Heron from disturbance. Works on the west side of the river will be carried out in June and July. Works on the compound channel on the east side of the river at the Bare Meadow will be carried out in August and September, by which time any late brood Grey Herons are expected to have fledged and juveniles relatively mobile and independent.

The proposed schedule of channel widening and dredging works in the southern floodplain is set out in Chapter 2.

Works on the east side of the river will commence at the downstream end, in order to limit the duration of disturbance to waterbirds on the Bare Meadow. During re-watering of the compound channel, all access to the impermeable barrier for monitoring and for the removal of the barrier shall be required to be carried out from boats, barges and pontoons.

No machinery tracking along the east river bank will be permitted in the southern floodplain, and all machinery will be excluded from the Bare Meadow on the southern floodplain to the south of CH 4700. This exclusion area will be clearly indicated by temporary fencing prior to the commencement of works and all contractors will be notified. All machinery and personnel will work and move within the dry works area provided in the river channel to the north of the River Urrin inflow. All machinery will operate from pontoons/barges located on the River Slaney with personnel being transported to these works via boat. This will occur in areas 8, 9 and 10.

Any requirement for “pegging out” of compound channel construction areas near the river bank, will be carried out under the authorisation and supervision of the EnCoW.

The compound channel in the Bare Meadow has been designed so that the existing profile of the riparian edge and existing soils profile is recreated. The design of the bankside will have regard to dimensions and vegetation cover of the existing riparian edge and will be replicated as part of the construction works following consultation with EnCoW and NPWS. This will ensure the retention of existing visual screening of waterbirds from disturbance arising from recreational boating and canoeing on the River Slaney, during the construction and operational phases.

Wherever possible, the existing Alder treeline screening on the west bank opposite Bare Meadow will be maintained by coppicing and replacement, rather than by tree removal, in order to ensure continuity of screening of waterbirds using the River Slaney channel and adjoining Bare Meadow from recreational use of the west bank promenade by walkers and dogs.

6.2.1.3 Mitigation measures to avoid land use changes on the Bare Meadow during and post construction

Seasonal horse grazing at the current stocking densities will be facilitated on the Bare Meadow during construction, by the provision of gated access and provision of an agreed route through the new road bridge temporary construction area adjoining the east bank of the Slaney. The land owner will facilitate horse grazing and will be contacted in this regard prior to construction.

6.2.1.4 Mitigation to minimise waterbird collision risk at proposed new road bridge over the Slaney

During the construction phase, 2m high Harris fencing with visual screening will be provided at the temporary works areas boundaries of the bridge working area in the southern floodplain. Visual screening will be white or pale grey and will incorporate reflective material to enhance its visibility to Grey Heron and other SCI waterbird species flying in the vicinity in poor light conditions and during the hours of darkness. While some existing background lighting is provided by public lighting along the N11, it is recommended that additional lighting is provided on tall construction equipment and on bridge pier structures under construction to minimise collision risk. Additional construction lighting will be agreed in consultation with the suitably qualified/experienced EnCoW and will be designed to avoid significant impacts on protected mammals i.e. otters and bats.

Painted steel handrails and pedestrian guardrails on the proposed new bridge are considered to be more visible to waterbirds in flight during poor light conditions and during the hours of darkness, in comparison to stainless steel. A bright cream colour is recommended to maximise visibility and will be agreed in consultation with NPWS. This mitigation measure refers to the construction phase and to the operational phase.

6.2.1.5 Mitigation measures to improve SCI waterbird habitat in the back channel in the northern floodplain

The dominant marginal plants along the existing back channel are Reed Canary grass (Phalaris arundinacea) and Branched Bur-reed (Sparganium erectum), both species are abundant towards the northern end of the channel. Branched Bur-reed is beneficial to Mallard and Teal. Both species consume the seeds in autumn and winter, and the growing plant provides good cover for Mallard broods, and is also a good invertebrate habitat. Branched Bur-reed grows in water up to 1m deep, as does Reed Canary-grass. Since works on the back channel are proposed to start at the southern, downstream end, it is recommended that rooted plant material is taken and transplanted on newly worked channel margins as the works progress. Transplanting is best undertaken in late spring when plants are in active growth, into soft un-compacted soil along the waterline, and firmed in to place manually. Plants establish rapidly in these circumstances and root growth will assist in stabilising the back channel and reducing potential downstream siltation impacts.

A detailed landscape planting plan will be set out in consultation with the EnCoW and NPWS and the project landscape architect. The plan will seek out planting opportunities within the works area for planting Willow, Birch and Alder along the back channel.

