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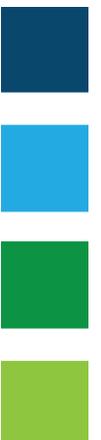


Comhairle Contae Thiobraid Árann
Tipperary County Council

Tipperary County Council

Templemore Infilling Works

Natura Impact Statement



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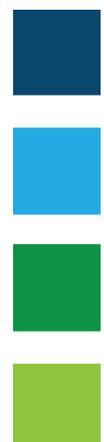


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1.0 INTRODUCTION

TOBIN Consulting Engineers (TOBIN) have been appointed by Tipperary County Council to prepare a Natura Impact Statement (NIS) to inform the Appropriate Assessment (AA) of the proposed infill of the channel of a diverted river (Templemore_Demesne, EPA Code: 16T38), in Templemore, County Tipperary (proposed development).

This NIS comprises the Screening for AA (Stage 1), which screens and evaluates the potential for likely significant effects from the proposed development upon designated European sites. In the current context, where significant effects are considered likely, in view of the Qualifying Interests or Special Conservation Interests and the respective Conservation Objectives of any European site, Stage 1 identifies that an Appropriate Assessment (Stage 2) is required.

The information and appraisal reported within this NIS is intended to inform the AA process to be undertaken by the Competent Authority, while following the requirements of Article 6(3) of the EU Habitats Directive (92/43/EEC).

This report was authored and informed by a desk study undertaken by TOBIN Consulting Engineers (TOBIN) Senior Ecologist, Joao Martins (M.Sc.), and was updated by Sinead O'Reilly (B.Sc., M.Res.) and senior reviewed by TOBIN Associate Director and Lead Ecologist, Laura Kennedy (M.Sc.), all of whom are qualified and experienced competent ecologists.

2.0 THE APPROPRIATE ASSESSMENT PROCESS

2.1 EUROPEAN SITES

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive), provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of a European Union (EU)-wide network of sites known as Natura 2000 (hereafter referred to as 'European sites'). In the Republic of Ireland, European sites comprise:

- Special Areas of Conservation (SAC) designated for habitats, plants, and non-bird species, under the Habitats Directive (92/43/EEC);
- Special Protection Areas (SPA) designated for bird species and their habitats, under the Birds Directive (79/409/ECC as codified by Directive 2009/147/EC); and,
- 'Candidate' sites, including 'cSAC'. The process of designating cSACs as SACs is ongoing in Ireland. The term SAC is used throughout this report for both SACs and cSACs, given they are subject to equal protection.

2.2 APPROPRIATE ASSESSMENT

Article 6(3) of the Habitats Directive establishes the requirement for AA as a decision-making test for plans and projects likely to have a significant effect, or to adversely affect, the integrity of European sites:

"any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives".

The provision for an AA is transposed into Irish law by Part XAB of the Planning and Development Act 2000 (as amended). While Section 177V (3) explicitly states that “ (...) a competent authority shall (...) give consent for proposed development only after determining that the (...) proposed development shall not adversely affect the integrity of a European site”, Section 117V (2) of the Act discriminates the matters the Competent Authority shall take into account while carrying out an AA:

“

- a) the Natura impact report or Natura impact statement, as appropriate;
- b) any supplemental information furnished in relation to any such report or statement;
- c) if appropriate, any additional information sought by the authority and furnished by the applicant in relation to a Natura impact statement;
- d) any additional information furnished to the competent authority at its request in relation to a Natura impact report;
- e) any information or advice obtained by the competent authority;
- f) if appropriate, any written submissions or observations made to the competent authority in relation to the application for consent for proposed development;
- g) any other relevant information.”

Thus, an AA should be based on best scientific knowledge and the Competent Authority should ensure that expertise, such as ecological, geological, and hydrological are utilised, where relevant.

The Court of Justice of the European Union (CJEU) has made a number of rulings in relation to AA, regarding when it is required, its purpose, and the standards it should meet. Consideration has been given to the evolution in interpretation and application of directives and national legislation arising from jurisprudence of the European and Irish courts, in respect of Article 6 of the Habitats Directive.

2.2.1 Stages of Appropriate Assessment

The AA process involves a stage-by-stage approach, in which the result of each stage determines the requirement for assessment under the next. The European Commission (2021) defined this approach as entailing three stages, to assure compliance with Article 6(3) and (4) of the Habitats Directive:

- **Stage 1: Screening**

“The first part of the procedure consists of a pre-assessment stage (‘screening’) to ascertain whether the plan or project is directly connected with, or necessary to, the management of a Natura 2000 site, and, if this is not the case, then whether it is likely to have a significant effect on the site⁷ (either alone or in combination with other plans or projects) in view of the site’s conservation objectives. Stage one is governed by the first part of the first sentence of Article 6(3)”.

- **Stage 2: Appropriate Assessment**

“If likely significant effects cannot be excluded, the next stage of the procedure involves assessing the impact of the plan or project (either alone or in combination with other plans or projects) against the site’s conservation objectives, and ascertaining whether it will affect the integrity of the Natura 2000 site, taking into account any mitigation measures. It will be for the competent authorities to decide whether or not to approve the plan or project in light of the findings of the appropriate assessment. Stage two is governed by the second part of the first sentence and the second sentence of Article 6(3)”.

- **Stage 3: Derogation from Article 6(3) under certain conditions**

“The third stage of the procedure governed by Article 6(4). It only comes into play if, despite a negative assessment, the developer considers that the plan or project should still be carried out for imperative reasons of overriding public interest. This is only possible if there are no alternative solutions, the imperative reasons of overriding public interest are duly justified, and if suitable compensatory measures are adopted to ensure that the overall coherence of Natura 2000 is protected”.

3.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The town of Templemore, County Tipperary, is intersected by a disused channel, which historically carried the, locally named, River Mall (Templemore_Demesne - EPA Code: 16T38). This channel, of approximately 805m, is predominately bounded by stone walls, roads, or private properties.

Although no surface water body currently runs through the mentioned channel, Tipperary County Council have confirmed there are currently 26 surface drainage outfalls discharging into it, presenting a potential health and safety risk, as well as potential pollution and anti-social behaviour risk (Tipperary County Council, pers comm.).

Therefore, the proposed development intends to capture the drainage from these outfalls and drive them downstream, preventing water accumulation into the old channel and the potential risks identified above by Tipperary County Council.

3.1 CONSTRUCTION PHASE

The Proposed Development will consist of the following works:

- i. The construction of a 900mm drainage header pipe in the existing redundant channel section of the River Mall and manholes.
- ii. Provision for the connection of 26 existing surface water outfalls, currently discharging to the redundant channel section of the River Mall, to the 900mm drainage header pipe along with all accommodation works.
- iii. The infilling of the redundant channel section, including pipe surround of the 900mm drainage header pipe, to match existing ground elevations surrounding the river channel.
- iv. Provision of a footpath and grass area over the infilled river from Templemore Town Park pedestrian entrance to a point 100m south in the direction of the N62, behind an existing stone wall / parapet.
- v. Provision of approximately 100m of new footway adjacent to the Blackcastle Road to the junction of the N62 (at Young’s garage), with a footway width by 1.8m which and reduced carriageway width.
- vi. Removal of existing parapet wall to create an AC hardstanding area adjacent to Youngs garage.
- vii. The demolition of approximately 50m of existing stone wall and bridge parapet north of the N62 to allow for the construction of a new proposed footway to match existing from O’Dwyer Bridge.
- viii. Provision of improvement works north of O’Dwyer bridge for approximately 40m to include increasing corner radius, installation of aggregate bollards and hard landscaping area.

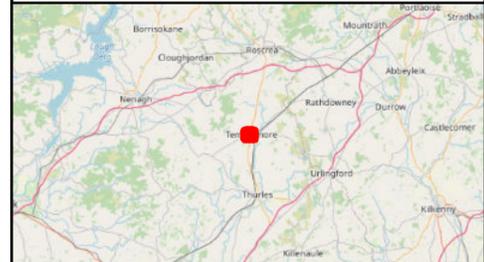
- ix. Widening of approximately 30m of the carriageway crossing, by means of removing the existing parapet wall on the north side and realigning the parapet wall on the southern side of O'Dwyer bridge along the N62, whilst maintaining the existing lane configurations.
- x. The demolition of approximately 15m of existing stone wall and bridge parapet south of the N62 to allow for improvement works to include a new footway, increased corner radius and increase sight lines between The Mall Road and the N62.
- xi. Construction of approximately 70m AC hard standing area over the existing channel south of the N62 and maintenance of the existing stone wall / parapet.
- xii. The demolition of sections of existing stone walls to allow for the construction of a new proposed footpath from O'Dwyer Bridge to the Templemore Town Park.
- xiii. Construction of a proposed stone wall separating the property boundaries and the proposed footpath, along with associated streetscape works at O'Dwyer Bridge.
- xiv. Landscape works to match existing surrounding environment at the Templemore town park.
- xv. Construction of proposed hardstand/pavement over existing channel at Youngs Garage and Templemore Motor Works.
- xvi. Demolition of existing bridge structures at residential accesses where existing channel is to be infilled.
- xvii. Landscape works to match existing surrounding environment from Templemore Motor Works, in a southerly direction, to the outfall to the existing River Mall.
- xviii. Construction of discharge headwalls.
- xix. Construct new agricultural entrance approximately 180m south of O'Dwyer's bridge on the western side of the Mall Road.

The Proposed Site Layout is presented in Appendix A.

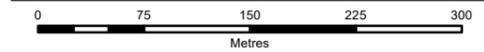
The proposed works are scheduled to commence in 2024 and last for approximately 24 weeks (including pre-construction surveys and materials procurement).

3.2 OPERATION PHASE

The operation phase of the proposed development is not likely to require any maintenance or control activities.



- Legend**
- Old Channel
 - ▶ WFD - River Water Bodies amended reach of the Suir_030 WFD river
 - - - water body representing current configuration



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	27/03/2023	Final Issue	S.P	J.M

Client: Comhairle Contae Thiobraid Árann
Tipperary County Council

Project:
Templemore Infilling works

Title:
**Figure 3-1
Site Location Map**

Scale @ A3: 1:5,000

Prepared by: S.Pezzetta Checked: J.Martins Date: March 2023

Project Director: D.Grehan

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4.0 METHODOLOGY

4.1 GUIDANCE DOCUMENTATION

This report has been carried out using the following guidance:

- Communication from the Commission on the Precautionary Principle (European Commission, 2000);
- Nature and Biodiversity Cases: Ruling of the European Court of Justice (European Commission, 2006);
- Managing Natura 2000 sites – The provisions of Article 6 of the Habitats Directive 92/43/EEC (European Commission, 2019);
- Interpretation Manual of European Union Habitats (European Commission, 2013);
- Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities (DoEHLG, 2010);
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (European Commission, 2007);
- Nature and biodiversity cases (European Commission, 2006);
- Article 6 of the Habitats Directive: Rulings of the European Court of Justice (Sundseth and Roth, 2014);
- Assessment of plans and projects in relation to Natura 2000 sites (European Commission, 2021); and
- Appropriate Assessment Screening for Development Management (OPR, 2021).

Definitions of conservation status, integrity and significance used in this assessment are defined in accordance with European Commission (2019):

- Favourable conservation status can only be defined and achieved at the level of the natural range of a species or a habitat type. A broad conservation objective aiming at achieving favourable conservation status can, therefore, only be considered at an appropriate level, such as, for example, the national, biogeographical, or European level. The conservation measures have to correspond to the ecological requirements of the natural habitat types in Annex I and of the species in Annex II present on the site. The ecological requirements of those natural habitat types and species involve all the ecological needs which are deemed necessary to ensure the conservation of the habitat types and species. They can only be defined on a case-by-case basis and using scientific knowledge;
- The integrity of a European site is defined as the coherent sum of the site's ecological structure, function, and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated; and
- Significant effect should be determined in relation to the specific features and environmental conditions of the protected site concerned by the plan or project, taking particular account of the site's conservation objectives and ecological characteristics.

4.2 ECOLOGICAL DATA

4.2.1 Desk Study

4.2.1.1 Biodiversity Data

A desk study was undertaken to inform the appraisal in this report. The desk study comprised a review of the following key datasets and information sources:

- Identification of European sites within the Zone of Influence (Zoi) (Section 4.3.1) of the proposed development area through the identification of potential pathways from the proposed development establishing connectivity with European sites;
- Review of the National Parks and Wildlife Service (NPWS) most updated site synopsis, Natura 2000 data forms, and Conservation Objectives for European sites within the proposed development Zoi¹;
- NPWS datasets on Annex I habitats and Annex II species²;
- National Biodiversity Data Centre (NBDC) records³;
- Ireland Geospatial Data Hub⁴;
- Inland Fisheries Ireland (IFI) research data⁵;
- Water Framework Directive (WFD) monitoring information⁶;
- Geological Survey Ireland Spatial Resources⁷;
- Environmental Protection Agency (EPA) Unified GIS Application⁸; and
- Review of previous ecological assessments undertaken within the area.

4.2.1.2 Ecological Surveys

Several ecological surveys have been undertaken at, and in the vicinity of, the proposed development, associated with the Office of Public Works (OPW) River Mall (Templemore) Flood Relief Scheme. The central portal for government services and information (gov.ie) avails to the public all relevant documentation (e.g., Environmental Impact Statement - EIS) associated with this scheme, including ecological surveys over a long period range (2014 – 2021)⁹.

4.2.1.2.1 Environmental Impact Statement (2014)

The EIS for the River Mall (Templemore) Flood Relief Scheme was informed by, amongst others, a faunal assessment of mammal activity, and a set of aquatic ecology surveys undertaken in 2014.

4.2.1.2.1.1 Relevant Fauna

The relevant mammal survey conducted for the River Mall (Templemore) Flood Relief Scheme was for Otter activity (Appendix B-I), which involved searching the Templemore Demesne river corridor, locally known as River Mall, and wetlands in its vicinity, for evidence/signs of otter (e.g., tracks, scats, holts and potential direct sightings).

1 Available at <https://www.npws.ie/protected-sites>. Accessed in March 2023.

2 Available at <https://www.npws.ie/maps-and-data>. Accessed in March 2023.

3 Available at <https://maps.biodiversityireland.ie/>. Accessed in March 2023.

4 Available at <https://www.geohive.ie/>. Accessed in March 2023.

5 Available at <https://www.fisheriesireland.ie/>. Accessed in March 2023.

6 Available at <https://www.catchments.ie/>. Accessed in March 2023.

7 Available at <https://www.gsi.ie/en-ie/Pages/default.aspx>. Accessed in March 2023.

8 Available at <https://gis.epa.ie/EPAMaps/>. Accessed in March 2023.

9 Available at gov.ie - River Mall (Templemore) Flood Relief Scheme: Relevant Documentation (www.gov.ie). Accessed in March 2023.

An assessment of habitat suitability for Otter was also conducted within that study area.

4.2.1.2.1.2 Aquatic Ecology

The aquatic ecology surveys carried out in support of the EIS for the River Mall (Templemore) Flood Relief Scheme (Appendix B-II) comprised surveys of:

- Habitat Assessment;
- Electrofishing;
- White-Clawed Crayfish (*Austropotamobius pallipes*); and
- Aquatic macroinvertebrate assemblage.

It is important to note that these surveys were undertaken prior to the works associated with the river diversion for the River Mall (Templemore) Flood Relief Scheme. At that moment in time, the proposed development channel carried the Templemore_Demesne river (EPA Code: 16T38), locally known as River Mall.

4.2.1.2.2 White-clawed Crayfish Trapping and Translocation (2021)

One of the mitigation measures prescribed in the EIS, mentioned in Section 4.2.1.2.1, was the translocation of White-clawed Crayfish from the diverted channel and thalweg area of in-stream works (TOBIN Consulting Engineers, 2021). It included a Crayfish survey (carried out in July 2021) and trapping (setting 61 traps across the study area for 6 days, in August/September 2021; hand searching/collecting, electrofishing, evening visual search).

4.3 RELEVANT EUROPEAN SITES

The identification of relevant European sites to be included in this report was based on the identification of the Zol of the proposed development, a source-pathway-receptor model of effects, and the likely significance of any identified effects.

4.3.1 Zone of Influence

Guidance in AA of plans and projects in Ireland notes that a distance of 15km is recommended for the preliminary identification of relevant European sites (DoEHLG, 2010). For some projects the distance could be much less than 15km, and in some cases less than 100m, but it must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects.

Following the guidance set out by the NRA (2009), the proposed development has been evaluated based on an identified Zol with regard to the potential impact pathways to ecological feature (e.g. mobile and static). The Zol of the proposed development on mobile species (e.g., birds, mammals, and fish), and static species and habitats (e.g., saltmarshes, woodlands, and flora) is considered differently. Mobile species have a 'range' outside of the European site in which they are a Qualifying Interest (QI) or a Special Conservation Interest (SCI). The range of mobile QI/SCI species varies considerably, from several metres (e.g., in the case of Whorl Snail, *Vertigo* spp.), to hundreds of kilometres (in the case of migratory wetland birds). Whilst static species and habitats are generally considered to have a Zol within close proximity of the proposed development, they can be significantly affected at considerable distances from an effect source; for example, where an aquatic QI habitat or plant is located many kilometres downstream from a pollution source.

Hydrological linkages between the proposed development and European sites (and their QIs/SCIs) can occur over significant distances. However, any effect will be site specific depending on the receiving water environment and nature of the potential impact. In the case of the proposed development, a reasonable worst-case Zol for water pollution is considered to not extend beyond the first water body of depositional nature (e.g., transitional water body). Therefore, the Zol for water pollution from the proposed development will not be considered likely beyond the Upper Suir Estuary WFD transitional water body (Section 5.1.3.2).

4.3.2 Source-Pathway-Receptor Model

The likely effects of the proposed development on European sites have been appraised using a source-pathway-receptor model, a standard tool used in environmental assessment (Holdgate, 1979), where:

- A 'source' is defined as the individual element of the proposed development that has the potential to impact on a European site, its qualifying features, and its conservation objectives;
- A 'pathway' is defined as the means or route by which a source can affect the ecological receptor; and
- A 'receptor' is defined as the SCI of SPA or the QI of SAC for which Conservation Objectives have been set for the European sites being screened.

The existence of a pathway is a crucial element in the screening process. If no pathway can be identified between the 'source' and the 'receptor', then no effect can be anticipated on the receptor (OPR, 2021).

4.3.3 Likely Significant Effect

It is relevant to distinguish between 'impact' and 'effect', in the context of AA. The former, 'impact', is considered the outcome of an element of a development on the environment, whereas 'effect' is how that outcome relates to the Conservation Objectives (OPR, 2021).

The threshold for a Likely Significant Effect is treated in the screening exercise as being above a de minimis level. The opinion of the Advocate General in CJEU case C-258/11 outlines:

"The requirement that the effect in question be 'significant' exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on a European site are thereby excluded. If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill".

In this report, therefore, 'relevant' European sites are those within the potential Zol of activities where pathways to European sites were identified through the source-pathway-receptor model.

5.0 RECEIVING ENVIRONMENT

The proposed development is located in Templemore, County Tipperary, within an urban setting.

5.1 DESK STUDY

5.1.1 Biodiversity Records

A search of the NBDC³ for protected and invasive alien plant species (IAPS), listed in the Third Schedule of the S.I. 477/2011, was undertaken for the S17A Ordnance Survey 2kmx2km grid square, in which the proposed development is located at. The search resulted in a list of 9 relevant species (Table 5-1).

Table 5-1: Relevant Biodiversity Records for S17A Grid Square

Common name	Scientific name	Record date	Designation
Avifauna			
Black-headed Gull	<i>Larus ridibundus</i>	31/12/2011	Wildlife Acts
Common Kingfisher	<i>Alcedo atthis</i>	11/11/2022	EU Birds Directive - Annex I; Wildlife Acts
Eurasian Wigeon	<i>Anas penelope</i>	31/12/2011	EU Birds Directive - Annex II, III; Wildlife Acts
Mallard	<i>Anas platyrhynchos</i>	31/05/2014	EU Birds Directive - Annex II, Annex III; Wildlife Acts
Northern Lapwing	<i>Vanellus vanellus</i>	31/12/2011	EU Birds Directive - Annex II; Wildlife Acts
Non-volant mammals			
European Otter	<i>Lutra lutra</i>	10/09/2022	EU Habitats Directive - Annex II, IV; Wildlife Acts
Volant mammals			
Lesser Noctule	<i>Nyctalus leisleri</i>	08/08/2009	EU Habitats Directive - Annex IV; Wildlife Acts
Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	08/08/2009	EU Habitats Directive - Annex IV; Wildlife Acts
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	08/08/2009	EU Habitats Directive - Annex IV; Wildlife Acts

5.1.2 Environmental Impact Statement – Faunal Activity (2014)

The EIS for the River Mall (Templemore) Flood Relief Scheme states that “in 2008 an Otter spraint and Otter print was observed 50m upstream and immediately downstream of O’Dwyer’s Bridge, respectively”. However, no evidence of Otter activity was observed in 2014, despite the presence of suitable habitat and conditions for its occurrence (Appendix B-I).

5.1.3 Aquatic Environment

A search of the EPA Unified GIS Application⁸ was conducted for surface water bodies draining the proposed development area and their most recent WFD water quality status. The proposed development is located within the Suir WFD Catchment (16), Suir_SC_010 WFD Subcatchment (16_22).

5.1.3.1 River Water Bodies

The proposed development lies on an old and disused channel in which the Templemore_Demesne river (EPA Code: 16T38), locally known as River Mall, historically flowed. The Templemore Demesne river, which currently flows approximately 100m west (maximum distance), is part of the Suir_030 WFD river water body (IE_SE_16S020300), classified with a *Moderate* WFD water quality status for the 2016-2021 period (Invertebrate and Nitrate status being the limiting water quality factors - Table 5-2).

Following the criteria for the definition of the proposed development's Zol (Section 4.3.1), the considered hydrological pathway includes 19 other WFD river water bodies (Table 5-2). The WFD water quality status of these water bodies (and their reported limiting factors) seem to reflect the national water quality assessment results, which classifies the Suir (16) catchment as one of the catchments with the highest number of rivers with increasing nutrient concentration trends (generally associated with pasture and wastewater discharges - EPA, 2021).