6.2.1.6 Mitigation measures to assist vegetation and habitat recovery rates in proposed compound channels

Reed Canary grass (Phalaris arundinacea) tends to dominate the existing banks and tolerates tidal submersion. Inclusion of Sparganium erectum on the lower bank slope above the berm is recommended. It is proposed that an appropriate plant nursery is contracted to collect native seed/plant material, under EnCoW supervision, from the scheme area prior to works, and to propagate appropriate native marginal and aquatic plants for planting on the berms immediately prior to re-watering.

6.3 POTENTIAL IN-COMBINATION EFFECTS ON SITE SPECIFIC CONSERVATION OBJECTIVES

A search area of 5km from the proposed scheme was considered appropriate to assess potential in-combination effects with the proposed scheme on the River Slaney Valley SAC and Wexford Harbour and Slobs SPA. Potential in-combination effects are likely to arise from developments which may affect water quality within the River Slaney and would occur simultaneously with the construction phase of the proposed scheme.

The developments considered in this assessment include the ongoing construction of the M11 Gorey to Enniscorthy PPP Scheme and the Enniscorthy Waste Water Treatment Plant.

A number of other single dwelling or similar scale developments are proposed within a 5km radius of the proposed scheme, however were not considered to be of a magnitude to cause perceptible changes to the aquatic or terrestrial features that could result in potential in-combination effects with the proposed scheme.

The M11 Gorey to Enniscorthy PPP Scheme and other construction works within a river catchment have the potential to contribute to run-off and the proposed bridge across the Slaney is upstream of the proposed works. This proposed development was subject to a Natura Impact Statement which provided appropriate robust mitigation measures for the protection of water quality. The majority of the construction works for this development will also have been completed prior to the proposed Enniscorthy Flood Defence Scheme.

The upgrade to the Enniscorthy Waste Water Treatment Plant is expected to be completed in Q2 of 2019 and therefore will be largely complete prior to the commencement of the Scheme. The improvement in discharge standards will have a positive impact by improving water quality within the River Slaney. Therefore, there are no negative in-combination impacts affecting the conservation objectives of European site QI habitats or species, or SCI species envisaged to arise.

The in-combination effect search area included an assessment for the potential Margaritifera translocation site, approximately 5.5km upstream at Scarawalsh Bridge. There are no major plans or projects at present that are likely to conflict with the translocation effort, apart from the current level of intense land use that is present throughout the Slaney Valley. The nearest quarry (Ballingale Quarry) is 4km upstream of the proposed translocation area and within 500m of River Slaney channel. The Drumderry Quarry is located 14km upstream, within 50m of River Slaney channel. The in-combination effects from these on the translocation potential is deemed to be low enough so as to rule out potential interactions with the impact of the proposed Scheme.

7 MONITORING

The proposed monitoring measures have been agreed to ensure that the implementation of the mitigation of impacts is recorded and also that any background changes to the attributes of the European Site are taken into account:

- Monitoring of recovery of FRV vegetation will take place within the scheme area. This should be continued until the 2016 distribution FRV is achieved and the vegetation is typical of the 2016 species composition (species and relative abundance). This may require annual surveying for up to and beyond five years as FRV populations can fluctuate or otherwise agreed with NPWS. The newly created areas of habitat will have lower in situ propagule banks and may take longer to recolonise than areas where FRV was previously abundant. However, the replacement of the top 10cm of sediment in selected areas will facilitate regeneration in these areas. At five years post-construction a review of macrophyte recolonisation will be undertaken (species composition, abundance and distribution within the channel). If the vegetation has not shown to be typical of the 2016 species composition during this time, then appropriate action will be taken. This would include a review of potential habitat enhancement options;
- Proven sediment control measures and instream monitoring during construction will be developed as part of a Sediment Management Plan included within the CEMP and implemented accordingly during the works to minimise and contain any silt plumes travelling downstream when dry works areas are re-flooded. This is to prevent silt travelling downstream and depositing on Callitriche truncata sites. This is likely to include monitoring at 500m, 1km and 1.5km downstream of the works, this threshold could be monitored hourly or as frequently as required and works suspended if thresholds are exceeded;
- Monitoring of the three Callitriche truncata sites closest to the proposed scheme extent (Bormount House (1, 2) and Edermine Bridge (3)) and the closest site where Callitriche truncata has most recently been recorded (c. 6.3km downstream from the proposed scheme near Jamestown Nature Reserve). The aim is to monitor the condition of the habitat, with particular attention on the presence and abundance of non-native invasive macrophytes and any negative impacts of siltation. The results of the 3-year monitoring should be used to assess whether further monitoring or management action is required (e.g. if the monitoring shows an unfavourable trend in habitat condition or population). This will only be undertaken if pre-construction surveys record the presence of Callitriche truncata populations in these sites;
- Although Callitriche truncata was not recorded during 2016 surveys, pre-construction surveys up to 2km downstream of the scheme extent (e.g. historic sites at Bormount House and Edermine Bridge) will be carried out to identify any new records of this species within the scheme zone of influence;
- Bi-annual monitoring of area of Annex I habitat type 91A0 adjacent to construction area to assess long-term impacts so that management actions can be undertaken if required (e.g. invasive species removal). This will follow the standard 91A0 habitat condition assessment methodology. This should be undertaken for a minimum of 5 years as some impacts (e.g. spread of invasive species), may not be immediately apparent. The results of the 5 years of monitoring should be used to assess whether further monitoring or management action is required (e.g. if the monitoring relevé(s) fail or show an unfavourable trend);
- Monitoring and condition assessment of 91E0 woodland and, if necessary, invasive species management. This will be undertaken for a minimum of five years or as otherwise agreed with NPWS as some impacts (e.g. spread of invasive species), may not be immediately apparent. The results of the 5 year monitoring should be used to assess whether further

monitoring or management action is required (e.g. if the monitoring relevé(s) fail or shows an unfavourable trend);

- Monitoring of translocation of FPM will be required to monitor the progress of the receptor site habitats and the adult (and potentially juvenile) mussels. Initial site receptor surveys in high flow and low flow conditions have been carried out and are provided in Appendix P and Appendix Q. The favoured receptor site was found to have suitable locations for the translocation of adult and juvenile mussels. Numerous young-of-year salmon and trout were found at the proposed receptor site in the Aquatic Study undertaken by Ecofact (Appendix I), the presence of plentiful host fish is essential in choosing a suitable translocation site. The sites should be monitored for habitat condition, condition and survival of adult mussels, and levels of success of survival of any juvenile mussels in the receptor habitat. If habitat condition is better in some pockets of habitat compared to others, some movement of mussels may be recommended. If translocated mussels are found to be not brooding, it may be due to the stress of living in sub-optimal conditions in Enniscorthy. Therefore, brooding checks would be carried out after one year in their translocation receptor site, and if brooding, a cohort of captive bred juveniles should be produced and translocated. If mussels are again found to be not brooding after 12 months in the new receptor site, it is unlikely that they will recover and thus no further intervention should be attempted; and
- A detailed monitoring programme to monitor waterbird numbers and distribution will be developed or otherwise agreed with NPWS and will include monitoring of wintering, passage and resident waterbirds. Grey Heron breeding surveys and monitoring of waterbird movements and flight height at new road bridge will be included in the monitoring programme. Monitoring will continue throughout the construction phase and for at least one year post construction. The detailed monitoring programme will be agreed with NPWS prior to the commencement of construction and will incorporate any additional NPWS requirements.

8 CONCLUSIONS ON THE STAGE 2 APPROPRIATE ASSESSMENT PROCESS

In order for the AA to comply with the requirements of Article 6(3) the Habitats Directive and Part XAB of the Planning and Development Act 2000, a Stage 2 AA undertaken by the competent authority must include an examination, analysis, evaluation, findings, conclusions and a final determination. The information in this report will, along with all other submissions and observations received, enable the Minister of Public Expenditure and Reform under the Arterial Drainage Act to perform its statutory function in this regard.

This NIS has examined and analysed, in light of the best scientific knowledge, with respect to the relevant European sites, the potential impact sources and pathways, how these could impact on the QI habitats and QI/SCI species and whether the predicted impacts would adversely affect the integrity of the European sites. Mitigation measures are set out within this report to ensure that any impacts on the conservation objectives of European sites will be avoided and/or minimised during the construction and operation of the proposed scheme such that there will be no risk of adverse effects on European sites, from the proposed scheme either alone or in combination with other plans or projects.

Accordingly, in the professional opinion of the authors of this report, whilst it has been acknowledged that there is the potential in the absence of mitigation for the proposed development to have significant indirect or indirect impacts on European sites, with the implementation of the detailed mitigation measures identified in this NIS, the integrity of those European sites will not be adversely affected.

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