Table 5-2: WFD River Water Bodies within the Considered Hydrological Pathway, and Respective WFD Water Quality Status (EPA, 2021)

WFD Water Body Name	WFD Water Body Code	Limiting Factor	WFD Water Quality Status (2016-2021)
SUIR_030	IE_SE_16S020300	Invertebrate Status; Nitrate	Moderate
SUIR_040	IE_SE_16S020400	-	Moderate
SUIR_050	IE_SE_16S020500	Nitrate	Good
SUIR_060	IE_SE_16S020600	Invertebrate Status	Poor
SUIR_070	IE_SE_16S020900	Invertebrate Status; Nitrate	Moderate
SUIR_080	IE_SE_16S021100	Invertebrate Status; Nitrate	Moderate
SUIR_090	IE_SE_16S021300	Invertebrate Status; Nitrate	Moderate
SUIR_100	IE_SE_16S021400	Invertebrate Status; Nitrate	Moderate
SUIR_110	IE_SE_16S021500	Nitrate	Good
SUIR_120	IE_SE_16S021600	Invertebrate Status; Nitrate	Moderate
SUIR_130	IE_SE_16S021700	Invertebrate Status; Nitrate	Moderate
SUIR_140	IE_SE_16S021930	Nitrate	Good
SUIR_150	IE_SE_16S022000	Nitrate	Good
SUIR_160	IE_SE_16S022200	Nitrate	Good
SUIR_170	IE_SE_16S022300	Nitrate	High
SUIR_180	IE_SE_16S022400	Nitrate	Good
SUIR_190	IE_SE_16S022600	Nitrate	Good
SUIR_200	IE_SE_16S022700	Invertebrate Status; Nitrate	Moderate
SUIR_210	IE_SE_16S022750	Invertebrate Status; Nitrate	Moderate
SUIR_220	IE_SE_16S022850	Invertebrate Status	Poor

5.1.3.2 Transitional Water Bodies

The surface water body limiting the downstream extent of the hydrological pathway from the proposed development is the Upper Suir Estuary WFD transitional water body

(IE_SE_100_0600). *Phytoplankton* has been identified as the determining element for the *Bad* WFD water quality status of transitional water body in the 2016 to 2021 period (EPA, 2021).

5.1.4 Aquatic Ecology

5.1.4.1 Environmental Impact Statement – Aquatic Ecology (2014)

The relevant results from the aquatic surveys conducted in 2014 reflect the historical presence of several protected species at the proposed development (when it was the channel of the Templemore_Demesne river), and downstream (Table 5-3). The low values of abundance could be related to reported disturbance activities occurring shortly before the survey, rather than indicating a marginal importance of the area for these protected species.

Table 5-3: Summary of Aquatic Survey Results in Support of the EIS for the River Mall (Templemore) Flood Relief Scheme (Appendix B-II)

Site ID	Distance to proposed development ('as the crow flies'; d/s – downstream)	Relevant Species	Abundance
1	2.2km d/s	White-clawed Crayfish <i>Austropotamobius pallipes</i>	1
2	1.2km d/s	White-clawed Crayfish <i>Austropotamobius pallipes</i>	9
3	50m d/s	White-clawed Crayfish <i>Austropotamobius pallipes</i>	1
4	Within proposed development reach	Atlantic Salmon (<i>Salmo salar</i>)	3
		Brook Lamprey (<i>Lampetra planeri</i>)	1
		White-clawed Crayfish <i>Austropotamobius pallipes</i>	5
5	Within proposed development reach	Atlantic Salmon (<i>Salmo salar</i>)	1
		White-clawed Crayfish <i>Austropotamobius pallipes</i>	1
6	Within proposed development reach	Brook Lamprey (<i>Lampetra planeri</i>)	6
7	Within proposed development reach	White-clawed Crayfish <i>Austropotamobius pallipes</i>	1

5.1.4.2 White-clawed Crayfish Trapping and Translocation (2021)

Despite the thorough search for White-clawed Crayfish during the surveys in 2021, no live specimens were found. These results have been attributed to the river's low water quality due to an ongoing discharge of raw sewage – "(...) raw sewage was discovered discharging into the river due to a combined sewer blockage (...) it was noted that this discharge had greatly impacted on the quality of water and there was a large presence of bacteria and algae especially on the right hand bank where the pipe was discharging" (TOBIN Consulting Engineers, 2021). The discovery of two dead crayfish and a calcified shell near the southern end of the proposed development is likely to be related to the mentioned contamination.

5.1.5 European sites

There are 2 European sites (SAC) within the proposed development ZoI (Figure 5-1): Devilsbit Mountain SAC [000934] and Lower River Suir SAC [002137] (Table 5-4).

Table 5-4: Relevant European Sites, Conservation Objectives and Connectivity to the Proposed Development (Highlighted QI/SCI/European Sites are Identified with Potential Pathways with the Proposed Development)

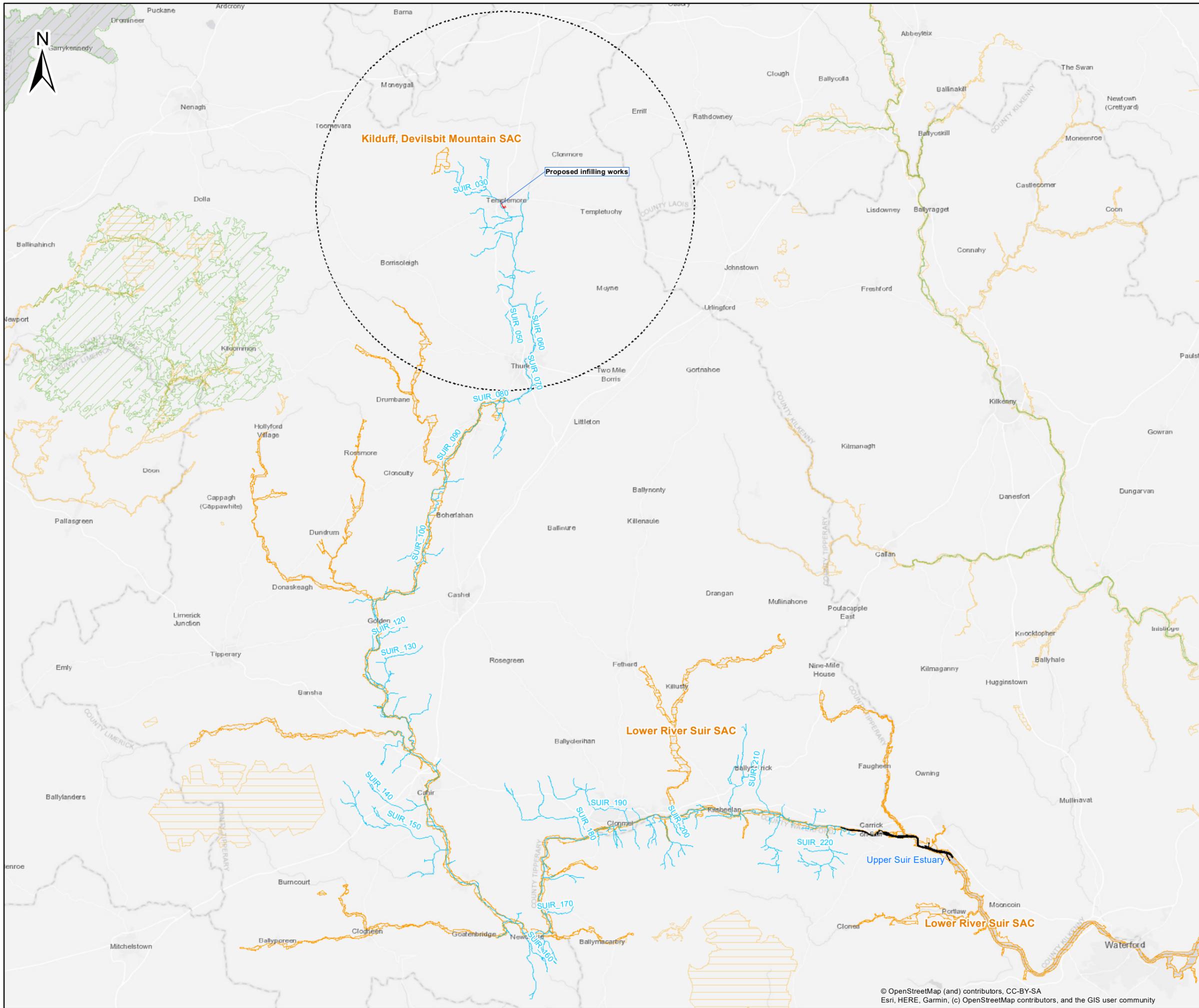
European Site	Conservation Objectives; Statutory Instrument	Distance from Proposed Development	Qualifying Interests/Special Conservation Interests	Proposed Development Connectivity
Kilduff, Devilsbit Mountain SAC [000934]	Version 1 (NPWS, 2018a); S.I. 145/2017	4.7km	<ul style="list-style-type: none"> European dry heaths [4030] Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* [6230] 	<p>No.</p> <p>The proposed development is located at enough distance to exclude any direct links with both of the Kilduff, Devilsbit Mountain SAC QI, and is located downstream of the SAC, which would impede hydrological connectivity in the SAC direction.</p>
Lower River Suir SAC [002137]	Version 1 (NPWS, 2017a); -	11.2km	<ul style="list-style-type: none"> Freshwater Pearl Mussel <i>Margaritifera margaritifera</i> [1029] 	<p>Yes.</p> <p>Although the Conservation Objectives for Freshwater Pearl Mussel of the Lower River Suir SAC only applies to the Clodiagh population, which inhabits the Clodiagh[Portlaw]_SC_010 WFD Subcatchment (16_17), Freshwater Pearl Mussel is dependent on salmonid fish (e.g., Atlantic Salmon). As salmonid fish occur within the Suir_030 WFD river water body, near the proposed development, which, given the species anadromy, may swim to the Clodiagh[Portlaw]_SC_010 WFD Subcatchment, there is ecological connectivity between the proposed development and the Freshwater Pearl Mussel population of the Lower River Suir SAC.</p>
			<ul style="list-style-type: none"> White-clawed Crayfish <i>Austropotamobius pallipes</i> [1092] 	<p>Yes.</p> <p>Despite the relatively long distance between the proposed development and the Lower River Suir SAC, the proposed development is located upstream of the SAC and, most importantly, the QI mobile species 1092 has been regularly recorded within the proposed development's vicinity (Section 5.1.4), whose individuals could be linked to the SAC population.</p>

European Site	Conservation Objectives; Statutory Instrument	Distance from Proposed Development	Qualifying Interests/Special Conservation Interests	Proposed Development Connectivity
			<ul style="list-style-type: none"> Sea Lamprey <i>Petromyzon marinus</i> [1095] 	<p>Yes.</p> <p>Although the adult part of the life cycle of Sea Lamprey [1095] might occur beyond the considered hydrological pathway from the proposed development, the larvae of all three species occur within the same type of habitat – silty sands in running freshwater (Maitland, 2003), which occurs within the considered hydrological pathway from the proposed development.</p>
			<ul style="list-style-type: none"> Brook Lamprey <i>Lampetra planeri</i> [1096] 	
			<ul style="list-style-type: none"> River Lamprey <i>Lampetra fluviatilis</i> [1099] 	
			<ul style="list-style-type: none"> Twaite Shad <i>Alosa fallax fallax</i> [1103] 	<p>Yes.</p> <p>The diadromous nature of Twaite Shad [1103] imparts the likelihood of its occurrence within the considered hydrological pathway from the proposed development.</p>
			<ul style="list-style-type: none"> Salmon <i>Salmo salar</i> [1106] 	<p>Yes.</p> <p>Despite the relatively long distance between the proposed development and the Lower River Suir SAC, the proposed development is located upstream of the SAC and, most importantly, the QI mobile species 1106 has been recorded within the proposed development’s vicinity (Section 5.1.4).</p>
			<ul style="list-style-type: none"> Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] 	<p>No.</p> <p>The QI 1330 has a restricted distribution, between the neap tide level and the high water spring tide level. This designated habitat has been recorded in the Lower River Suir SAC, at Little Island (McCorry and Ryle, 2009), within the Lower Suir Estuary (Little Island - Cheekpoint) WFD transitional water body (IE_SE_100_0500), which is beyond the considered hydrological pathway from the proposed development.</p>
			<ul style="list-style-type: none"> Otter <i>Lutra lutra</i> [1355] 	<p>Yes.</p> <p>Otters are known to be in the vicinity of the proposed development. Otters occasionally use the new river channel for feeding and commuting purposes. Otters are also known to visit the Templemore Town Park Lake.</p>

European Site	Conservation Objectives; Statutory Instrument	Distance from Proposed Development	Qualifying Interests/Special Conservation Interests	Proposed Development Connectivity	
			<ul style="list-style-type: none"> Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] 	<p>No. The QI 1410 has been referred to be likely present across the Lower River Suir SAC (NPWS, 2017b), despite not being recorded by McCorry and Ryle (2009). Nevertheless, because this saltmarsh habitat QI has a distribution restricted to areas highly influenced by tides, it is not likely that the QI 1410 is present within the hydrological pathway from the proposed development.</p>	
			<ul style="list-style-type: none"> Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] 	<p>Yes. As the area and distribution of the QI 3260 in the Lower River Suir SAC is currently unknown, and the description of the QI habitat includes both upland eroding rivers, and lowland depositing rivers (both types abundant in the Lower River Suir SAC), connectivity between the proposed development and QI 3260 will be considered (following the precautionary principle - European Commission, 2000).</p>	
			<ul style="list-style-type: none"> Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] 	<p>Yes. Despite the QI habitat 6430 not being mapped in detail for the Lower River Suir SAC, this QI habitat has been observed at several locations within the hydrological pathway from the proposed development (e.g., Fiddown). As the QI habitat 6430 is reported to occur in association with alluvial forests (i.e., within the floodplain), it is hydrologically connected with the proposed development.</p>	
				<ul style="list-style-type: none"> Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] 	<p>No. Additional to the terrestrial nature of QI habitat 91A0 (i.e., with no pathways with the proposed development), the reported locations for its presence along the Lower River Suir SAC are upstream from any potential influence from the proposed development.</p>
				<ul style="list-style-type: none"> Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> 	<p>Yes. The designated habitat 91E0 occurs in close proximity and is dependent on surface water bodies, and, despite potentially occurring in other locations, it</p>

European Site	Conservation Objectives; Statutory Instrument	Distance from Proposed Development	Qualifying Interests/Special Conservation Interests	Proposed Development Connectivity
			<p>(<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* [91E0]</p> <ul style="list-style-type: none"> <i>Taxus baccata</i> woods of the British Isles* [91J0] 	<p>has been reported as present at several locations within the hydrological pathway from the proposed development (e.g., Fiddown).</p> <p>No. Additional to the terrestrial nature of QI habitat 91J0 (i.e., with no pathways with the proposed development), the reported locations for its presence along the Lower River Suir SAC are upstream from any potential influence from the proposed development.</p>

* indicates a priority habitat under the Habitats Directive



- Legend**
- Proposed Infilling Works
 - 15km Buffer
 - Special Protection Areas (SPAs)
 - Special Areas of Conservation (SACs)
 - WFD - Transitional Water Bodies



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	27/03/2023	Final issue	S.P	J.M

Client: Comhairle Contae Thiobraid Árann
Tipperary County Council

Project:
Templemore Infilling works

Title:
**Figure 5-1
Designated sites within
15km of the site boundary**

Scale @ A3: 1:280,000

Prepared by: S.Pezzetta Checked: J.Martins Date: March 2023

Project Director: D.Grehan

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6.0 STAGE 1: SCREENING FOR APPROPRIATE ASSESSMENT

6.1 MANAGEMENT OF EUROPEAN SITES

Screening for AA is not required where a development is associated with, or necessary for, the management of any European site. In the case of the proposed development, it is not directly connected with, or necessary to the management of any European site(s).

6.2 ASSESSMENT OF SOURCE-PATHWAY-RECEPTOR MODEL

As described in Section 4.3.2, this report adopts the appraisal of the source-pathway-receptor model. Table 6-1 elaborates on the source-pathway-receptor model for the proposed development, identifying the European sites that could be the potential receptors of likely significant effects, which is specifically appraised in Section 6.2.1.

6.2.1 *Scoping of Effects on European Sites*

6.2.1.1 Construction Phase

6.2.1.1.1 Disturbance of QIs

The construction phase of the proposed development involve works and activities that commonly generate high levels of noise and vibration (e.g., demolition). Considering the presence of mobile QI species within the vicinity of the proposed development (Section 5.0), disturbance effects on foraging, feeding, resting and/or breeding behaviours could potentially affect the integrity of their populations.

The potential disturbance cause by the proposed development construction phase is likely to affect the mobile QI of the Lower River Suir SAC occurring *ex-situ*, within the proposed development vicinity (Table 5-4).

6.2.1.1.2 Degradation of Water Quality/Contamination

Considering the demolitions, infilling and improvement works and activities during the construction phase of the proposed development, there is potential of sediment loss from the site, which could be drained away with surface water run-off, discharging into the Suir_030 WFD river water body. Sediment inputs to rivers and streams may negatively affect their habitat conditions, reducing the particle size of the river bed, blocking interstitial spaces and degrading habitat quality for fish, invertebrates and mammals (Geist and Auerswald, 2007), even if these sediment inputs will only be occasional (Reid *et al.*, 2012).

Also, landscape works are commonly associated with the application of fertilisers, herbicides/pesticides, and other products to limit the occurrence and growth of ruderal plants, while favouring the settlement of ornamental species. These products, if applied along the proposed development, are likely to be washed off and discharged into the Suir_030 WFD river water body, which would likely degrade its water quality, and of the surface water bodies forming the hydrological pathway from the proposed development, through contamination and/or eutrophication.

Finally, the use and storage of toxic materials during the construction phase of the proposed development (e.g., hydrocarbons, concrete) may give rise to accidental spillages, which may be

transported with surface water runoff and contaminate the receiving Suir_030 WFD river water body.

The described sources for potential effects on water quality from the proposed development construction phase are likely to affect the QI of the Lower River Suir SAC highlighted in Table 5-4.

6.2.1.1.3 Spread of Invasive Alien Plant Species

The construction phase of the proposed development involves infilling works to match the existing ground elevations. Although not specified, the likely natural filling material (e.g., sand) is expected to be imported from a remote location and could carry IAPS fragments/seeds into the proposed works area.

The spread and settlement of IAPS at the proposed works area could progressively create a monodominant and poor quality habitat, increase erosion and collapse of river banks and outcompete native species (TII, 2020). These effects are not only restricted to the proposed development surrounding area, where mobile QI of the Lower River Suir SAC could be indirectly affected, but, considering the hydrological connectivity with the Lower River Suir SAC to some of the QI habitats, these designated habitats could also be significantly affected (Table 5-4).

6.2.1.2 Operation Phase

6.2.1.2.1 Degradation of water quality/Contamination

As described in Section 3.0, the proposed development will gather the effluents of 26 surface drainage outfalls (Tipperary County Council, pers. comm.), directing them to the existing local SuDS infrastructure – a petrol interceptor.

As a probable significantly larger volume of water run-off will be reaching this petrol interceptor, it is likely that, without corrective measures, the pollutant/sediment separation capacity of this SuDS element will be affected and the released effluent may contain higher concentrations of sediment and pollutants, which, similarly to Section 6.2.1.1.2, would be discharged to the Suir_030 WFD river water body and could affect the QI of the Lower River Suir SAC highlighted in Table 5-4.

Table 6-1: Source-Pathway-Receptor Model for the Proposed Development

Activity	Source/Impact	Pathway	European Sites Potentially Affected
Construction Phase			
<ul style="list-style-type: none"> • Construction works; • Illumination; • Human presence; and • Movements of vehicles/machinery. 	<ul style="list-style-type: none"> • Noise; • Movement (people and vehicles/machinery); • Vibration; and • Lighting. 	<ul style="list-style-type: none"> • Visual; • Sound; and • Contact surface. 	<ul style="list-style-type: none"> • Considering the connectivity to European sites appraised in Table 5-4, the Lower River Suir SAC [002137] is considered a receptor for likely significant effects during the construction phase of the proposed development.
<ul style="list-style-type: none"> • Demolition works; • Construction, improvement, and road widening/vehicular access works; • Stockpiling; • Machinery operation; and • Usage/storage of fertilisers (for landscape works) and/or toxic materials (e.g., concrete, hydrocarbons). 	<ul style="list-style-type: none"> • Sediment laden run-off; • Contaminant spillages. 	<ul style="list-style-type: none"> • Hydrological. 	<ul style="list-style-type: none"> • The Lower River Suir SAC [002137] has been considered hydrologically connected with the proposed development (Table 5-4), thus considered a receptor for likely significant effects during the construction phase of the proposed development.
<ul style="list-style-type: none"> • Infilling works. 	<ul style="list-style-type: none"> • Spread of IAPS. 	<ul style="list-style-type: none"> • Hydrological. 	<ul style="list-style-type: none"> • The Lower River Suir SAC [002137] has been considered hydrologically connected with the proposed development (Table 5-4), thus considered a receptor for likely significant effects during the construction phase of the proposed development.
Operation Phase			
<ul style="list-style-type: none"> • Increased surface run-off (from built artificial surfaces – e.g., footpaths); • Urban drainage. 	<ul style="list-style-type: none"> • Effluent with high sediment and/or contaminant (e.g., hydrocarbons) content. 	<ul style="list-style-type: none"> • Hydrological. 	<ul style="list-style-type: none"> • The Lower River Suir SAC [002137] has been considered hydrologically connected with the proposed development (Table 5-4), thus considered a receptor for likely significant effects during the operation phase of the proposed development.

6.3 IN-COMBINATION EFFECTS

Article 6(3) of the Habitats Directive requires that “Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives”. It is, therefore, required that the potential impacts of the proposed development are considered in-combination with any other relevant plans or projects.

The assessment of in-combination effects has regard to developments potentially affecting the Lower River Suir SAC, with which a potential pathway from the construction and operation phases of the proposed development has been identified (Table 5-4). The Natura Standard Data Forms of the Lower River Suir SAC (NPWS, 2018b) identifies the most important negative impacts (high and medium) and activities significantly affecting the site.

- **Lower River Suir SAC [IE0002137]**
 - A08 – Fertilisation;
 - E01 – Urbanised areas, human habitation;
 - E03 – Discharges;
 - H01 – Pollution to surface waters (limnic & terrestrial, marine & brackish);
 - J02.12.02 – Landfill, land reclamation and drying out, general; and
 - J02.01 - Dykes and flooding defence in inland water systems.

6.3.1 Plans

6.3.1.1 Tipperary County Development Plan 2022-2028

The Tipperary County Development Plan 2022-2028 (Tipperary County Council, 2022), does not mention detailed development plans for Templemore town. However, it refers the “re-development of the former Town Hall for cultural and enterprise uses, with public realm enhancement works and linkages”. Although the plan does not provide specifics on the envisaged enhancement works at the former Town Hall, the County’s *Planning Policy* assures that:

“**11-2** Ensure the protection, integrity and conservation of European Sites and Annex I and II species listed in EU Directives. Where it is determined that a development may individually, or cumulatively, impact on the integrity of European sites, the Council will require planning applications to be accompanied by a NIS in accordance with the Habitats Directive and transposing Regulations (...)”.

Therefore, it is reasonable to expect that any enhancement works at the former Town Hall, and/or other locations, will be compliant with the County’s *Planning Policy* 11-2, observing the potential for in-combination effects on European sites with other plans or projects, and, if they will be appraised as likely, a NIS will accompany the planning application, with the prescription of mitigation measures protecting European site from adverse effects.

6.3.1.2 Templemore & Environs Development Plan 2012-2018

The Templemore and Environs Development Plan 2012-2018 (Templemore Town Council, 2012) sets out the strategic planning framework, policies and objectives of the Council for land use development within the plan boundary. Although it does not provide detailed descriptions of future developments that could act in-combination with the proposed development, it sets

important policies that should assure that any planning application for Templemore town will not be allowed if negative effects to European sites will be appraised as likely, and will include an assessment of in-combination effects:

“Policy NH1 – Natura 2000 Site

It is the policy of the Council to ensure that developments are not permitted which would adversely impact on the conservation and integrity of designated or candidate Special Areas of Conservation or Special Protection Areas”; and

“Policy NH2 - Habitats Directive Assessment

It is the policy of the Council to implement the EU Habitats Directive in accordance with the Department of Environment Heritage and Local Government guidelines on Appropriate Assessment of Plans and Projects in Ireland –Guidelines for Planning Authorities’ 2009. The Councils will screen all development proposals and may require, where considered appropriate the preparation of ecological reports and/or a Natura Impact Statement to enable the determination of planning applications”.

Moreover, the Templemore and Environs Development Plan 2012-2018 (Templemore Town Council, 2012) also sets important objectives for the context of the proposed development and the potential for in-combination effects on water quality:

“Strategic Objective 6: *To ensure that the water quality of the River Suir and its tributaries, groundwater and public sources of drinking water are improved and protected from pollution”; and*

“Objective WS7: Water Framework Directive / River Basin Management Plan

It is an objective of the Council to implement the South Eastern River Management Plan by seeking to achieve, subject to resources, the water quality targets set out under the plan”.

6.3.2 Projects

A search was conducted of planning applications (projects) that could act in-combination with the proposed development using the Department of Housing, Local Government and Heritage web map portal¹⁰ and EIA portal map viewer¹¹. The search was limited to the five-year period preceding the date of issue of this report and excluded retention applications (i.e., typically local-scale residential or commercial developments where an impact has already occurred), incomplete, withdrawn, and refused applications. The projects considered to hold potential for in-combination adverse effects on the integrity of relevant European sites with the proposed development are detailed in Table 6-2.

The River Mall (Templemore) Drainage Scheme was approved by the Minister for Public Expenditure and Reform in 2017, which involved diverting the reach of the Templemore_Demesne river [EPA Code: 16T38] that crossed Templemore town (approximately 805m in length). A NIS was undertaken for this scheme⁹, which appraised the

¹⁰ Available at <https://myplan.ie/>. Accessed in March 2023.

¹¹ Available at <https://housinggov.ie/maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1>. Accessed in March 2023

potential for significant effects on the Lower River Suir QI Otter, Salmon, River Lamprey, Brook Lamprey and White-clawed Crayfish, due to deterioration of the water quality of the Templemore_Demesne river (contamination and siltation), the temporary migration barrier to anadromous species, and the potential spread of IAPS downstream. Through the prescription of mitigation measures, the NIS report concluded that the River Mall (Templemore) Drainage Scheme would not give rise to any significant direct or indirect impacts, alone and/or in combination with other plans and projects on the integrity of relevant European sites.

Planning application 18601545 consists of the demolition of a previous building and construction of a supermarket and all its associated infrastructure (above and underground), including office buildings, parking spaces, ESB substation, exterior access and lighting arrangements, drainage, riverside amenities, amongst others. A NIS was prepared for the development, which included the identification of potential sources of impact (i.e. demolition phase: surface water runoff contaminated with asbestos, chemicals and sediment; disturbance because of vibration, light pollution and human presence; construction phase: surface water runoff contaminated with chemical pollutants or sediment, disturbance; Operation phase: storm water being discharged into the river) on Atlantic Salmon, Brook and River Lamprey, White-clawed Crayfish and Otter. The NIS included mitigation measures during the construction (e.g. as asbestos removal; foul sewage/drainage from the development in an on-site storage tank, instead of a settlement pond; avoidance of direct drainage reaching the River Suir during demolition and construction works through temporary settlement storage tank, earth berms, diversion drains or bunds, silt fencing, silt traps and surface drainage protection; spillage management protocol; options are given to minimise impacts on water quality during the installation of surface water outlet pipes) and operation phases (e.g. a flow control device to be installed to maintain an acceptable discharge rate to prevent excess sewage water release during storm events; crate storage tank on crushed stone to the adjacent water course to prevent runoff water to reach the river; Petrol Interceptors installation). The NIS concluded that there would be no untreated discharges to the River Suir.

The planning application 19601159 includes the affixation of solar PV panel array to ground mounted steel frames, 1 substation, 8 inverter units, underground cable and ducts, temporary construction compound, boundary fencing, deer fencing, site entrance, access track and all associated site works all on a site of approximately 37 Ha in the townland of Ballycarrane, Thurles, Co Tipperary. Effects on water quality were appraised and mitigation measures proposed, which included, during the construction and future decommissioning phases the restriction of water drainage would be directed to watercourses. Drainage will take the form of swales, that discharge to ground via level spreaders or other stable outlets (to ground). The NIS predicted that no untreated discharges will reach the River Suir.

Application 18601370 consists of the construction of a 14-home residential development. A NIS accompanied the planning application and included the appraisal of impacts on water quality to salmon from runoff contamination. It also contained mitigation measures for the construction phase, as: the erection of silt curtain; silt trap/settlement pond; contaminants banded storage; personnel training; usage of quick-curing concrete. Upon the implementation of these mitigation measures, no impacts on the integrity of the Lower River Suir SAC were anticipated.

Finally, an AA Screening was undertaken for the appraisal of demolition works in the 19600102 planning application. It identified potential water quality effects, although no likelihood for significant impacts on the integrity and functioning of the Natura 2000 site network was accounted.

There are other consented developments, listed in Table 6-2, located in proximity of the hydrological pathway of the proposed development (e.g., Planning Applications 20729; 20386; 19600729). However, the planning authority considered that the nature and minor scale of these applications would preclude any potential for likely significant effects on European sites and, therefore, ecological reports (e.g., AA screening, NIS) were not considered necessary for these planning applications.

Considering the most important negative impacts and activities significantly affecting the Lower River Suir SAC (Section 6.3) and the nature of potential effects (without mitigation) described for the planning applications in Table 6-2, through the adoption of a precautionary approach (European Commission, 2000), in the absence of mitigation potential significant effects on water quality from the proposed development in-combination with other plans and projects along its hydrological pathway are considered likely.

Table 6-2: Relevant Projects with Potential for In-combination Adverse Effects on European Sites

Planning Application Reference Number	Project/Applicant Name and Proposed Location	Brief Development Description	Approximate Distance from Proposed Development	Date Planning Application Granted
N/A	Office of Public Works; River Mall (Templemore) Drainage Scheme	Diversion of the River Mall (i.e., Templemore Demesne river [EPA Code: 16T38]/Suir_030 WFD river water body [IE_SE_16S020300]) within the town through a long diversion channel approximately 805m in length that begins in Shortt's Field and finishes approximately 230m downstream of Small's Bridge.	0m	27/01/2017 (Minister for Public Expenditure and Reform)
20729	D.B. Homes Ltd; Manna South, Templemore, Co. Tipperary	It is proposed to construct 2 no. semi-detached two-storey houses in place of 2 no. detached dormer-type houses previously proposed, together with associated changes to development works and external works in their development.	130m	06/10/2020
20386	Brendan & Lisa Healy; Tinvoher, Loughmore, Co. Tipperary	New part two storey (low eaves), part single storey dwelling; proposed new single storey garage; proposed new treatment system, percolation area; proposed new entrance from main road; and all associated site works.	3.5km	12/08/2020
18601545	Lidl Ireland GmbH; he Former Erin Foods Factory, Slievenamon Road, Clongour, Thurles Town Parks, Thurles	The demolition of the former Erin Food Factory, associated buildings, and structures as well as works to change the levels of the site. The construction of a supermarket; a three storey office building; ESB substation building; new access arrangements and works to Slievenamon Road (N62) and Clongour Road to provide a lighted junction with all associated works above and below ground together with provision for future access to adjoining lands. The development includes riverside amenities and soft and hard landscaping areas, 305 parking spaces to service the above proposed uses and 64 cycle parking spaces; all drainage and underground works; lighting across the entire development; signage for the supermarket.	12.9km	09/08/2019
19601159	Engie Developments (Ireland) Ltd; Ballycarrane, Thurles, Co. Tipperary	The construction and operation of solar PV arrays mounted on metal frames on a 37.6ha site, inclusive of an electrical substation compound, up to 10 inverter units, a temporary construction area and ancillary facilities.	14.6km	01/07/2020
18601370	O'Gorman Construction (Ardfinnan) Ltd; Former	Demolition of existing building comprising of a single dwelling house, storage buildings and part of existing commercial building and the construction of 14 no.	53km	26/06/2019

Planning Application Reference Number	Project/Applicant Name and Proposed Location	Brief Development Description	Approximate Distance from Proposed Development	Date Planning Application Granted
	Creamery Site, Ardfinnan Village, Co. Tipperary	new dwelling houses which comprise of 6 no. terraces and 8 no. semi-detached houses, together with all roads, footpaths, underground services, connections to an existing foul sewer, additions to the existing surface water drainage network and all boundary treatments with all associated site development works.		
19600102	South City Limited;	Consist of the demolition and clearance of all existing buildings and structures on site and levelling of the site together with all associated site development works.	50km	03/04/2019
19600729	Clonmel Oil Company Limited; Ferryhouse, Waterford Road, Clonmel, Co. Tipperary	(a) new crossover arrangement at eastern end of site to provide access for service station and access/egress for oil depot; (b) dedicated HGV parking, fuelling and marshalling area including relocation of oil tanker offloading point and HGV hi-speed fuel pump; (c) car/LCV parking areas for service station; (d) relocation of drive-thru automatic brush wash with associated screens; (e) demolition of existing canopy, pump islands and underground tanks; (f) provision of 4 no. fuel pump islands with canopy over and link-back to forecourt building and new underground fuel storage tanks; (g) construction of extension to existing forecourt building to provide a store (54.48 sq.m) and deli/cafe prep area (17.76 sq.m); (h) revised internal layout including change of use from office, stores and welfare facilities to provide new deli/cafe seating area, office, stores and welfare facilities; (i) sale of specially prepared hot and cold food for consumption both on and off the premises from the deli-cafe area of forecourt building; (j) provision of revised fenestration and elevational changes to existing forecourt building; (k) ancillary signage for development, both illuminated and non-illuminated; (l) all associated site works including bin compound; (m) revised road markings at east & west crossovers on Waterford Road.	49.5km	01/04/2020

6.4 STAGE 1: SCREENING CONCLUSION

The Stage One: Screening for Appropriate Assessment provided herein has examined potential effects on designated SAC and SPA within the ZOI of the proposed development, either alone or in-combination with other plans or projects.

Following the screening process, it has been determined that adverse effects on the integrity of a European site within the Zone of Influence cannot be excluded. By virtue of the requirement for protection or mitigation measures required during construction and operation of the proposed development, the recommendation of the screening process is, therefore, to proceed to Stage Two: Appropriate Assessment with regards to the Lower River Suir SAC [002137].

7.0 STAGE 2: APPROPRIATE ASSESSMENT

This Stage 2 Appropriate Assessment (Natura Impact Statement) examines the potential for significant adverse effects on the integrity of European sites as a result of the proposed development, based on the source-pathway-receptor model, appraised in Section 6.2, and further scoped in Section 6.2.1.

Two types of sources for potential likely significant effects on European sites from the proposed development have been identified (Table 6-1). This section will specifically appraise the significance of any effects on the QI of the Lower River Suir SAC [002137] connected with the proposed development (Table 5-4) and their Conservation Objectives (CO).

7.1 SOURCES FOR LIKELY SIGNIFICANT EFFECTS

The scoping process following the source-pathway-receptor model conceptualized for the proposed development (Section 6.2) identified four types of sources for likely significant effects on European sites associated with the construction and operation phases of the proposed development:

- Construction works causing QI/SCI disturbance;
- Construction works affecting water quality (e.g., contamination and siltation);
- Spread of IAPS; and
- Development operation affecting water quality (e.g., contamination and siltation).

7.2 PATHWAYS FOR LIKELY SIGNIFICANT EFFECTS

Two pathways linking the sources of potential likely significant effects (Section 7.1) with the QI of the Lower River Suir SAC (Table 5-4) in the source-pathway-receptor model for the proposed development have been identified:

- Hydrological pathway (Section 5.1.3); and
- Terrestrial pathways (e.g., visual field, contact surface).

The proposed development is connected with 11 QI of the Lower River Suir SAC, either through hydrological, terrestrial, or a combination of both pathways, identified in Table 5-4:

- Freshwater Pearl Mussel *Margaritifera margaritifera* [1029];
- White-clawed Crayfish *Austropotamobius pallipes* [1092];
- Sea Lamprey *Petromyzon marinus* [1095];
- Brook Lamprey *Lampetra planeri* [1096];
- River Lamprey *Lampetra fluviatilis* [1099];
- Twaite Shad *Alosa fallax fallax* [1103];
- Salmon *Salmo salar* [1106];
- Otter *Lutra lutra* [1355];
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260];
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]; and
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0].

7.3 CONSERVATION OBJECTIVES LIKELY AFFECTED BY THE PROPOSED DEVELOPMENT

For the appraisal of the likelihood of significant adverse effects on the CO of the Lower River Suir SAC [002137] described in Section 6.0, through the pathways identified in Section 7.2, from the sources listed in Section 7.1, the CO attributes and targets of each QI connected with the proposed development (Table 5-4) have been considered, without the incorporation of mitigation measures, for the Construction and Operation phases of the proposed development (Table 7-1 and Table 7-2, respectively):

- Construction Phase:
 - Freshwater Pearl Mussel *Margaritifera margaritifera* [1029];
 - White-clawed Crayfish *Austropotamobius pallipes* [1092];
 - Sea Lamprey *Petromyzon marinus* [1095]; Brook Lamprey *Lampetra planeri* [1096]; River Lamprey *Lampetra fluviatilis* [1099];
 - Twaiter Shad *Alosa fallax fallax* [1103];
 - Salmon *Salmo salar* [1106];
 - Otter *Lutra lutra* [1355];
 - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260];
 - Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]; and
 - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0].
- Operation Phase:
 - Freshwater Pearl Mussel *Margaritifera margaritifera* [1029];
 - White-clawed Crayfish *Austropotamobius pallipes* [1092];
 - Sea Lamprey *Petromyzon marinus* [1095]; Brook Lamprey *Lampetra planeri* [1096]; River Lamprey *Lampetra fluviatilis* [1099];
 - Twaiter Shad *Alosa fallax fallax* [1103];
 - Salmon *Salmo salar* [1106];
 - Otter *Lutra lutra* [1355]; and
 - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260].

Table 7-1: Relevant European Sites and Respective CO Attributes for which a Pathway with the Proposed Development has been Identified (Without Mitigation, Likely Significant Effects from the Construction phase of the Proposed Development are Anticipated to the Grey Highlighted QIs/Attributes)

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
Construction Phase	Freshwater Pearl Mussel <i>Margaritifera margaritifera</i> [1029]	Distribution				
		Population size				
		Population structure: recruitment				
		Population structure: adult mortality				
		Suitable habitat: extent				
		Suitable habitat: condition				
		Water quality: macroinvertebrate and phyto-benthos (diatoms)				
		Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)				
		Substratum quality: sediment				
		Substratum quality: oxygen availability				

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Hydrological regime: flow variability				
		Host fish	See QI 1106 below		Although the Clodiagh[Portlaw]_SC_010 WFD Subcatchment (16_17), where the Clodiagh Freshwater Pearl Mussel population is located, is located upstream from any influence from the proposed development, the deterioration of water quality within the hydrological pathway of the proposed development may affect salmonid fish, the host to the larval stage of the Freshwater Pearl Mussel, which do not restrict their presence to a given sub catchment (i.e., anadromous/ potadromous species).	
		Fringing habitat: area and condition	See QI 6430 and 91E0 below			
	White-clawed Crayfish <i>Austropotamobius pallipes</i> [1092]	Distribution	Although the presence of breeding habitat within the proposed development area is not known, as the QI species occurs at that location (Section 4.2.1.2), adopting a precautionary approach (European Commission, 2000), it will		Decreasing water quality has been suggested as one of the causes for the decreasing range of White-clawed Crayfish in Ireland (Lyons and Kelly-Quinn, 2003).	

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Population structure: recruitment	be considered as present, and the sources for potential disturbance of the QI 1092 (e.g. vibration) is considered to potentially affect the species distribution and recruitment attributes significantly.			
		Negative indicator species	As the proposed development construction phase does not include any in-stream works, it is not likely that either alien crayfish species and/or crayfish plague could be introduced in the aquatic environment from the proposed development.			
		Disease				
		Water quality	It is not likely that potential QI 1092 will affect water quality and habitat heterogeneity of any	Common invasive plants that may be imported into the proposed development location include plants that die in the	The potential discharge of contaminants and/or silt-laden runoff from the proposed development site to the Templemore_Demesne river directly affects its water quality.	

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Habitat quality: heterogeneity	surface water body within the hydrological pathway from the proposed development.	winter, exposing bare earth and making it more prone to erosion leading to the excessive deposition of fine sediment in rivers (Stockan and Fielding, 2013), affecting water quality and the reducing the particle size range of the river bed, affecting habitat heterogeneity.	The excessive supply of fine sediment (silt) to a river the reduces the particle size range of the river bed, affecting habitat heterogeneity.	Contamination of a river has the potential to reduce the abundance of both macrophytes and riparian, which may reduce the availability of refuge, increase erosion, affecting habitat heterogeneity.
	Sea Lamprey <i>Petromyzon marinus</i> [1095]; Brook Lamprey <i>Lampetra planeri</i> [1096]; River Lamprey <i>Lampetra fluviatilis</i> [1099]	Distribution	It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will affect the physical accessibility of these QI species to all water courses within the Lower River Suir SAC.			
		Population structure of juveniles	It is not likely that the potential disturbance of the Lamprey QI species (1095, 1096 and 1099) will affect these attributes on any water courses within the Lower River Suir SAC.	These QI species prefer gravel-dominated substratum for spawning, and mainly silt and sand- dominated substratum for nursery habitat, while optimal ammocoete habitat are shallow waters with low water velocity, and the presence of organic detritus (Harvey and Cowx, 2003). Therefore, a change in the habitat heterogeneity by increasing direct sediment supply and/or bank erosion (from the establishment of IAPS – these are commonly plants that die in the winter, exposing the banks, making them more prone to erosion) will likely affect the population structure of these QI.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river may directly increase the QI mortality rate.	

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Juvenile density in fine sediment		It is not likely that any of these effects will negatively affect the habitat requirements of juveniles of these QI species to all water courses within the Lower River Suir SAC.		
		Extent and distribution of spawning habitat		These QI species prefer gravel-dominated substratum for spawning (Harvey and Cowx, 2003), which would be reduced by both the increased erosion from the settlement of IAPS and the direct sediment supply from the proposed development.		
		Availability of juvenile habitat		The preferred nursery substrate for these QI species is reported as being dominated by finer particle sizes (e.g. silt and sand - Harvey and Cowx, 2003), to which the potential spread of IAPS and direct siltation would contribute.		
	Twaite Shad <i>Alosa fallax fallax</i> [1103]	Distribution: extent of anadromy	It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will affect the physical accessibility of this QI species to all water courses within the Lower River Suir SAC.			
		Population structure: age classes	It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; siltation will affect the range of age classes of QI 1103 within any water courses within the Lower River Suir SAC.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne		

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality		
					Siltation	Contamination	
		Extent and distribution of spawning habitat	It is not likely that the potential disturbance of QI 1103 will affect the extent and distribution of spawning habitat and/or the oxygen levels of any water courses within the Lower River Suir SAC.	Preferred spawning habitat for Twaite Shad is reported to be diverse, with deep pools and overhanging banks for rest and shelter before and after spawning, and adjacent areas of suitable gravel over which to spawn (Maitland and Hatton-Ellis, 2003), which would be reduced by both the increased erosion from the settlement of IAPS and the direct sediment supply from the proposed development.	river may directly increase the QI mortality rate along the hydrological pathway.		
		Water quality: oxygen levels			Siltation, either induced by increased erosion from the settlement of IAPS, or by the direct sediment supply from the proposed development, may smother macrophytes, reducing spawning habitat quality for QI 1103, and the dissolved oxygen levels in the water column below 5mg/l.	The discharge of contaminants is likely to raise the Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) (e.g. Suárez and Puertas, 2005), and reduce the oxygen levels on the receiving waters below 5mg/l, which was set as the CO for this attribute.	
		Spawning habitat quality: Filamentous algae; macrophytes; sediment			The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river may directly affect the spawning habitat quality for QI 1103 along the hydrological pathway.		
	Salmon <i>Salmo salar</i> [1106]	Distribution: extent of anadromy	It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will affect the physical accessibility of Salmon to all water courses within the Lower River Suir SAC.				

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Adult spawning fish	Although the presence of spawning grounds within the proposed development area is not known, as the QI species occurs at that location (Section 4.2.1.2.1.2), adopting a precautionary approach (European Commission, 2000), it will be considered and the sources for potential disturbance of the QI 1106 (e.g. vibration) is considered to potentially affect the species adult spawning fish and Salmon fry abundance attributes significantly.	Optimal spawning sites are described as areas with shallow and swift-running water, mainly located near the banks of the river, with a bed substrate usually made of a small proportion of sand and a large proportion of coarse gravel to cobble (Bardonnet and Baglinière, 2000). The occurrence of invasive riparian plant species may impact Salmon habitat by reducing bank stability during the winter die-back and concurrently increase sediment inputs (NPWS, 2019b), which would also increase by the direct sediment supply from the proposed development, directly affecting the availability of optimal spawning habitat.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river may directly increase the QI mortality rate.	
		Salmon fry abundance	It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will affect the physical accessibility of smolt Salmon to downstream migration.	Habitat heterogeneity is one of the factors appointed for Salmon fry movement (Bardonnet and Baglinière, 2000), which is likely to be reduced by the potential spread of IAPS (and consequent likely bank erosion) and direct supply to sediment from the proposed development, along the hydrological pathway from the proposed development.		
		Out-migrating smolt abundance	It is not likely that the potential disturbance of the QI 1106 would affect the 'number and distribution of redds' and 'water quality'	Although the presence of redds within the proposed development area is not known, the habitat homogeneity promoted by potential spreading IAPS and sediment influxes from the proposed development would restrict the occurrence of Salmon redds within the hydrological pathway of the proposed development.		
		Number and distribution of redds				

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Water quality	attributes of the Lower River Suit SAC.	Common invasive plants that may be imported into the proposed development location include plants that die in the winter, exposing bare earth and making it more prone to erosion leading to the excessive deposition of fine sediment in rivers (Stockan and Fielding, 2013) which, combined with the direct sediment supply from the proposed development, is likely to affect the water quality of rivers within the hydrological pathway of the proposed development.		The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river directly affects its water quality.
	Otter <i>Lutra lutra</i> [1355]	Distribution	Otter has been reported as being a species with wide plasticity, apparently not being affected by perceived levels of disturbance (Reid <i>et al.</i> , 2013). Therefore, the potential disturbance from the proposed development construction phase is not considered likely to significantly affect Otter from the Lower River Suir SAC distribution.	The spread of IAPS may impact Otter habitat by reducing bank cover and stability during the winter die-back, restricting the QI extent of terrestrial suitable habitat and distribution.	Siltation and/or pollution may influence Otter either indirectly or directly. Indirect effects include damage to food supply or habitat, while direct effects impact of the animal itself, resulting in either rapid death, or in lowered fitness (IUCN, 1990). With regards to indirect effects to Otter, which is the type of effects the proposed development may, potentially, be associated with, although Otter has been reported as being a species with wide plasticity, the species local extinction has been attributed in some countries as a consequence of long-term exposure to toxic materials (Mason, 1995). Thus, contamination effects from the proposed development in combination with other projects (Section 6.3.2) may hinder the species distribution and occurrence.	
		Extent of terrestrial habitat			It is not likely that the potential deterioration of water quality will affect the physical accessibility of Otter to terrestrial habitats.	

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Extent of marine habitat	The hydrological pathway from the proposed development does not extend to the marine environment.			
		Extent of freshwater (river) habitat	It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will affect the physical accessibility of Otter to all freshwater habitat within the Lower River Suir SAC.			
		Extent of freshwater (lake/lagoon) habitat				
		Couching sites and holts	It is not likely that the potential disturbance of the QI 1106 would affect the physical characteristics of the riverine habitat utilised by QI 1355 of the Lower River Suir SAC.	The spread of IAPS may affect bank suitability to harbour couches and holts by reducing bank cover and stability during the winter die-back.	It is not likely that any of these effects (i.e., deterioration of water quality) will restrict the abundance and quality of couching sites and holts.	

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i>	Fish biomass available		Although the presence of Salmon spawning grounds within the proposed development area is not known, disturbance effects during the construction phase of the proposed development (e.g. vibration) was considered to potentially affect the Lower River Suir QI Salmon, which can constitute about 81% of Otter diet (Reid <i>et al.</i> , 2013).	Any potential contamination effects from the proposed development construction phase would affect the water quality of receiving surface water bodies, potentially affecting fish availability to Otter. Although Reid <i>et al.</i> (2013) concludes that Otter occurrence was not affected by water quality in the National Survey, results also indicate the majority of Otter diet items to be particularly sensitive to water quality effects, as Salmon, consequently affecting the fish biomass available.		
		Barriers to connectivity	It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will obstruct Otter's access to commuting routes.			
	Habitat area	It is not likely that any potential disturbance from the proposed development would affect the physical characteristics of any QI habitat of the Lower River Suit SAC.	The QI habitat 3260 is associated with low-nutrient, high-velocity river types which, consequently are linked with high bryophyte diversity, cascades, riffles and riparian woodland, and have been damaged in Ireland through hydrological and morphological change, eutrophication and other water pollution (NPWS, 2019a). The consequences of either the spread of IAPS and deterioration of water quality along the hydrological pathway of the proposed development could further restrict the QI habitat 3260 area and distribution.			
Habitat distribution						

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality		
					Siltation	Contamination	
		Hydrological regime: river flow		It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will affect any aspect of the hydrological regime of any river water body within the proposed development hydrological pathway.			
		Hydrological regime: groundwater discharge					
		Hydrological regime: tidal influence					
		Substratum composition: particle size range			Common invasive plants that may be imported into the proposed development location include plants that die in the winter, exposing bare earth and making it more prone to erosion leading to the excessive deposition of fine sediment in rivers (Stockan and Fielding, 2013) which, combined with the direct sediment supply from the proposed development, is likely to significantly reduce the river's substrate particle size range.	It is not likely that the potential contamination of the receiving surface water bodies will affect the substrate particle size range.	
		Water quality		Common invasive plants that may be imported into the proposed development location include plants that die in the winter, exposing bare earth and making it more prone to erosion leading to the excessive deposition of fine sediment in rivers (Stockan and Fielding, 2013) which, combined with the direct sediment supply from the proposed development, is likely to affect the water quality of rivers within the hydrological pathway of the proposed development.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river directly affects its water quality.		

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Typical species		IAPS commonly outcompete other species creating monocultural habitats (TII, 2020), which would not be compatible with the typical species of QI habitat 3260 (e.g. Opposite-leaved Pondweed, <i>Groenlandia densa</i>) which would maintain floodplain connectivity and marginal habitats.	Despite the current poor understanding of the typical species composition of the QI habitat 3260, two protected species are associated with this habitat (Opposite-leaved Pondweed (<i>Groenlandia densa</i>) and <i>Rumex crispus</i> subsp. <i>uliginosus</i>) which, given their tidal tolerance, are not likely affected by siltation.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river directly can potentially affect the occurrence of any species, as well as their corresponding habitats' connectivity.
		Floodplain connectivity			Effects of siltation within the hydrological pathway of the proposed development are not likely to significantly affect the floodplain connectivity or the marginal habitats.	
		Fringing habitats				
	Hydrophilous tall herb fringe communities of plains and of the	Habitat area	It is not likely that any potential disturbance from the proposed development would affect the physical characteristics of any QI habitat of the Lower River Suir SAC.	IAPS commonly outcompete other species creating monocultural habitats (TII, 2020), which could affect habitat the Lower River Suir SAC QI 6430 area and distribution where it occurs in association	As QI habitat 6430 is a terrestrial habitat that occurs in association with marginal habitats along rivers, it is not likely it would be affected by either siltation and/or contamination effects from the proposed development.	

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Habitat distribution		with fringe habitats along the hydrological pathway from the proposed development.		
		Hydrological regime: Flooding depth/height of water table		It is not likely that any of these effects (i.e., spread of IAPS; deterioration of water quality) will affect any aspect of the hydrological regime of any surface water body within the proposed development hydrological pathway.		
		Vegetation composition: positive indicator species (diversity)		IAPS commonly outcompete other species creating monocultural habitats (TII, 2020), which could affect habitat the Lower River Suir SAC QI 6430 area and distribution where it occurs in association with fringe habitats along the hydrological pathway from the proposed development.		Although the QI habitat 6430 occurs in association with marginal habitats along rivers, it is a terrestrial habitat, thus, not likely to be significantly affected by either siltation and/or contamination effects from the proposed development.
		Vegetation composition: positive indicator species (cover)				
		Vegetation composition: non-native species				
		Vegetation composition: negative indicator species				

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Vegetation composition: scrub, bracken, and heath Vegetation structure: height Physical structure: bare soil Physical structure: grazing and disturbance				
	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0]	Habitat area Habitat distribution Woodland size Woodland structure: cover and height Woodland structure: community diversity and extent Woodland structure: natural regeneration Hydrological regime: flooding depth/height of water table Woodland structure: dead wood	It is not likely that any potential disturbance from the proposed development would affect the physical characteristics of any QI habitat of the Lower River Suir SAC.	IAPS commonly outcompete other species creating monocultural habitats (TII, 2020), which could significantly affect all attributes for the habitat QI 91E0.	Although water quality effects from the proposed development could slightly affect the attributes and CO for habitat QI 91E0 of the Lower River Suir SAC, the magnitude of these effects is not likely to be significant at the marginal location where the habitat occurs.	

Phase	Qualifying Interest [Code]	Attribute	Mobile QI disturbance	Spread of IAPS	Deterioration of Water Quality	
					Siltation	Contamination
		Woodland structure: veteran trees Woodland structure: indicators of local distinctiveness Vegetation composition: native tree cover Vegetation composition: typical species Vegetation composition: negative indicator species				

Table 7-2: Relevant European Sites and Respective CO Attributes for which a Pathway with the Proposed Development has been Identified (Without Mitigation, Likely Significant Effects from the Operation phase of the Proposed Development are Anticipated to the Grey Highlighted QIs/Attributes)

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
Operation Phase	Freshwater Pearl Mussel <i>Margaritifera margaritifera</i> [1029]	Distribution	As the proposed development is not hydrologically connected with the Clodiagh[Portlaw]_SC_010 WFD Subcatchment, where the Clodiagh Freshwater Pearl Mussel population is located, it is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will affect the attributes for QI species 1029.	
		Population size		
		Population structure: recruitment		
		Population structure: adult mortality		
		Suitable habitat: extent		
		Suitable habitat: condition		
		Water quality: macroinvertebrate and phytobenthos (diatoms)		
		Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)		
		Substratum quality: sediment		
		Substratum quality: oxygen availability		
		Hydrological regime: flow variability		
		Host fish		
		Fringing habitat: area and condition	See QI 6430 and 91E0 below.	

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
	White-clawed Crayfish <i>Austropotamobius pallipes</i> [1092]	Distribution	Decreasing water quality has been suggested as one of the causes for the decreasing range of White-clawed Crayfish in Ireland (Lyons and Kelly-Quinn, 2003).	
Population structure: recruitment				
Negative indicator species		As the proposed development operation phase does not include any in-stream works, it is not likely that either alien crayfish species and/or crayfish plague could be introduced in the aquatic environment from the proposed development.		
Disease				
Water quality		The potential discharge of contaminants and/or silt from the proposed development site to the Templemore_Demesne river directly affects its water quality.		
Habitat quality: heterogeneity		The excessive supply of fine sediment (silt) to a river the reduces the particle size range of the river bed, affecting habitat heterogeneity.	Contamination of a river has the potential to reduce the abundance of both macrophytes and riparian vegetation, which may reduce the availability of refuge, increase erosion, affecting habitat heterogeneity.	

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
	Sea Lamprey <i>Petromyzon marinus</i> [1095]; Brook Lamprey <i>Lampetra planeri</i> [1096]; River Lamprey <i>Lampetra fluviatilis</i> [1099]	Distribution	It is not likely that any of these effects (i.e., mobile QI disturbance; spread of IAPS; deterioration of water quality) will affect the physical accessibility of these QI species to all water courses within the Lower River Suir SAC.	
		Population structure of juveniles	A change in the habitat heterogeneity by increasing direct sediment supply will likely affect the population structure of these QI.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river may directly increase the QI mortality rate.
		Juvenile density in fine sediment	It is not likely that siltation will negatively affect the habitat requirements of juveniles of these QI species to all water courses within the Lower River Suir SAC.	
		Extent and distribution of spawning habitat	These QI species prefer gravel-dominated substratum for spawning (Harvey and Cowx, 2003), which would be reduced by an increased direct sediment supply from the proposed development operation phase.	It is not likely that the deterioration of water quality through potential contamination will affect the physical characteristics of the habitat within the Lower River Suir SAC.
		Availability of juvenile habitat	The preferred nursery substrate for these QI species is reported as being dominated by finer particle sizes (e.g. silt and sand - Harvey and Cowx, 2003), to which the direct siltation from the proposed development operation phase would contribute.	

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
	Twaite Shad <i>Alosa fallax fallax</i> [1103]	Distribution: extent of anadromy	It is not likely that the deterioration of water quality will affect the physical accessibility of this QI species to all water courses within the Lower River Suir SAC.	
		Population structure: age classes	It is not likely that siltation will affect the range of age classes of QI 1103 within any water course within the Lower River Suir SAC.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river may directly increase the QI mortality rate along the hydrological pathway.
		Extent and distribution of spawning habitat	Preferred spawning habitat for Twaite Shad is reported to be diverse, with deep pools and overhanging banks for rest and shelter before and after spawning, and adjacent areas of suitable gravel over which to spawn (Maitland and Hatton-Ellis, 2003), which could be reduced by the direct sediment supply from the proposed development operation phase.	
		Water quality: oxygen levels	Siltation from the operation phase of the proposed development, may smother macrophytes, reducing spawning habitat quality for QI 1103, and the dissolved oxygen levels in the water column below 5mg/l.	The discharge of contaminants is likely to raise the Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) (e.g. Suárez and Puertas, 2005), and reduce the oxygen levels on the receiving waters below 5mg/l, which was set as the CO for this attribute.
		Spawning habitat quality: Filamentous algae; macrophytes; sediment		The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river may directly affect the spawning habitat quality for QI 1103 along the hydrological pathway.

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
	Salmon <i>Salmo salar</i> [1106]	Distribution: extent of anadromy	It is not likely that the potential deterioration of water quality will affect the physical accessibility of Salmon to all water courses within the Lower River Suir SAC.	
		Adult spawning fish	Optimal spawning sites are described as areas with shallow and swift-running water, mainly located near the banks of the river, with a bed substrate usually made of a small proportion of sand and a large proportion of coarse gravel to cobble (Bardonnet and Baglinière, 2000). This direct sediment supply from the proposed development operation phase would directly affect the availability of optimal spawning habitat.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river may directly increase the QI mortality rate.
		Salmon fry abundance	Habitat heterogeneity is one of the factors appointed for Salmon fry movement (Bardonnet and Baglinière, 2000), which is likely to be reduced by direct supply to sediment from the proposed development operation phase, along the hydrological pathway from the proposed development.	
		Out-migrating smolt abundance	It is not likely that potential siltation from the operation phase of the proposed development will affect the smolt Salmon to downstream migration.	

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
		Number and distribution of redds	Although the presence of redds within the proposed development area is not known, the habitat homogeneity promoted by potential sediment influxes from the proposed development operation phase would restrict the occurrence of Salmon redds within the hydrological pathway of the proposed development.	
		Water quality	The potential discharge of sediment/silt and/or contaminants from the proposed development operation phase to the Templemore_Demesne river directly affects its water quality.	
	Otter <i>Lutra lutra</i> [1355]	Distribution	Siltation and/or pollution may influence Otter either indirectly or directly. Indirect effects include damage to food supply or habitat, while direct effects impact of the animal itself, resulting in either rapid death, or in lowered fitness (IUCN, 1990). With regards to indirect effects to Otter, which is the type of effects the proposed development may, potentially, be associated with, although Otter has been reported as being a species with wide plasticity, the species local extinction has been attributed in some countries as a consequence of long-term exposure to toxic materials (Mason, 1995). Thus, contamination effects from the proposed development in-combination with other projects (Section 6.3.2) may hinder the species distribution and occurrence.	
		Extent of terrestrial habitat	It is not likely that the potential deterioration of water quality from the proposed development operation phase will affect the physical accessibility of Otter to terrestrial, marine and/or freshwater habitats.	
		Extent of marine habitat		
		Extent of freshwater (river) habitat		

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
		Extent of freshwater (lake/lagoon) habitat		
		Couching sites and holts	It is not likely that any of these effects (i.e., deterioration of water quality) will restrict the abundance and quality of couching sites and holts.	
		Fish biomass available	Any potential contamination effects from the proposed development operation phase would affect the water quality of receiving surface water bodies, potentially affecting fish availability to Otter. Although Reid <i>et al.</i> (2013) concludes that Otter occurrence was not affected by water quality in the National Survey, results also indicate the majority of Otter diet items to be particularly sensitive to water quality effects, as Salmon, consequently affecting the fish biomass available	
		Barriers to connectivity	It is not likely that the potential deterioration of water quality from the operation phase of the proposed development will obstruct Otter's access to commuting routes.	
	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260]	Habitat area	The QI habitat 3260 is associated with low-nutrient, high-velocity river types which, consequently are linked with high bryophyte diversity, cascades, riffles and riparian woodland, and have been damaged in Ireland through hydrological and morphological change, eutrophication and other water pollution (NPWS, 2019a). The consequences of the potential deterioration of water quality from the operation phase of the proposed development along its hydrological pathway could further restrict the QI habitat 3260 area and distribution.	
		Habitat distribution		
		Hydrological regime: river flow		
		Hydrological regime: groundwater discharge	It is not likely that the potential deterioration of water quality will affect any aspect of the hydrological regime of any river water body within the proposed development hydrological pathway.	
		Hydrological regime: tidal influence		
		Substratum composition: particle size range	Potential direct sediment supply from the proposed development operation phase is likely to significantly reduce the river's substrate particle size range.	It is not likely that the potential contamination of the receiving surface water bodies will affect the substrate particle size range.
		Water quality	The potential discharge of sediment/silt and/or contaminants from the proposed development operation phase to the Templemore_Demesne river directly affects its water quality.	

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
		Typical species	Despite the current poor understanding of the typical species composition of the QI habitat 3260, two protected species are associated with this habitat (Opposite-leaved Pondweed (<i>Groenlandia densa</i>) and <i>Rumex crispus</i> subsp. <i>uliginosus</i>) which, given their tidal tolerance, are not likely affected by siltation.	The potential discharge of contaminants from the proposed development site to the Templemore_Demesne river directly can potentially affect the occurrence of any species, as well as their corresponding habitats' connectivity.
		Floodplain connectivity	Effects of siltation within the hydrological pathway of the proposed development are not likely to significantly affect the floodplain connectivity or the marginal habitats.	
		Fringing habitats		
	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	Habitat area	Although QI habitat 6430 occurs in association with marginal habitats along rivers, it is a terrestrial habitat, and its area and distribution are not likely to be significantly affected by either siltation and/or contamination effects from the proposed development operation phase.	
		Habitat distribution		
		Hydrological regime: Flooding depth/height of water table	It is not likely that the potential deterioration of water quality from the proposed development operation phase will affect any aspect of the hydrological regime of any surface water body within the proposed development hydrological pathway.	
		Vegetation composition: positive indicator species (diversity)	Although the QI habitat 6430 occurs in association with marginal habitats along rivers, it is a terrestrial habitat, thus, not likely to be significantly affected by either siltation and/or contamination effects from the proposed development.	
		Vegetation composition: positive indicator species (cover)		
		Vegetation composition: non-native species		

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
		Vegetation composition: negative indicator species		
		Vegetation composition: scrub, bracken, and heath		
		Vegetation structure: height		
		Physical structure: bare soil		
		Physical structure: grazing and disturbance		
	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0]	Habitat area		
		Habitat distribution		
		Woodland size		
		Woodland structure: cover and height		
		Woodland structure: community diversity and extent		
		Woodland structure: natural regeneration		
		Hydrological regime: flooding depth/height of water table		
		Woodland structure: dead wood		
		Woodland structure: veteran trees		
Woodland structure: indicators of local distinctiveness				
Vegetation composition: native tree cover				
Vegetation composition: typical species				

Phase	Qualifying Interest [Code]	Attribute	Deterioration of Water Quality	
			Siltation	Contamination
		Vegetation composition: negative indicator species		

8.0 MITIGATION

The mitigation measures proposed herein are aimed at preventing the proposed development construction and operation phases to give rise to any adverse effects to European sites and their CO, in particular the avoidance of the sources identified in Section 6.2 and elaborated in Section 6.2.1. Moreover, all works and activities to be undertaken during the proposed development's construction and operation phases will fully comply with Best Practice/Industry Standards.

8.1 CONSTRUCTION PHASE

An outline Construction Environmental Management Plan (CEMP) will be prepared as part of the design, covering the potential environmental risks and the proposed environmental construction strategies that are to be carried out before and during the construction phase of the proposed development. It will include scheduling of works and best practice measures in relation to the prevention of environmental impacts. The CEMP will be a live document that will be updated according to changing circumstances on the project and to reflect activities on site. It is intended that this outline CEMP will be finalised by the appointed contractor prior to commencement of construction.

The CEMP will include, amongst other procedures, the following general measures:

- All site contractors will be briefed regarding the biodiversity value of the surrounding landscape, including adjacent wetland habitats and its sensitivities, particularly the designated species that occur in proximity of the proposed development. The briefing should also raise awareness to environmentally damaging actions conducted during the construction phase and that such matters often arise accidentally through lack of awareness, rather than as a result of an intentional action;
- An Environmental Clerk of Works (ECoW) will be employed by the appointed contractor to oversee the construction phase of the proposed development and monitor and prevent the occurrence of any source of likely significant effects identified in Section 7.1. Particular attention will be devoted on the prevention of contaminant spillages; and
- The appointed contractor will ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts for heavy rainfall (i.e., if there is a yellow weather warning in place or 5mm in a 1-hour period) is required and the Contractor will be required to prepare a contingency plan for before and after such events.

Moreover, for the prevention of effects on European sites, as elaborated in Section 7.0, specific mitigation measures are proposed in Table 8-1.

Table 8-1: Specific Mitigation measures for the Prevention of Adverse Significant Effects on European Sites During the construction phase of the proposed development

Mitigated Effect	Construction Phase Element	Mitigation Measure	Rationale
Disturbance of mobile QI	Machinery operation	<ul style="list-style-type: none"> Control at Source Noise Barrier 	<ul style="list-style-type: none"> Vehicles and machinery will be switched off when not in use and not let idling. Following NRA (2004) guidelines, the simplest noise mitigation measure is the creation of a barrier. Construction site hoarding of a minimum of 2.5m in height, with a mass per unit of surface area greater than 7kg/m² will be used to provide sound insulation;
	Light	<ul style="list-style-type: none"> Works timing & lighting 	<ul style="list-style-type: none"> All construction works will be carried out during daylight hours and artificial lighting will not be allowed to spill into areas beyond the proposed development site boundary – i.e., into the Templemore_Demesne river and riparian habitats.
Spread of IAPS	Infilling works	<ul style="list-style-type: none"> Prevention of importing IAPS into the proposed development site 	<ul style="list-style-type: none"> If soil is imported to the site for landscaping, infilling or embankments, the contractor shall gain documentation from suppliers that it is free from invasive species.
Siltation	Demolition/Excavation	<ul style="list-style-type: none"> Overburden storage 	<ul style="list-style-type: none"> For the temporary storage of excavated and/or demolition material, site preparation should take place during dry season wherever possible. Construction should stop during heavy rains; No permanent storage of excavated and/or demolition material will be permitted within 20m of the Templemore_Demesne river; Sloping ground and areas with wet ground conditions will be avoided; The excavated and/or demolition material storage area will be located on flat vegetated ground, as the existing vegetation will act as an effective buffer against any sediment in runoff from the storage area;

Mitigated Effect	Construction Phase Element	Mitigation Measure	Rationale
			<ul style="list-style-type: none"> • Stockpiling of materials at appropriate heights / batters to prevent potential instability; • A reduced stockpile height of 2m will apply to any top soil / soil forming materials to prevent possible degradation of soil structure; • The temporary excavated and/or demolition material will be piled at a 2:1 slope ratio, with the smaller slope gradient facing the watercourse. The shallow gradient should be not greater than 20°; • The temporary excavated and/or demolition material will be placed behind the access road. The gravel access road is a minimum 10cm in height from ground level, this will act as a bund for surface water runoff; • Rock boulders will be placed at the base of the temporary stockpile to give stability and prevent collapse. These will act as rock anchors; • The stockpile deposition area will be enclosed within erosion control fencing (silt curtain) prior to works being undertaken; so as to intercept and minimise the potential direct runoff from the works area to the adjacent watercourses; • A silt curtain will be placed at the base of the stockpile between the rock boulders and the access road, this will allow surface water runoff to collect at the base of the access road and act as a bund; • A silt curtain will be placed on the opposite side of the access road, approximately 15m from the watercourse to prevent surface water runoff directly entering the watercourse; • A silt curtain will be placed along the drain ditch (minimum distance of 10m), located northwest of the temporary stockpile site; • A buffer zone will remain between the silt curtain and the watercourse (river and drainage ditch) with riparian vegetation left intact for its protection to a minimum distance of 20m; • Surface water filtered through the silt curtains be intercepted by the riparian vegetation before entering the watercourses;

Mitigated Effect	Construction Phase Element	Mitigation Measure	Rationale
			<ul style="list-style-type: none"> The temporary excavated and/or demolition material will be delivered by lorries to the stockpile area via the access road; A periodic inspection will be carried out to verify and inspect the effectiveness and integrity of the silt curtains; A periodic inspection will be carried out to verify and inspect the integrity of the stockpile to ensure no erosion is taking place; All temporary excavated and/or demolition material storages areas will be regularly checked/monitored to ensure no drainage issues of surface water quality impacts are occurring; Once the stockpile has been completed the area should be cordoned off with secure fencing to prevent any disturbance or contamination by other construction activities; and Silt curtains cannot be removed until the temporary excavated and/or demolition material has been fully removed from its storage area and used as part of the infill works.
	Infilling works	<ul style="list-style-type: none"> Natural revegetation 	<ul style="list-style-type: none"> The infilled area will be seeded in compliance with European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017 (S.I. 605/2017), with the exception of the use of fertilisers – no fertilisers shall be used; In all cases disturbed ground will be allowed to naturally re-vegetate.
Contamination	Construction compound and refuelling	<ul style="list-style-type: none"> Distance to Templemore_Demesne river 	<ul style="list-style-type: none"> If the construction phase of the proposed development requires a construction compound, its boundary will be separated from the Templemore_Demesne river by a minimum of 50m.
		<ul style="list-style-type: none"> Designated refuelling station location 	<ul style="list-style-type: none"> A designated refuelling location within the construction compound of the proposed development site will be clearly demarked from its surrounding; The designated refuelling location will be selected on a level area, separated by a minimum of 10m from any minor water feature (e.g., drainage ditch), in addition to the protective distance to the Templemore_Demesne river above;

Mitigated Effect	Construction Phase Element	Mitigation Measure	Rationale
			<ul style="list-style-type: none"> • Refuelling of machinery during the construction phase will only be carried out on site at the designated refuelling location.
		<ul style="list-style-type: none"> • Fuel/hydrocarbon storage 	<ul style="list-style-type: none"> • Fuels, lubricants, and hydraulic fluids for equipment used on the site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice; • Any diesel, fuel, or hydraulic fluids to be kept on site will be stored in bunded storage tanks located within the site compound; • The bund area will have a volume of at least 110 % of the volume of the materials stored.
		<ul style="list-style-type: none"> • Management of refuelling operation 	<ul style="list-style-type: none"> • Only trained and competent operatives will be authorised to operate the bowser/refuelling; • Drip trays and fuel absorbent mats will be used during all refuelling operations.
		<ul style="list-style-type: none"> • Accidental hydrocarbon spillages 	<ul style="list-style-type: none"> • Emergency drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles/machinery are contained and removed off site; • Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and disposed of at an appropriately licensed facility. Licences, permits and permissions will be required for this activity.
	Concrete/cement	<ul style="list-style-type: none"> • Exclusion of concrete batching 	<ul style="list-style-type: none"> • There will be no concrete batching onsite.

Mitigated Effect	Construction Phase Element	Mitigation Measure	Rationale
		<ul style="list-style-type: none"> Concrete wash-out 	<ul style="list-style-type: none"> Where concrete will be delivered on site, only the chute will need to be cleaned, using the smallest volume of water practicable; A designated, bunded area for this effect will be created within the construction compound. This designated area will be placed at least 20m from any water feature (e.g., drain); The concrete wash water will be collected and disposed of to a licenced waste facility.
		<ul style="list-style-type: none"> Timing 	<ul style="list-style-type: none"> No concrete will be poured during a rainfall event.
	Landscaping	<ul style="list-style-type: none"> Restriction on the use of fertilisers, herbicides, and pesticides 	<ul style="list-style-type: none"> During any of the construction phase works and activities for the proposed development (e.g., landscaping works), the application of fertilisers (chemical and/or biological), herbicides and/or pesticides will not be allowed.

8.2 OPERATION PHASE

The potential adverse effects to QI of the Lower River Suir SAC relate to the potential degradation of the water quality of the receiving Templemore_Demesne river due to eventual siltation and/or contamination processes. As detailed in Section 6.2.1.2.1, these relate to the possibility of the local SuDS element (i.e., petrol interceptor) not being able to capture the likely added silt and contamination loads from the connected outfalls.

To this effect Ballard *et al.* (2015) requirements for *oil/water separators* shall be strictly followed, namely:

- Every 6 months (at a minimum), the following items shall be checked:
 - Volume of sludge;
 - Thickness of light liquid;
 - Function of automatic closure device;
 - Empty the separator, if required;
 - Check the coalescing material and clean or change if necessary (class 1 only); and
 - Check the function of the warning device (if fitted).
- Every year, a general inspection of the integrity of the system will be undertaken, covering the following:
 - Watertightness of system;
 - Structural condition;
 - Internal coatings;
 - In-built parts;
 - Electrical devices and installations; and
 - Adjustment of automatic closure devices.

The amount of time intermediating consecutive general inspections can be adjusted after the first year of operation. Ballard *et al.* (2015) suggest a maximum frequency of 5 years.

A relevant requirement prescribed by Ballard *et al.* (2015) that shall be followed in the proposed development case consists in:

“It is usually a requirement that separators are filled with clean water before being put into operation and each time after emptying for maintenance. Failure to do so will cause the separator to malfunction until surface water builds up the required permanent water level in the facility.”

9.0 CONCLUSION

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

Appropriate Assessment Stage One Screening of all European sites identified within the Zol of the proposed development concluded that the potential for significant effects on the Qualifying Interests of the Lower River Suir SAC [002137] could not be excluded.

Thus, the above elements were brought forward for further critical examination in the Stage 2 NIS to inform the Appropriate Assessment process.

It is determined that, following the implementation of mitigation measures for the protection of designated QI and water quality during the construction and operation phases of the proposed development, as outlined in Section 8.0, the effects of the proposed development are unlikely to be significant. Taking account of the mitigation proposed for the avoidance of significant effects on the QI of the Lower River Suir SAC [002137], it is concluded that the proposed development, as described, will not result in direct, indirect, or in-combination effects, therefore, not adversely affecting on the integrity of any European site.

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

10.0 REFERENCES

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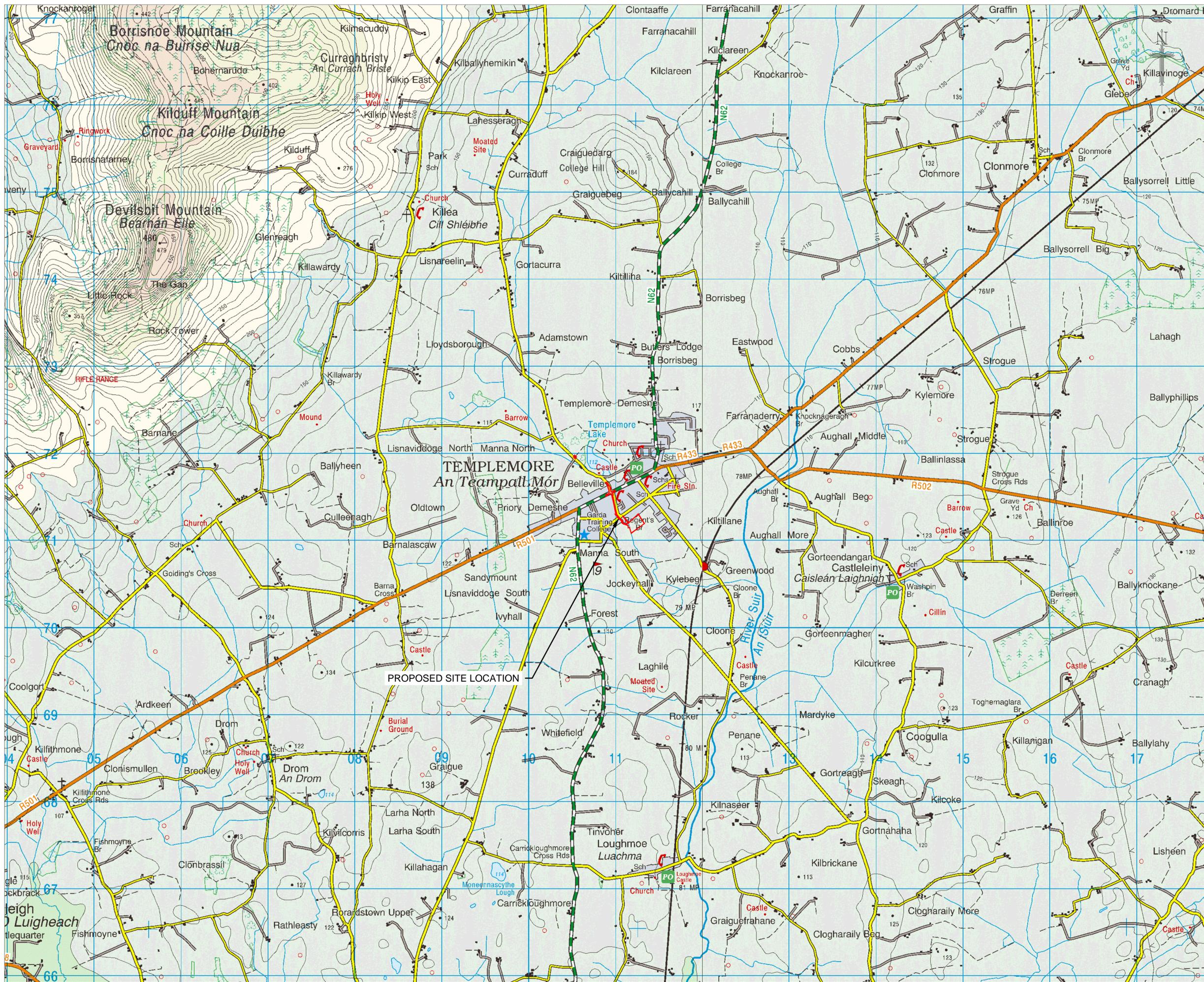
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Appendix A PROPOSED DEVELOPMENT LAYOUT DRAWINGS



LEGEND
 PROPOSED SITE LOCATION

- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD, THE GEOGRAPHIC COORDINATE SYSTEM IS TO IRISH TRANSVERSE MERCATOR (ITM)

Rev.	Date	Description	By	Chkd.
D08	NOV 23	Planning Application	M.C.	P.C.
D07	AUG 23	DRAFT	M.C.	P.C.
D06	JUN 23	DRAFT	M.C.	P.C.

Client
 Comhairle Contae Thiobraid Árann
 Tipperary County Council

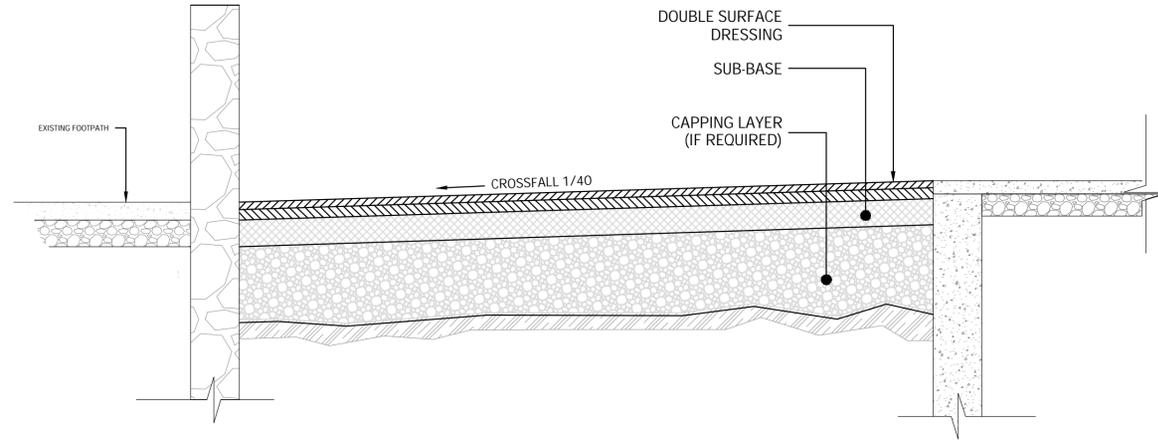
Project
 Templemore Infill Works

Title
 Proposed Site Location
 OS MAP -DISCOVERY SERIES
 SERIES 59

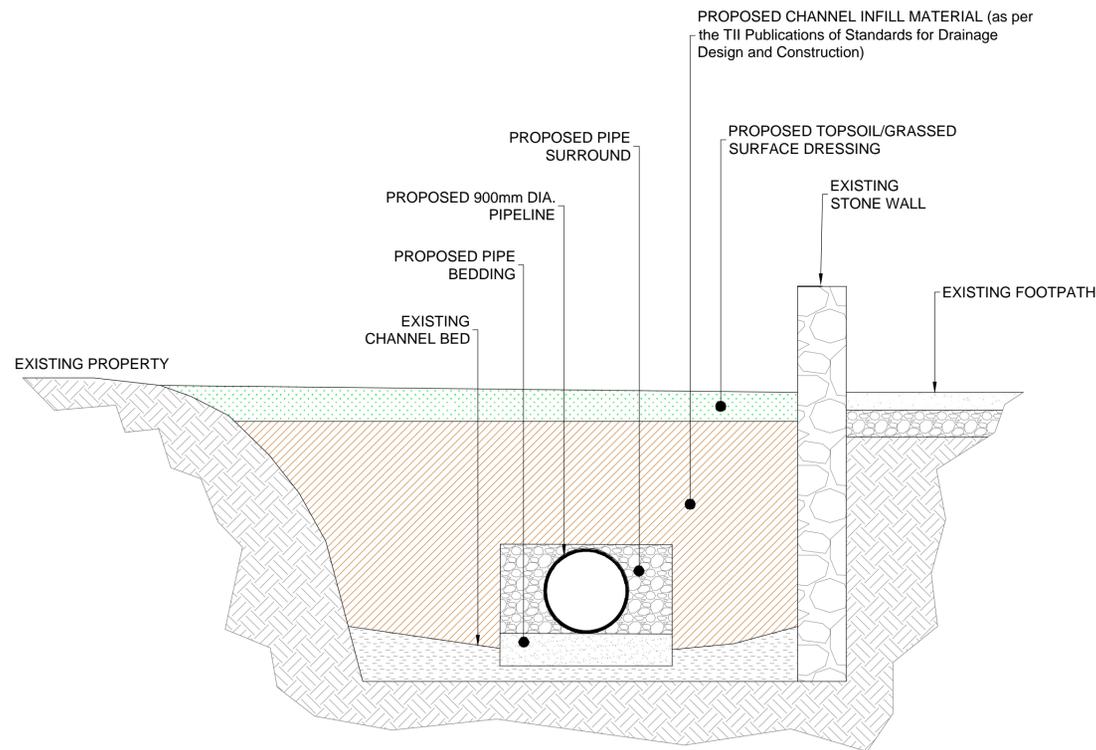
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Prepared by:	Checked	Date
M.C.	P.C.	NOV 23
Project Director	B.DOWNES	
Drawing Status	Planning Application	

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PROPOSED INFILL DETAIL (PAVED AREAS) - TYPICAL CROSS SECTION
SCALE 1:20



PROPOSED INFILL DETAIL (GRASSED AREAS) - TYPICAL CROSS SECTION
SCALE 1:20

NOTES

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D06	JUN' 23	DRAFT	M.C.	P.C.

Client



Project

Templemore Infill Works

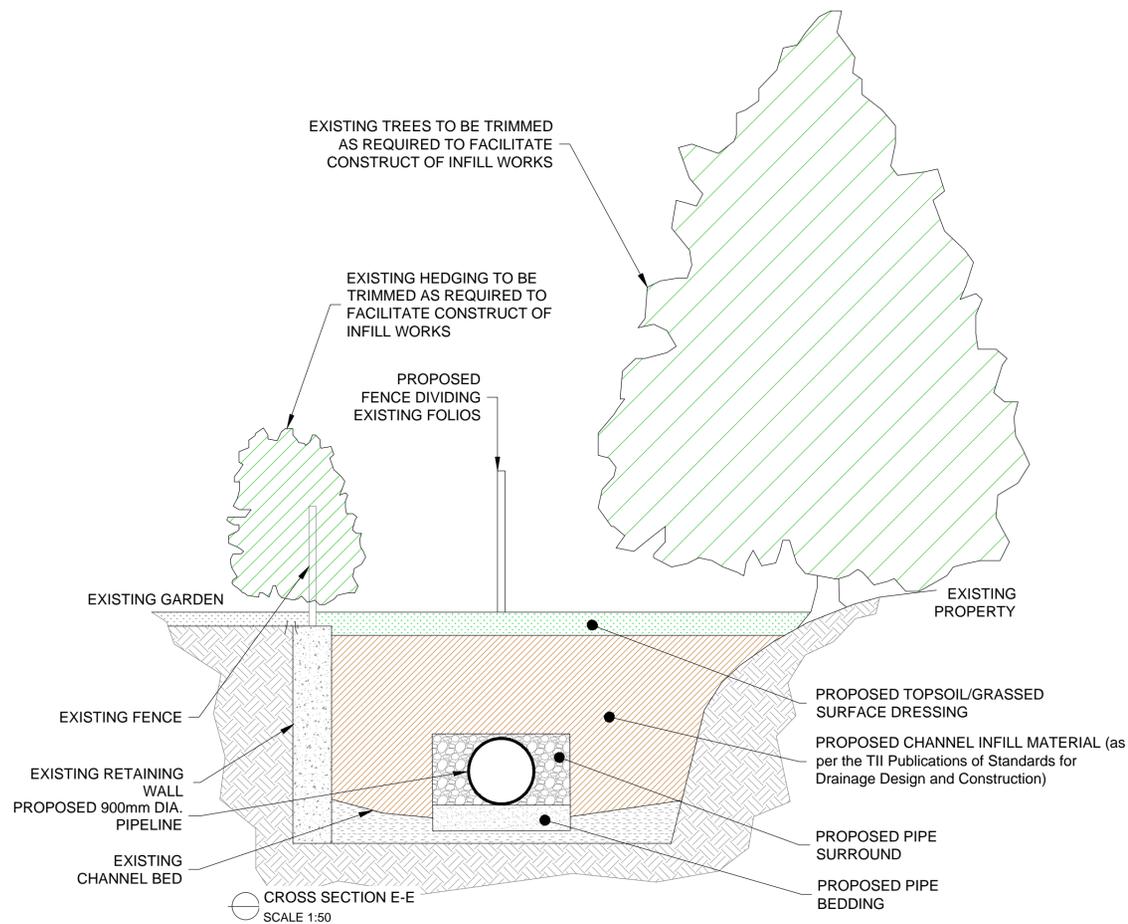
Title

Typical Cross Section Details

Scale	AS SHOWN	
Prepared by:	Checked	Date
M.C.	P.C.	NOV 23
Project Director	B.DOWNES	
Drawing Status	Planning Application	

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Rev.	Date	Description	By	Chkd.
D08	NOV 23	Planning Application	M.C.	P.C.
D01	Sep' 21	Amended per comments	M.C.	P.C.
D00	OCT' 21	DRAFT	M.C.	P.C.

Client



Comhairle Contae Thiobraid Árann
Tipperary County Council

Project

Templemore Infill Works

Title

Typical Cross Section Details

Scale	AS SHOWN	
Prepared by:	Checked	Date
M.C.	P.C.	NOV 23
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**Appendix B RIVER MALL (TEMPLEMORE) DRAINAGE SCHEME -
ENVIRONMENTAL IMPACT STATEMENT**

Appendix B-I 6. TERRESTRIAL ECOLOGY

6 TERRESTRIAL ECOLOGY

6.1 Introduction

This chapter of the EIS was prepared by TOBIN Consulting Engineers and considers terrestrial ecology. The assessment of aquatic ecology is addressed separately in Chapter 7 of the EIS and was conducted by ECOFACT Consultants. Terrestrial ecology references used in this assessment are presented in Volume 3, Appendix 6-1.

Key work elements in the proposed flood relief scheme considered are detailed below.

- A 60m-long inlet channel with Debris and Gravel Traps and a small Drop Weir.
- A new outflow from the lake to run under Blackcastle Road to the inlet channel.
- A flood-defence line north of the town, in line with a culvert over the new diversion.
- Relocating the river by constructing a new 805m long channel (with a 7.5m base-width) that begins in Shortt's Field and finishes approximately 230m downstream of Small's Bridge.
- As the bypassed stretch of river is no longer required, there are no residual flood risks from wall failure, etc and no need to sluice its drainage outlets.
- The road and access bridges will need to pass the full Climate Change flow of 21.63 m³/s.
- At Richmond Road and Church Avenue, separated by 8.4m, walls along both banks of the diversion both up- and downstream.
- Starting at the confluence (approximately 230m downstream of Small's Bridge) with a bed level of 107.3m OD, the riverbed will be re-profiled to finish at 106.1m OD 480m further downstream. The riverbed will be widened to 7.5m base-width from the diversion for approximately 450m and from there a transition returns to the existing 4.5m base wide over a further 250m (or so).
- A 90m-long embankment on the left bank (east side) below properties at Small's Bridge.
- A 320m-long embankment to defend the Railway View Estate area.
- To improve aeration and fish movement along the excavated river and diversion, a fish channel (Thalweg) will be dug and partially backfilled with gravels. While this will likely be about 0.3m deep with a 2m wide bed and up to 5 to 1 side slopes, it will be designed and constructed in consultation with the Inland Fisheries Ireland (IFI) and along the channel may be higher or lower and its width may vary.
- The channel from the upstream works to where the Mall discharges to the Suir is being designated for maintenance to prevent further growth of woody vegetation encroaching into the river or crowding-out the flowing floodplain.

- Impacts to the landscape will be reduced by using high quality finishes to works, grassed finishes to embankments and open channel sections, and by planting replacement and new vegetation; including in-channel, where possible.

6.1.1 Legislation

This ecological assessment has been prepared in accordance with the following legislation:

- Consolidated EIA Directive 2011/92/EU;
- Wildlife Acts 1976-2012;
- The Habitats Directive 92/43/EEC;
- The Birds Directive 2009/147/EC;
- The European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 411/2011];
- European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011 [S.I. No. 456/2011];
- European Union (Environmental Impact Assessment and Habitats) Regulations 2011 [S.I. No. 473/2011];
- European Union (Environmental Impact Assessment and Habitats) Regulations 2012 [S.I. No. 246/2012]; and
- Flora (Protection) Order, 1999.

In addition, in considering the ecological impacts of the proposed scheme, regard was made to the following guidance and information documents:

- CIEEM (2006). *Guidelines for Ecological Impact Assessment (Chartered Institute of Ecology and Environmental Management)*;
- DAHG (2011). *Ireland's National Biodiversity Plan: Actions for Biodiversity 2011 – 2016*;
- DoECLG (March 2013), *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*;
- DoEHLG (2009). *Appropriate Assessment of Plans and Projects in Ireland*;
- EPA (2003). *Advice notes on current practice (in the preparation of Environmental Impact Statements)*;
- EPA (2002). *Guidelines on the information to be contained in Environmental Impact Statements*;
- European Commission (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites*;
- European Commission (2013). *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*;
- Fossitt (2000). *A Guide to Habitats in Ireland*;

- NRA (2005). *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes*;
- NRA (2006). *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*;
- NRA (2006). *Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes*;
- NRA (2006). *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*;
- NRA (2006). *Guidelines for the Treatment of Bats during the Construction of National Roads Schemes*;
- NRA (2009). *Guidelines for Assessment of Ecological Impacts of National Road Schemes*; and
- Smith *et al.* (2011). *Best practice guidance for habitat survey and mapping in Ireland*.

6.2 Study Methodology

This ecological assessment comprised a desktop study, consultation and field surveys.

6.2.1 Desktop Study

The desk study comprised the following elements:

- Identification of all sites designated for nature conservation within 15km of the site and sites located further away that are potentially linked to effects of the development;
- Consultation with the Development Applications Unit, Department of Arts, Heritage and the Gaeltacht (DAHG);
- Review of National Parks and Wildlife Service (NPWS) and National Biodiversity Data Centre (NBDC) website and mapping;
- Review of Environment Protection Agency data;
- Review of Templemore Town and Environs Development Plan 2012-2018;
- Consultation with Inland Fisheries Ireland; and
- Review of Ordnance Survey maps in order to determine broad habitats that occur within the existing site and to aid with mapping habitats.

6.2.2 Field Survey

Field surveys were undertaken to assess various components of the ecology of the area. Surveys were initially carried out in 2008 and updated in 2014. Surveys included:

- Habitat assessment to include rare and protected species of flora;
- Faunal assessment to include birds, mammals (including otter and bats), amphibians, reptiles and invertebrates; and

- A separate aquatic ecology assessment was conducted by ECOFACT for the Mall River habitat corridor (refer to Chapter 7). Chapter 7 deals with aquatic flora and fauna e.g. fish species,

TOBIN Consulting Engineers undertook site visits to carry out habitat, bird and general mammal assessments on the 9th May 2014 and the 10th June 2014. A bat survey was carried out on the 2nd July 2014. The 2014 surveys updated and identified any change to previous survey findings (2008).

Habitat Assessment

The habitat assessment was conducted within the scheme boundary and took in adjacent land in accordance with The Heritage Council's methodology, Best Practice Guidance for Habitat Survey and Mapping (Smith *et. al*, 2011) and habitats were classified according to The Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000). Plant identification and nomenclature principally follows Webb *et al.* (1996)². Grass and fern identification and nomenclature was further assisted by Rose (1989)³. The predominant plant species for each habitat type were recorded in order to accurately determine habitats present on the site. Habitats were rated according to the Site Evaluation Scheme contained in the National Roads Authority's *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2009). Refer to Volume 3, Appendix 6-2 for qualifying criteria.

Faunal Assessment

Protected and common mammal surveys were conducted on the site and adjacent areas, including Templemore Lake and woodlands, given its proximity to the scheme and likely inclusion within protected mammal territories.

Signs of other fauna, (amphibians, invertebrates) found on the site were also recorded.

Otter

Surveys were conducted for otter which primarily involved searching the Mall River corridor and adjacent Templemore Lake, for evidence/signs of otter (e.g. tracks, scats, holts and occasionally direct sightings).

An assessment of habitat suitability for otter was conducted within the works area (Mall River and adjacent Templemore Lake).

² Webb, D.A., Parnell, J., & Doogue, D. 1996. *An Irish Flora*. Dundalgan Press (W. Tempest) Ltd., Dundalk.

³ Rose, F. 1989. *Colour Identification Guide to the Grasses, Sedges, Rushes and Ferns of the British Isles and north-western Europe*. Viking

Bats

Guidelines including NRA (2005)⁴ and Kelleher *et al.*, (2006)⁵ informed the survey methodology and mitigation proposed. An initial assessment of the suitability of existing buildings and trees was conducted during daylight hours. Structures including bridges and old culverts (riverside) were carefully inspected for bat signs such as droppings, insect remains and urine streaks. Activity surveys were conducted from dusk. Bat activity was recorded using a heterodyne detector. The Mall River corridor and offsite areas, specifically Templemore Lake and woodlands were the focus of the survey. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations.

Birds

Populations of birds using/ potentially breeding on the site were assessed by carrying out a walkover survey on May 9th 2014. Species were identified by calls and sightings by an experienced bird surveyor. The methodology broadly followed BirdWatch Ireland countryside breeding bird survey methodologies and appropriate methods detailed in Gilbert *et al.* (1998).

The Mall River was surveyed for riparian and water bird species in particular Kingfisher (listed Annex 1 Birds Directive), Grey Wagtail, Moorhen and Dipper.

6.2.3 Survey Constraints

No significant constraints existed to conducting the updated ecological surveys which were carried out during the main botanic and breeding bird season (May, June and July 2014). Protected mammals such as otter are also readily detectable at this time.

6.2.4 Consultation

Department of the Environment, Community and Local Government (DoECLG)

A consultation letter was issued on the 4th June 2014 by TOBIN Consulting Engineers to the Development Applications Unit (DAU) of the Department of Arts, Heritage and the Gaeltacht (DAHG). No response has been received to date. A consultation response from the DAU to the previous proposed Templemore Flood Relief Scheme in 2008 highlighted the following:

- Best practise with regard to pollution control and siltation prevention should be implemented;
- No protected flora records exist for the works area; and
- The works may potentially impact Templemore Wood proposed Natural Heritage Area (pNHA) and breeding and resting sites for otter. Suitable mitigation for adverse impacts to the pNHA and a survey for otter habitat are recommended.

⁴ National Roads Authority, 2005. Best Practice Guidelines for the Conservation of Bats In the Planning of National Road Schemes.

⁵ Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. *Irish Wildlife Manuals*, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

A phone conversation was held with Stefan Jones, District Conservation Officer with National Parks and Wildlife Service (NPWS), on 16th June 2014. He noted the potential to impact salmonids, crayfish, otter and lamprey and commented on the need for a salvage operation and mitigation measures such as silt curtains and fuel bunds to ameliorate downstream impacts. He further noted the presence of the pNHA and the potential to disturb the birds using the lake, and that there may be a possibility of Kingfisher using the area.

Inland Fisheries Ireland (IFI)

A consultation letter was issued to IFI on the 4th June 2014 by TOBIN Consulting Engineers. A consultation response was received from the IFI stating that in principle they support the proposal to establish a new river channel including the establishment of appropriate in-stream and riparian habitat. They state:

- The detailed design of the new channel will be agreed in consultation with the IFI;
- No works shall be carried out without prior consultation and agreement with the IFI;
- The IFI welcome the development of proposals for linear parkland / river walks, particularly in urban areas;
- The proposal for a new river walk, while well intended is inappropriate as it is immediately adjacent to the proposed diversion channel;
- IFI is of the view that the proposal should include a riparian zone of approximately 10m;
- IFI requires at least two weeks notification of the intention to divert the Mall River to the new channel so that the removal and transfer of fish from the existing channel to the new channel can be planned; and
- Diversion into the new channel can only take place during the period July to September inclusive.

6.2.5 Evaluation and Impact Assessment Criteria

The assessment was undertaken in accordance with the guidance contained in the document *Guidelines for Ecological Impact Assessment in the United Kingdom* (IEEM, 2006), with reference to *Guidelines for Assessment of Ecological Impacts of National Roads Schemes* (NRA, 2009). These documents detail the procedure for establishing the 'value' of ecological habitats (i.e. international, national, regional, high local, moderate local, low local) and the criteria for assessing the significance of predicted impacts (i.e. severe, major, moderate, minor or no impact). Table 6-1 overleaf details the NRA evaluation scheme (NRA, 2009) for sites.

Table 6-1 Site Evaluation Criteria

Ecological Valuation	
Internationally Important	<p>Sites designated (or qualifying for designation) as an SAC or SPA under the EU Habitats or Birds Directives;</p> <p>Undesignated sites that fulfil criteria for designation as a European Site;</p> <p>Features essential to maintaining the coherence of the Natura 2000 network;</p> <p>Sites containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive;</p> <p>Resident or regularly occurring populations of birds listed in Annex I of the Birds Directive and species listed in Annex II and/or Annex IV of the Habitats Directive;</p> <p>Ramsar Site;</p> <p>World Heritage Site;</p> <p>Biosphere Reserve;</p> <p>Site hosting significant species populations under the Bonn Convention;</p> <p>Site hosting significant populations under the Berne Convention;</p> <p>Biogenetic Reserve;</p> <p>European Diploma Site;</p> <p>Salmonid water.</p>
Nationally Important	<p>Sites or waters designated or proposed as an NHA*;</p> <p>Statutory Nature Reserve;</p> <p>Refuge for fauna and flora protected under the Wildlife Acts;</p> <p>National Park;</p> <p>Undesignated sites fulfilling criteria for designation as a NHA; Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act and/or a National Park;</p> <p>Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts and/or species listed on the relevant Red Data list;</p> <p>Site containing viable areas of the habitat types listed in Annex I of the Habitats Directive.</p>
County Importance	<p>Areas of Special Amenity;</p> <p>Area subject to a Tree Preservation Order;</p> <p>Area of High Amenity, or equivalent, designated under the County Development Plan;</p> <p>Resident or regularly occurring populations (assessed to be important at the County level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed on the relevant Red Data list;</p> <p>Site containing area(s) of the habitat types listed in Annex I of the Habitats Directive that do not fulfil criteria for valuation as of International or National Importance;</p> <p>County important populations of species, or viable area of semi-natural habitats or natural heritage features identified in the National or local BAP;</p> <p>Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county;</p> <p>Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</p>

Ecological Valuation	
Local Importance (higher value)	<p>Locally important populations of priority species or habitats or natural heritage features identified in the Local Biodiversity Action Plan (BAP);</p> <p>Resident or regularly occurring populations (assessed to be important at the Local level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed in the relevant Red Data list;</p> <p>Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;</p> <p>Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.</p>
Local Importance (lower value)	<p>Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;</p> <p>Sites of features containing non-native species that are of some importance in maintaining habitat links.</p>

Source: Guidelines for Assessment of Ecological Impacts in National Road Schemes (NRA, 2009)

Impacts are discussed and assessed in relation to impact type (positive, neutral or negative), character and sensitivity of the affected feature, magnitude, duration, timing and frequency. Criteria for assessing impact and magnitude are presented in Table 6-2 and 6-3 respectively.

Table 6-2 Criteria used in Ecological Impact Assessment (EPA 2002, IEEM 2006, EirGrid 2012)

<p>Positive or Negative: Is the impact likely to be positive or negative? International and national policy now pushes for projects to deliver positive outcomes for biodiversity.</p>
<p>Context (Magnitude and extent): A scheme may affect only a small part of a site but the area of habitat affected in that location (in hectares) should be given in the context of the total area of such habitat available (e.g. 1 Ha of a woodland which measures 30 Ha in total.)</p>
<p>Character: The type of habitat (e.g. natural or highly modified woodland; mature or recently established, wet or dry) is important, as is the quality of the site (e.g. undamaged active blanket bog).</p>
<p>Significance: State whether a site has a designation, such as a SAC or MHA, or contains a listed (Annex I) habitat. The ecological value of a site can be assigned a rating using an evaluation scheme (e.g. undesignated areas of semi- natural broadleaved woodland are normally rated as high value, locally important).</p>
<p>Sensitivity: Indicate changes that would significantly alter the character of an aspect of the environment (e.g. changes in hydrology of a wetland due to construction of access road).</p>
<p>Duration: Indicate the time for which the impact is expected to last prior to recovery or reinstatement of impacted habitats and/or species. The duration of an activity may differ from the duration of the resulting impact caused by the activity (e.g. short-term construction activities may cause disturbance to birds during the breeding season, however, there may be longer –term impacts due to a failure to reproduce in the disturbed area during that season).</p>
<p>Reversibility: Identify whether an ecological impact is permanent (non-reversible) or temporary (reversible – with or without mitigation).</p>
<p>Timing and Frequency: Some changes may only cause an impact if they happened to coincide with critical life-stages or seasons (for example, the bird nesting season). This may be avoided by careful scheduling of the relevant activities.</p>

Table 6-3 Criteria for assessing impact magnitude (Gittings 1998)

Impact Magnitude	Definition
No change	No discernible change in the ecology of the affected feature.
Imperceptible Impact:	A change in the ecology of the affected site, the consequences of which are strictly limited to within the development boundaries.
Minor Impact:	A change in the ecology of the affected site, which has noticeable ecological consequences outside the development boundary, but these consequences are not considered to significantly affect the distribution or abundance of species or habitats of conservation importance.
Moderate Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to significantly affect the distribution and/or abundance of species or habitats of conservation importance.
Substantial Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to significantly affect species or habitats of high conservation importance and to potentially affect the overall viability of those species or habitats in the wider area.
Major Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to be such that the overall viability of species or habitats of high conservation importance in the wider area is under a very high degree of threat (negative impact) or is likely to increase markedly (positive impact).

6.3 Existing Environment

6.3.1 Designated Conservation Sites

The NPWS database of designated nature conservation areas was reviewed. The database was searched for designated sites within 15km of the proposed scheme. In addition, sites potentially linked to effects of the development (e.g. downstream rivers) were considered. The proposed scheme works area does not fall within or adjacent to any designated site. Templemore Wood is not currently designated (it is a proposed Natural Heritage Area (pNHA) and lies close to parts of the proposed works). The nearest designated site is Kilduff, Devils Bit Mountain (Natural Heritage Area (NHA) / Special Area of Conservation (SAC)), which is located approximately 2.4km northwest of the proposed works area. The Lower River Suir (SAC) is approximately 22km downstream of the scheme and hence is linked to activities including the proposed scheme works in its catchment. Table 6-4 and Figure 6.1 overleaf present the designated areas located within 15km of the proposed scheme.

Table 6-4 Nature Conservation Designations identified as potentially linked to effects of site works and within 15km.

Site code	Status	Site name	Approx. distance from study area (km)
000942	pNHA	Templemore Wood	Adjacent to proposed works
000934	SAC and NHA	Kilduff, Devil's Bit Mountain	2.4km North-west
002066	pNHA	Ormond's Mill, Loughmoe, Templemore	4km South
001934	pNHA	Cabragh Wetlands	>11km South
002060	pNHA	Aghsmear House	12km North-east
002137	SAC	Lower River Suir	22km South-west (river distance)

Note:

SAC = Special Area of Conservation

NHA = Natural Heritage Area

pNHA = proposed Natural Heritage Area (non designated)

The NPWS site synopsis for all nature conservation sites within 15km of the proposed scheme are presented in Volume 3, Appendix 6.3. A description is provided (below) for Templemore Wood (pNHA) as this is adjacent to proposed works.

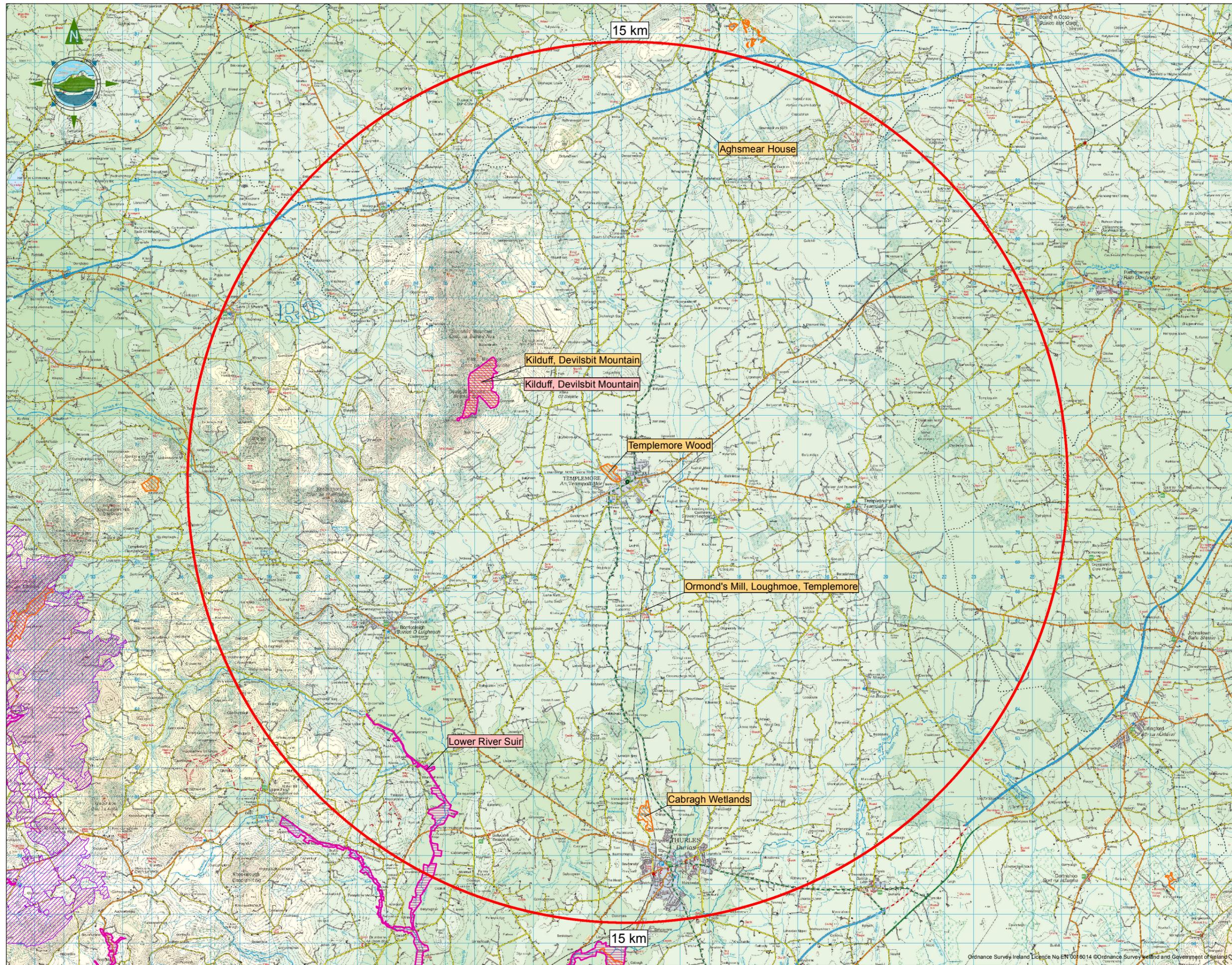
Templemore Wood pNHA (20.4 ha)

Templemore Wood pNHA is located close to the proposed scheme works area. This site encompasses an area of oak-ash-hazel woodland dominated by oak and ash with frequent elm *Ulmus* sp. and occasional hazel. This woodland is part of an old estate and exotic trees occasionally occur so that parts of the woodland are characterised by elements of (mixed) broadleaved woodland (WD1). Exotic species include beech (which is particularly frequent along the eastern margin), sycamore, horse-chestnut *Aesculus hippocastanum* and Sitka spruce *Picea sitchensis*. Although the lake appears to have been created artificially, it is characterised by abundant emergent aquatic vegetation and it is an important habitat for waterfowl, fish and aquatic invertebrates. An area of reed and large sedge swamp dominated by reed mace *Typha latifolia* occurs in the northern part of the lake, to the north of the northernmost island.

A Natura Impact Statement (NIS) (refer to Volume 3, Appendix 6.4) has been carried out due to potential impacts of the scheme on the Lower River Suir SAC. While the works are at a significant distance upstream of the Lower River Suir SAC (>22km) the NIS was produced given the possibility of aquatic qualifying interest species being impacted and therefore requiring mitigation consideration. This document is provided to inform the Appropriate Assessment conducted by the consenting authority

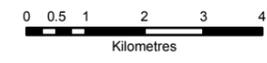
required under Article 6(3) and 6(4) of the European Habitats directive which is statutory legislation identified in various Irish regulations; refer to section 6.1 above.

The NIS concludes that following implementation of precautionary water pollution control measures, it is considered that there would be no significant direct or indirect impacts, alone and/or in combination with other plans and projects on the integrity of relevant European Sites. Such mitigation measures include, but are not limited to, the production of a Construction Environmental Management Plan prior to commencement of works on-site, design and implementation of silt/sedimentation traps, surface water quality monitoring and supervision by an Ecologist.



Legend

-  SAC - Special Area of Conservation
-  SPA - Special Protection Area
-  pNHA - Proposed National Heritage Area



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	16.07.14	Issued	G.F.	A.A.

Client:



The Office of Public Works
Oifig na hArdchúise Poblaithe

Project:

**TEMPLEMORE
FLOOD RELIEF SCHEME
EIS**

Title:

**DESIGNATED
CONSERVATION
AREAS**

Scale @ A3: 1:120,000

Prepared by: G.Fil Checked: A. Austin Date: July 2014

Project Director: D.Grehan



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6.3.2 Habitat Assessment

The habitats identified within the proposed scheme works boundary are presented in Figure 6.2 'Habitat Map' and are described in subsequent sections.

This report details the habitats found within the works area of the proposed scheme. For the purposes of this section of the Chapter this area is referred to as 'the site'.

Habitat types identified within the site include:

- Eroding/Upland Rivers (FW1);
- Drainage ditches (FW4);
- Wet Grassland (GS4);
- Improved Agricultural Grassland (GA1);
- Scattered trees and parkland (WD5);
- Hedgerows (WL1);
- Treelines (WL2);
- Re-colonising bare ground (ED3); and
- Buildings and artificial surfaces (BL3).

The dominant habitat types present are wet grassland, buildings and artificial surfaces and improved agricultural grassland. Linear woodland fringes parts of the Mall River. Hedgerow/ tree-lines form field boundaries and are crossed by elements of the proposed development.

Eroding/Upland River (FW1)

The Mall River is discussed in more detail in the aquatic ecology assessment detailed in Chapter 7 of this EIS. It consists of a relatively fast flowing river with gravel and cobble substratum. Water is hard (limestone fed) and it eventually links into the River Suir. In-stream vegetation included fool's water cress *Apium nodiflorum*, fennel pondweed *Potamogeton pectinatus* and brooklime *Veronica beccabunga*. Riparian woody vegetation is extant along the banks of part of the river and includes typical hedgerow species including ash *Fraxinus excelsior*, hawthorn *Crataegus monogyna*, holly *Ilex aquifolium*, alder *Alnus glutinosa* and blackthorn *Prunus spinosa*. Vegetation growing on the bridge walls was also noted, this included; maidenhair spleenwort *Asplenium trichomanes*, red valerian *Centranthus ruber* and ivy leaved toadflax *Cymbalaria muralis*.

The Mall River retains a high degree of naturalness and a minimum of four Annex II listed European Union Habitat Directive faunal species including Salmon, Brook Lamprey, Freshwater Crayfish and Otter. It is therefore evaluated as being of high local ecological value.

Drainage Ditch (FW4)

Drainage ditches exist within wet grassland at the north of the site. These partly connect to the Mall River. They appear not to be regularly maintained as siltation has allowed wet grassland type vegetation to establish on the drain edges. Also noted are more aquatic species including duckweed, green algae, brooklime and fools watercress.

These areas are evaluated as being of low to moderate local ecological value.

Wet Grassland (GS4)

Wet grassland of varying ecological value can be found in three locations within the site:

North West

Fields, known locally as Shortt's Field, located at the northern section of the proposed culvert consist of wet grassland. This field appeared to be grazed by cattle and moderately poached. The area is moderately species rich and dominated by soft rush. Other species noted include compact rush *Juncus conglomerates*, silverweed *Potentilla anserina*, meadowsweet *Filipendula ulmaria*, marsh ragwort *Senecio aquaticus*, autumnal hawkbit *Leontodon autumnalis*, dock *Rumex* sp., creeping thistle *Cirsium arvense*, creeping bent *Agrostis stolonifera* and cocks-foot *Dactylis glomerata*. The bordering hedgerow understory is relatively diverse, containing meadow sweet *Filipendula ulmaria*, St. John's wort, *Hypericum tetrapterum*, speedwell *Veronica officinalis*, cow parsley *Anthriscus sylvestris* and mouse ear *Cerastium fontanum*. This area shows a degree of naturalness and has a low to moderate diversity of plant species. This habitat type is considered to be of moderate local ecological value.

South

A noteworthy wet grassland habitat is located south of Patrick Street, west of O'Dwyer's Bridge; this area is species rich and appears to have partly developed in an area with an infill or deposit of builder's rubble. Species noted include; mouse ear *Cerastium fontanum*, ox-eye daisy *Leucanthemum vulgare*, red clover *Trifolium pratense*, white clover *Trifolium repens*, spear moss, black medick *Medicago lupulina*, bird's foot trefoil *Lotus corniculatus*, field horsetail *Equisetum arvense*, purple loosestrife *Lythrum salicaria*, meadow buttercup *Ranunculus acris*, creeping thistle *Cirsium arvensis*, creeping cinquefoil *Potentilla reptans* and willowherb *Chamerion angustifolium*. The wet conditions support numerous grass and sedge species such as; meadow foxtail *Alopecurus pratensis*, meadow grass *Poa pratensis*, sweet vernal grass *Anthoxanthum odoratum*, Yorkshire fog *Holcus lanatus*, crested dog's-tail *Cynosurus cristatus*, hard rush *Juncus inflexus*, hairy sedge *Carex hirta*, carnation sedge *Carex panacea*, oval sedge *Carex ovalis* and remote sedge *Carex remota*.

There is evidence of tree succession in the centre of the field, with development of ash *Fraxinus excelsior*, sycamore *Acer pseudoplatanus*, willow *Salix* spp., and hawthorn *Crataegus monogyna* saplings. This tree line is developing on an area of builders rubble previously deposited on the site.

This area of wet grassland has high species diversity and is regarded as having moderate local ecological value.

South East

Wet grassland habitat is located to the south east of the site, adjacent to Railway View housing estate would be regarded as having low ecological value. This habitat has some species indicative of marsh (GM1) but due to gravel infill it has reduced in size and vegetation diversity. Species noted include mare's tail, floating reed sweet grass *Glyceria maxima*, bulrush *Typha latifolia*, purple loosestrife *Lythrum salicaria*, silverweed *Potentilla anserina* and bindweed *Convolvulus arvensis*. This area appears to have been used as a dump as significant evidence of rubbish dumping exists. This area has relatively low species diversity and is highly modified. It is regarded as having low local ecological value.

Improved Agricultural Grassland (GA1)/ Dry meadow grassy verge (GS2)

Improved agricultural grassland habitat occurs in the southern half of the works area. This habitat is cattle grazed, which has produced a short uniform sward where the dominant grass species is perennial ryegrass *Lolium perenne*. Some 'agricultural' herb species are present within the sward with creeping buttercup *Ranunculus repens* being the most abundant of these. Other species to occur include dandelion *Taraxacum* sp, meadow buttercup *Ranunculus acris*, clover *Trifolium* sp., daisy *Bellis perennis*, spear thistle *Cirsium vulgare*, ragwort *Senecio jacobaea*, common nettle *Urtica dioica* and docks *Rumex* sp.

A number of fields at the centre of the proposed works and adjacent to the southern culvert outflow have not been intensively managed in recent years and have become rank and overgrown. Species diversity is low though species composition is more diverse as broadleaved herbs are more common. These are generally common opportunistic species including sheep sorrel *Rumex acetosella*, thistle species *Cirsium* sp, knapweed species *Centaurea* sp and more atypical species of improved grasslands including marsh woundwort *Stachys palustris* and Autumnal hawkbit *Leontodon autumnalis*.

Overall this habitat is evaluated as being of low ecological value as it has been highly modified and has low species diversity.

Scattered trees and parkland (WD5)

Scattered planted birch trees are present in amenity parkland to the south of Templemore Lake. This area is considered to be of moderate local ecological value.

Hedgerows and Treelines (WL1/WL2)

Dense, diverse hedgerows (riparian woodland type) occur along much of the length of the Mall River. In addition to their floral species diversity, hedgerows are of value for their associated wildlife, including invertebrates, birds, bats and other mammals. These habitats act as important wildlife corridors linking the various woodland sites described above and connectivity should be retained as much as possible.

Hedgerow diversity is quite similar throughout the site. The main trees species present are ash *Fraxinus excelsior*, alder *Alnus glutinosa*, hawthorn *Crataegus monogyna* and elder *Sambucus nigra*. Other species to occur include sycamore *Acer pseudoplatanus*, hazel *Corylus avellana*, willow *Salix* and holly *Ilex aquifolium*. Bramble *Rubus* sp. is the most frequent under storey scrub to occur with occasional blackthorn *Prunus spinosa*, gorse *Ulex europaeus* and wild rose *Rosa* spp. Planted tree-lines of poplar species, *Leylandi*, Laurel *Prunus laurcerasus Rotundifolia* and Lawson cypress *Chamaecyparis lawsoniana* exist around houses in parts of the site.

The quantity of ground flora species present varies from hedgerow to hedgerow but essentially comprises of “agricultural” herbs and grasses including dandelion *Taraxacum officinale*, herb-Robert *Geranium robertianum*, creeping thistle *Cirsium arvense*, false oat grass *Arrhenatherum elatius*, velvet bent *Agrostis canina*, cleavers *Galium aparine*, cocksfoot *Dactylis glomerata*, common ragwort *Senecio jacobaea*, common nettle *Urtica dioica* and ivy *Hedera helix*. Other species noted in the hedgerow understory included; bind weed *Convolvulus arvensis*, bush vetch *Vicia sepium*, celandine *Ranunculus ficaria*, meadow sweet *Filipendula ulmaria*, lords and ladies *Arum maculatum*, common dock *Rumex*, cow parsley *Anthriscus sylvestris* and purple loosestrife *Lythrum salicaria*.

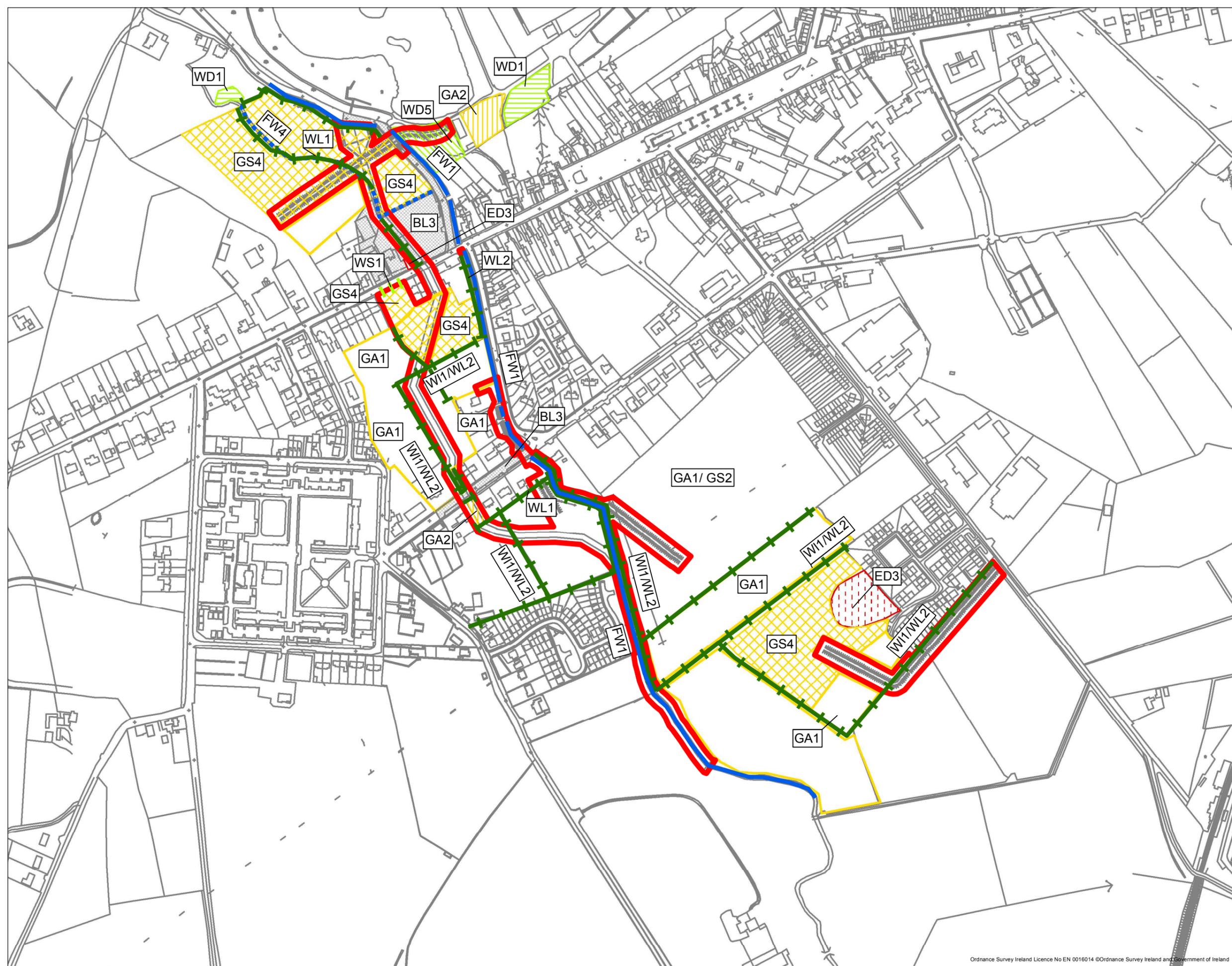
Hedgerows close to the Mall River are evaluated as being of moderate to high local ecological value, as they contain semi-natural habitat, are adjacent to the Mall River and are important for wildlife, particularly birds, feeding bats and otter. Other hedgerows/ tree-lines are considered to be of moderate local ecological value.

Re colonising Bare Ground (ED3)

A small area of re-colonising bare ground is located on Patrick Street, at a field entrance. This area is partly vegetated with common grasses, horsetail, knapweed, ivy and bindweed. It is of low ecological value. This habitat can also be found adjacent to Railway View housing estate in the southern end of the site. This was previously categorised as GM1 Marsh. Due to gravel infill, used to alleviate flooding, the extent of the marsh area has decreased and is now non-existent. This area is of low ecological value.

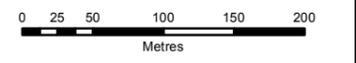
Buildings and Artificial Surfaces

Much of the culverts will pass through built habitats of no significant ecological value.



Legend

- Proposed Culvert & other works
- FW1 Eroding/upland rivers
- - - FW4 Drainage ditches
- WL1/WL2 Hedgerows/ Treelines
- WS1 Treelines
- BL3 Building sand artificial surfaces
- ED3 Recolonising bare ground
- GA1 Improved agricultural grassland
- GS2 Dry Meadow/ Grassy Verges
- GA2 Amenity grassland
- GM1 Marsh
- GS4 Wet grassland
- WD1 (Mixed) broadleaved woodland
- WD5 Scattered trees and parkland



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	13.11.08	Issued	G.F.	R.M.

Client:

Project: **TEMPLEMORE FLOOD RELIEF EIS**

Title: **HABITAT MAP**

Scale @ A3: 1:5,000

Prepared by: G.Fil Checked: R. MacNaughton Date: July 2014

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Appendix B-II 7. AQUATIC ECOLOGY

7 AQUATIC ECOLOGY

7.1 Introduction

ECOFACT Environmental Consultants were commissioned by TOBIN Consulting Engineers to carry out an Aquatic Ecology Impact Assessment of proposed flood relief works on the Mall River in Templemore.

The assessment concerns the baseline aquatic ecology within the Mall River in terms of individual aquatic species and aquatic ecological communities. Preparation of this study included both a desk study and a field survey of the site and surrounding areas. References used for this desk study are presented in Volume 3, Appendix 7-1. Fieldwork for the current assessment was undertaken during July 2014, and followed on a previous study undertaken in September 2008. There were no seasonal constraints in undertaking this assessment and the work was undertaken during ideal survey conditions of low water levels.

7.2 Study Methodology

The preparation of this assessment included an ecological site survey of the Mall River upstream and downstream of the proposed diversion and also within the affected stretch of river in order to characterise habitats and aquatic ecological features present. In total, seven locations were subject to aquatic assessments; one site on of the River Suir main channel, one site on the Mall River downstream of the Oldtown River confluence, two sites on the Mall River downstream of the proposed works, two sites within the affected stretch of the Mall River and one site on the Mall River upstream of the proposed scheme works (refer to Volume 3, Appendix 7-2). The entire Mall River corridor from upstream of the scheme to the River Suir confluence was also walked. Table 7-1 presented in Volume 3, Appendix 7-2, gives the aquatic ecology survey locations. Volume 3, Appendix 7-3 presents photographs taken during the assessment at each of the survey locations.

7.2.1 Habitat Assessment

An assessment of the aquatic habitat was carried out at the aquatic survey sites using the methodology given in the Environment Agency's '*River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003*' (EA, 2003). Each site was assessed in terms of:

- Width and depth and other physical characteristics;
- Substrate type, listing substrate fractions in order of dominance, i.e. large rocks, cobble, gravel, sand, mud etc;
- Flow type, listing percentage of riffle, glide and pool in the sampling area;

- In-stream vegetation, listing plant species occurring and their percentage coverage of the stream bottom at the sampling site (as applicable) and on the bankside; and
- Estimated cover by bankside vegetation, giving percentage shade of the sampling site.

Aquatic plants as well as rare and/or protected plant species and non-native flora were recorded at each site. Plant species nomenclature follows Stace 'New Flora of the British Isles' (1997).

The results of the physical habitat study were used in conjunction with the leaflet 'The Evaluation of habitat for Salmon and Trout' to assess habitat suitability for salmonids. This leaflet (Advisory leaflet No. 1) was produced by the Department of Agriculture for Northern Ireland Fisheries Division and was designed for use in the EU salmonid enhancement programme.

An opinion of lamprey habitats was made within the study area with reference to National Parks and Wildlife Service (NPWS) Irish Wildlife Manuals lamprey surveys (O'Connor, 2004; O'Connor, 2006; and O'Connor, 2007). A bathyscope was used to aid underwater observation of habitats/substrates. The results of the physical habitat study were used in conjunction with the publication 'Ecology of the River, Brook and Sea Lamprey' (Maitland, 2003) which details the life cycle of lampreys including their spawning habitat requirements.

Habitat for macroinvertebrates was assessed using Barbour and Stribling (1991) where bottom substrate, habitat complexity and various other physical features were considered in assessment of sites for their suitability for macroinvertebrate production.

7.2.2 Electrical Fishing

Electrical fishing was carried out during normal / low water levels during July 2014. Electrical fishing assessments were carried out under authorisation from the Department of Communication, Energy and Natural Resources under Section 14 of the Fisheries Act (1980).

Electrical fishing specifically for salmonids was carried out at each site following the methodology outlined in the Central Fisheries Board (now Inland Fisheries Ireland) guidance "Methods for the Water Framework Directive - Electric fishing in wadable reaches". A portable electrical fishing unit (Smith Root-LR 24 backpack or Marine Electrics Safari) was used during this semi-quantitative assessment. Fishing was carried out continuously for a set period at each site and captured fish were collected into a container of river water. The boundary of the surveyed area at each location comprised a bank of the river, and where possible other features that limited fish from swimming from the survey area were utilized as boundaries (e.g. exposed rock, high gradient riffles in the channel). Stop nets were also used to enclose the survey areas. Fish species other than salmon and trout were also recorded. Following completion of the fishing, the dimensions and physical habitat characteristics of the site were recorded.

Juvenile lamprey surveys generally followed the methodology for ammocoete surveys given in the manual 'Monitoring the River, Brook and Sea Lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus* by Harvey & Cowx (2003). Electrical fishing for juvenile lampreys was carried using 1m² sub-site enclosures. In each case the enclosures were located in the most optimal juvenile lamprey habitats that could be found. All captured lampreys and other fish were identified and counted. Identification followed the manual 'Identifying Lamprey. A Field key for Sea, River and Brook Lamprey' by Gardiner (2003).

Captured fish and lampreys were collected and placed into containers of river water after individual surveys and were anaesthetised using a solution of 2-phenoxyethanol and measured to the nearest mm on a measuring board. Subsequent to this the fish were allowed to recover in a container of river water. All fish were released alive and spread evenly over the sampling area. Results of the investigations are presented using Catch per Unit Effort (CPUE) indices; fish number/m² and fish number/minute fishing.

7.2.3 White-clawed crayfish

White-clawed crayfish surveys were carried out under licence from NPWS (Licence C059 / 2014). Methodology for White-clawed crayfish surveying followed recognised procedures (hand searching and sweep netting) given in the manual 'A technical manual for monitoring white-clawed crayfish *Austropotamobius pallipes* in Irish lakes' by Reynolds *et al* (2010).

Hand searches were carried out with a bathyscope. A total of 100 potential refuges (ten patches each with ten potential refuges) were investigated at each location where a crayfish survey was undertaken. Habitat considered to offer the best potential refuges was selected at each site. Potential refuges are places that can shelter crayfish and include underneath rocks, logs, holes in banks, crevices between stonework in weirs and in-stream objects such as tyres etc. Following the examination of each refuge, the refuge type, where applicable was reinstated to its original position insofar as possible e.g. rocks repositioned to their original location and orientation. Boulders greater than 30cm were not moved during hand searching due to the possibility of damage to crayfish and their refuges. The catch of crayfish was expressed as a number per 100 refuges.

Records were taken of all captured White-clawed crayfish at each site (numbers of crayfish, life stage, and method of capture). Any unusual anatomical features such as a missing cheliped was noted or if a specimen had recently moulted. For juvenile and adult crayfish, total length TL (excluding claws) was measured using a vernier callipers. TL is from the tip of the rostrum to the end of the telson (tail). Hatchlings were not measured due to their frailty. White clawed crayfish of TL ≤ 15mm were classed as hatchlings. Crayfish in the length range 16-50mm were recorded as juveniles and specimens having a total length of greater than 50mm were classed as adults, in accordance with Reynolds (2006).

7.2.4 Biological Sampling

Semi-quantitative sampling of benthic (or bottom dwelling) aquatic macroinvertebrates was undertaken at selected sites using kick-sampling (Toner *et al*, 2005). Stone washings and vegetation sweeps were also undertaken to ensure a representative sample of the fauna present at each site was collected. The Quality Rating (Q) System (Toner *et al.*, 2005) was used to obtain a water quality rating for each site.

7.3 Existing Environment

At the time of the current survey, the watercourses are lower than normal following a long dry period. The Environmental Protection Agency (EPA) recommends that biological sampling be carried out in these conditions since it is at these times that watercourses are most vulnerable to pollution. These flows in combination with bright conditions were also ideal for carrying out habitat assessments, electrical fishing surveys and white-clawed crayfish surveys. The results of the surveys undertaken at each site are given below, and provided in a list of Tables (Tables A7.1 to A7.9) presented in Volume 3, Appendix 7-2. Survey site locations examined on the Mall River and River Suir in July 2014.

7.3.1 Site 1

Site 1 was located on a stretch of the River Suir in the environs of Pennane Bridge. This stretch of the River Suir is approximately 4km downstream of the N62 Bridge crossing of the Mall River in Templemore. At Pennane Bridge, the River Suir is a 4th order watercourse and is fed by the Aughall River approximately 20m upstream of Pennane Bridge.

Habitat assessment

The River Suir at Pennane Bridge had a wetted width of approximately 5m. The mean depth of the river at Pennane Bridge was 25cm. There was little variation in depth across the river. This part of the river had little physical diversity and the dominant flow feature was glide/pool. The banks of the river were sloped at an angle of approximately 60° and were heavily vegetated and stable. Discrete areas of the river were shaded from trees/scrubs growing along the banks.

The River Suir at this location flows through rich agricultural lands. Instream vegetation was dominated by filamentous algae *Cladophora* sp. which grew to a few meters in length where flow conditions allowed. Such profuse growth indicates enrichment. Some aquatic moss *Fontinalis* sp. was seen growing on rocks. This part of the river is regarded as suboptimal for the early life stages of salmonids due to limited riffled habitat. It is considered best suited to the rearing of salmonids as it provides cover in the form of overhanging bankside vegetation and in-stream rocks. Habitat for macroinvertebrates in this part of the River Suir is deemed suboptimal given the polluted conditions and poor pool quality.

White-clawed crayfish

White-clawed crayfish occur in the River Suir in the environs of Pennane Bridge. A single juvenile crayfish was recorded during biological sampling at Pennane Bridge. Habitat suitable for adult (beneath rock and cobble) and for hatchling/juveniles (submerged bank side vegetation and cobbles), occurred along this part of the river. However, a full crayfish survey was not undertaken. The presence of hatchling crayfish at this location indicates that this stretch of the river is used by breeding adults.

Biological sampling

Macroinvertebrates in 17 different families were recorded in the River Suir at Pennane Bridge. By and large, the macroinvertebrate community at this location consisted of pollution tolerant taxa. Group C pollution tolerant mayfly larvae of *Ephemerella ignita* and *Baetis rhodani* were common. The only pollution sensitive indicator recorded at this location was the mayfly *Ecdyonurus dispar* which was scarce. Group B less sensitive indicators were limited to larvae of *Leuctra* sp. and cased caddisfly larvae of the Limnephilids *Potamophylax* sp. and *Limnephilus* sp. Caseless Trichopterans recorded were *Hydropysche* sp. and *Rhyacophila dorsalis*, listed by the EPA (Toner *et al*, 2005) as pollution tolerant indicators. *Gammarus deubeni* was numerous at this location while another crustacean, the White-clawed crayfish *Austropotamobius pallipes* was present. The macroinvertebrate assemblage at this site also comprised larvae of true flies (Simuliidae, Green chironomids), the beetle *Elmis* sp. and molluscs (*Ancylus fluviatilis*, *Potamopyrgus jenkinsi*, *Pisidium* sp.)

Based on the macroinvertebrate community and other criteria (habitat suitability, macrophyte growth, siltation, algal growth), biological water quality at this site was rated Q3-4, equivalent to Water Framework Directive (WFD) Moderate status. It is noted that this site is borderline Q3 taking into account significant algal growth and relative abundance of pollution sensitive indicators.

7.3.2 Site 2

Site 2 was located on the Mall River upstream of Cloone Bridge. This 3rd order reach of the Mall River has been deeply drained but has recovered to some degree. The 2nd order Oldtown River joins the Mall River approximately 0.5km upstream of Cloone Bridge (downstream of the part of the Mall River directly affected by the proposed scheme).

Habitat assessment

The stretch of the Mall River upstream of Cloone Bridge is a low-medium gradient stretch. Banks on both sides of the river were approximately 2.5m high and the cross sectional shape of the channel was typically trapezoidal, evidence of drainage works in the past. This stretch of the watercourse had a wetted width of approximately 4m. The substrate in the river was a mix of rock, cobble, gravel and fines in nearly equal proportions. It was noted that the substrate was heavily silted. Flows were characterised by short riffle/glides linking shallow pools. In-stream vegetation comprised aquatic moss *Fontinalis* sp.

and filamentous algae *Cladophora* sp. Some sparse stands of water crowfoot *Ranunculus* sp. were also present.

This stretch of the Mall River is most suited to the early life stages of salmonids, rocks and riffles providing cover and protection from predators. It is likely to be used to some degree by spawning trout and salmon also. This part of the river is deemed suboptimal for adult trout (and salmon) given the lack of deep pools favoured by larger fish (along with the relatively small stream size). Rocks in this part of the river provide suitable habitat for crayfish. Habitat for macroinvertebrates is considered to be suboptimal overall due to marginal habitat complexity.

White-clawed crayfish

White-clawed crayfish occur in the Mall River at Cloone Bridge. A total of nine crayfish were recorded during hand searching survey where 100 potential refuges were examined (CPUE = 0.09). The primary habitat for this species was underneath rock and cobble substrate. There was little emergent vegetation along this part of the river, a niche preferred by hatchling juvenile crayfish.

A total of seven adult crayfish and two juveniles were recorded at this location. The age structure of the crayfish population at this location suggests that this part of the river is sub-optimal for the species.

Biological sampling

A macroinvertebrate family diversity of 19 was recorded at Cloone Bridge on the Mall River. The benthic faunal assemblage was dominated by pollution tolerant indicators across a range of taxa. Mayfly larvae of Group C *Ephemerella ignita* and *Baetis rhodani* were common and numerous respectively. The only Group A taxon recorded was the heptagenid mayfly *Rhithrogena semicolorata* which was scarce. The most diverse order was the Trichoptera with five cased species (*Potamophylax* sp., *Limnephilus* sp., *Sericostoma personatum*, *Agapetus fuscipes*, *Silo pallipes*) and two caseless species (*Hydropysche* sp., *Rhyacophila dorsalis*) recorded. Fair numbers of the snails *Ancylus fluviatilis* and *Potamopyrgus jenkinsi* were recorded.

Using the EPA freshwater biological monitoring system (Toner *et al*, 2005), this site was rated Q3-4, equivalent to WFD Moderate status. This rating has been assigned tentatively given the low abundance and occurrence of only species of pollution sensitive indicator. However, based on visual observations this site would be borderline Q4.

7.3.3 Site 3

Site 3 was located on the Mall River at Manna south, approximately 0.6km downstream (south) of the N62 Bridge in Templemore. This stretch of the river has been recently maintained by dredging and

riparian areas have been affected by bank clearance. The highly modified nature of the channel has significantly affected its aquatic ecological value.

Habitat assessment

The wetted width of the Mall River at Site 3 was approximately 3.3m. This part of the river has intermediate gradient and is artificially wide, the mean depth of the channel being in the order of only 10cm. The maximum recorded depth along the surveyed stretch was only 30cm. The substrate in this stretch was mainly of gravel, with smaller proportions of cobble and finely deposited materials. Banks of both side of the river were denuded of riparian vegetation in places, with evidence of continuing erosion in certain places along the right bank. This part of the river had monotonous physical characteristics and was deemed a marginal habitat for all life stages of salmonids. Similarly, habitat suitability for macro invertebrates was considered poor, with considerations for bottom substrate, habitat complexity, pool quality, bank stability, bank protection and canopy cover.

Electrical fishing

Electrical fishing was carried out over a 100m length of this part of the Mall River over a period of 20 minutes. The area fished was approximately 330m² and only brown trout *Salmo trutta* (N=4) were recorded. These fish ranged in length from 12.8cm to 13.7cm and were deemed to be 1+ group fish. The catch per unit effort (CPUE) indices for trout were 0.2 fish/minute and 0.012 fish/m². Salmonid habitat along this stretch of the Mall River has been negatively affected by recent maintenance works and the low minimum density of trout recorded is a reflection of the damage to aquatic habitats.

There was no suitable habitat for juvenile lampreys in the surveyed stretch at Manna South; probably as a result of the recent drainage works.

White-clawed crayfish

A total of one White-clawed crayfish was recorded in 100 potential refuges examined in the Mall River at Manna South (CPUE = 0.01). This crayfish was a juvenile of length 4.2cm. The potential refuges examined at this location were mostly cobbles and rocks. This species was not recorded during biological sampling, indicating the sparse distribution of crayfish in this highly modified part of the Mall River. In its current state, this part of the river is only a marginal habitat for any life stage of White-clawed crayfish.

Biological sampling

A total of fourteen macroinvertebrate families were recorded at Site 3 on the Mall River. This stretch of the Mall River supported only less sensitive (Group B), pollution tolerant (Group C), very tolerant (Group D) and most tolerant (Group E) indicators. Mayfly larvae of *Ephemerella ignita* and *Baetis rhodani* were common. Cased caddisfly (Group B) larvae of *Agapetus fuscipes* were common with

Sericostoma personatum, *Limnephilus* sp. and *Potamophylax* sp. scarce. Caseless caddisfly (Group C) larvae of *Hydropysche* sp. and *Rhyacophila dorsalis* were present. Small numbers of pollution tolerant true fly larvae of Green chironomid and Simuliidae were recorded while Group E larvae of *Chironomus* sp. were present. Small numbers of the snails *Potamopyrgus jenkinsi* were recorded and *Ancylus fluviatilis* was scarce. *Gammarus deubeni* was dominant at this location.

The macroinvertebrate community at this location was indicative of unsatisfactory water quality and was rated Q3, moderately polluted, equivalent to Water Framework Directive (WFD) Poor status.

7.3.4 Site 4

Site 4 was located on the stretch of the Mall River in the environs of Small's Bridge on the southern extents of Templemore. This part of the river is within the stretch directly affected by the proposed works. This part of the river flows along roadways and forms the boundaries of some dwelling properties. It is noted that bank side vegetation upstream of Small's Bridge had been recently cut/sprayed and that some resulting dead vegetation was present in-stream. Paragraph (1) (a) of section 40 of the Wildlife (Amendment) Act, stipulates that "*It shall be an offence for a person to cut, grub, burn or otherwise destroy, during the period beginning on the 1st day of March and ending on the 31st day of August in any year, any vegetation growing on any land not then cultivated*". It is clear that the clearance of vegetation along the Mall River upstream of Small's Bridge contravenes the section 40 of the Wildlife Act.

Habitat assessment

The Mall River in the vicinity of Small's Bridge had a wetted width of approximately 3.4m. The mean and maximum depth of the channel was 25cm and 40cm respectively. River substrate comprised almost equal proportions of rock, cobble gravel and fine material. Banks were in the order of 2m high with some walls set approximately 0.5m back from the bank upstream of Small's Bridge. This part of the river was characterised by long shallow glide and short riffle sequences, with some shallow pool habitat also present. This stretch of the river is likely to be used by spawning salmonids given the presence of some pool/glide habitat. Based on habitat, this part of the river was also deemed suitable for the early life stages of salmonids, with rocks providing ample cover for young fish. The few pools along this stretch were considered suitable for holding adult trout, especially those downstream of Small's Bridge. Diversity of bottom substrate and habitat complexity favour macroinvertebrate production in this stretch of the river but bank protection and shade conditions do not. Overall, habitat for macroinvertebrates in the environs of Small's Bridge was deemed suboptimal.

Electrical fishing

Electrical fishing was carried out over a channel length of approximately 100m corresponding to a surveyed area of 340m². Four fish species were recorded during this 20 minute survey: Brown trout,

Atlantic salmon *Salmo salar*, European eel *Anguilla anguilla* and Pike *Esox lucius*. Brown trout were the most frequently occurring fish (N=35). The mean length of these trout was 15.6cm and ranged in length from 4.8cm to 27cm. Most of these fish were juveniles, indicating that this part of the river is an important spawning and nursery area. The minimum density of trout was 0.1 fish/m², indicating that this part of the river holds a good stock of trout. A total of three juvenile salmon were recorded having an average length of 12.2cm. These fish were in the 1+ cohort and this part of the river is used to some degree by spawning salmon. Salmon are listed as a conservation interest of the Lower River Suir Special Area of Conservation (SAC) (downstream of Thurles) and are listed under Annex II and Annex V of the European Habitats Directive (S.I. No. 94/1997 - European Communities (Natural Habitats) Regulations, 1997).

One pike (juvenile) was recorded and measured 26cm long. Eel (N=3) ranged in length from 22.5cm to 38cm and were recorded in stony habitat and crevices under Small's Bridge. It is noted that European eel is listed as 'Critically endangered' and is now 'Red Listed' according to the recently published 'Red List No. 5: Amphibians, Reptiles & Freshwater Fish' (King *et al.*, 2011).

One juvenile brook lamprey *Lampetra planeri* was recorded in an area of 1m² during a specific survey for juvenile lampreys (length = 11.5cm). An area of 2m² depositing habitat deemed suitable for juvenile lampreys was also surveyed but these were not recorded in this area. Brook lamprey is listed as a conservation interest of the Lower River Suir SAC and listed under Annex II of the European Habitats Directive.

White-clawed crayfish

Five crayfish were recorded in 100 potential refuges at this location: four adults and one hatchling (CPUE = 0.03). Potential refuges included the undersides of rock/cobble, underneath deadwood and in crevices in Small's Bridge. Crayfish were not detected during biological sampling indicating the sparse occurrence of the species in the surveyed area.

Biological sampling

A relatively diverse macroinvertebrate assemblage was recorded in the Mall River at Small's Bridge. Macroinvertebrates in 19 families were found during biological sampling. The only pollution sensitive indicator recorded was mayfly larvae of *Rhithrogena semicolorata* which was scarce. Mayfly larvae of *Ephemerella ignita* and *Baetis rhodani* were common and numerous respectively. Caseless caddisfly larvae were generally recorded in small numbers and included *Sericostoma personatum* and *Limnephilus* sp. Larvae of the caseless caddisflies *Hydropysche* sp. and *Rhyacophila dorsalis*. True flies were well represented and this fraction of the macroinvertebrate community comprised *Simuliidae*, *Chironomidae*, *Thaumaleidae* and *Dicranota* sp. *Gammarus deubeni* was numerous and was the sole member of order Crustacea recorded at this location.

Using the EPA freshwater biological monitoring system (Toner *et al*, 2005), this site was rated Q3-4, equivalent to WFD Moderate status. This rating has been assigned tentatively given the low abundance and occurrence of only species of pollution sensitive indicator.

7.3.5 Site 5 / 6

Site 5 was located on the Mall River upstream of the N62 Bridge in Templemore Town. Site 6 was also located on this stretch of the river - upper end of same stretch as Site 5. This part of the river flows through an urban landscape and riparian habitats were seen to have been impacted by recent cutting of bank side vegetation. As previously mentioned, performing such un-necessary work is in breach of the Wildlife Act. It is noted that the only survey work carried out at Site 6 was electrical fishing for lampreys as it contained the only optimal lamprey habitat patch is the entire study area of the Mall River.

Habitat assessment

The Mall River upstream of the N62 Bridge had a wetted width of approximately 4.5m. The mean and maximum depth of the channel was approximately 20cm and 25cm in that order. A strip of vegetated soil occurred on the left side of the channel in some areas but the river banks proper (set back from riparian areas) were concrete, brick and stone walls. Some bedrock was present in this stretch but the bed of the river comprised mostly of gravel, sand and silt. This part of the Mall River was exposed owing to the lack of bank side trees and other riparian vegetation.

This stretch was regarded as a suboptimal rearing habitat for salmonids (some cover provided by rock and some riffled habitat) but may be used to some degree by spawning trout during the winter months. Habitat for macroinvertebrates was rated marginal with respect to the physical characteristics of the channel: habitat dominated by sluggish flow, fully exposed to light and poor pool quality. There was little/no suitable habitat for juvenile lampreys at Site 5. Some deposited silt at Site 6 was deemed suitable for juvenile lampreys.

Electrical fishing

Three fish species were recorded at Site 5 during a 10 minute electrical fishing operation over an area of approximately 270m². Brown trout (N=19) ranged in length from 3.4cm to 16cm and had a mean length of 7.5cm. A large proportion of the brown trout were progeny of the most recent spawning effort indicating that this part of the river is used for trout spawning and rearing. The CPUE for brown trout was 1.9 fish/minute (minimum density of 0.07/m²). A single juvenile salmon was also recorded (length=13.9cm). Three spined stickleback (N=30) were also recorded at this location. Cutting of vegetation in the river along this stretch of the river is likely to have affected the abundance of the fish recorded.

At Site 6, an area of approximately 2m² was assessed for lampreys. A total of six brook lampreys were recorded in this area (minimum density of 3/m²). The surveyed area at this location was deemed optimal for lampreys, and was the only patch of optimal juvenile lamprey habitat in the area.

White-clawed crayfish

Only one crayfish, a juvenile of length 3.4cm was recorded during hand searching at this site (CPUE=0.01). Crayfish were not detected at this site during biological sampling. A single adult crayfish was seen during electrical fishing, its refuge was a crevice in a wall/bank.

Biological sampling

Macroinvertebrate family diversity at this location was 19. The assemblage was dominated by pollution tolerant taxa. Small numbers of pollution sensitive mayfly larvae of *Rhithrogena semicolorata* were recorded in a patch of riffled habitat. Larvae of *Baetis rhodani* and *Ephemerella ignita* were numerous and common in that order. Family Glossosomatidae of Trichoptera (cased caddisfly) were well represented with larvae of *Silo pallipes* (fair numbers) and *Agapetus fuscipes* (numerous) being recorded. The mollusc *Ancylus fluviatilis* was common and small numbers of the snail *Potamopyrgus jenkinsi* were recorded. The fish leech *Piscicola* sp. was also recorded at this site, indicating the use of this area by brown trout.

This site was rated Q3-4, equivalent to WFD Moderate status using EPA freshwater biological monitoring criteria.

7.3.6 Site 7

Site 7 was located on the Mall River in the townland of Manna north, approximately 0.5km upstream of Templemore and upstream of the stretch of river directly affected by the proposed works. This stretch of the river flows through agricultural lands.

Habitat assessment

The Mall River at Manna north is a low-medium gradient channel of wetted width approximately 2.8m. The mean and maximum depths of the channel were 20cm and 40cm respectively. The substrate was dominated by finer grade particles (80% gravel and 20% fine). There was evidence that this stretch of river had been deepened in the recent past with bank height generally in the order of 1.8m. This part of the Mall River was heavily shaded by trees/shrubs and in-stream vegetation was not recorded along the surveyed channel.

This stretch of the river was generally considered unsuitable/poor for spawning salmonids with respect to sluggish flows and substrate conditions. Parts of this channel had overhanging banks/vegetation

considered suitable refuges for juvenile salmonids. This part of the river was deemed a poor habitat for holding adult trout and unsuitable for holding salmon.

The benthic habitat of this stretch of the river was dominated by one structural component - fine material. Considering this and the lack of habitat complexity and pool quality, habitat for macro invertebrate production is deemed marginal.

Electrical fishing

Electrical fishing was carried out over a channel length of approximately 60m corresponding to a surveyed area of 270m². Two fish species were recorded during this 10 minute survey: Brown trout and Three-spined stickleback. Three-spined stickleback were the most frequently occurring fish (N=20). A total of 14 trout were recorded. The mean length of these trout was 15.7cm and ranged in length from 5.3cm to 22.6cm.

Four brook lampreys at juvenile stage were recorded corresponding to a CPUE of 0.25/m².

White-clawed crayfish

One adult crayfish of length 5.4cm was recorded during hand searching at this site (CPUE=0.01). This crayfish was found in a riverbank refuge. Crayfish were not detected at this site during biological sampling.

Biological sampling

A total of nineteen macroinvertebrate families were again recorded at Site 7 on the Mall River. This stretch of the Mall River supported no pollution sensitive indicators. The assemblage consisted of larvae of mayfly *Ephemerella ignita* and *Baetis rhodani*, caddisflies *Potamophylax* sp., *Limnephilus* sp., and *Agapetus fuscipes*, true flies Simuliidae and Chironomidae and beetles *Helophorus* sp. and *Elmis* sp.

The macroinvertebrate community at this location was indicative of unsatisfactory water quality and was rated Q3, moderately polluted, equivalent to WFD Poor status.

7.4 Potential Impacts

Two flood relief scheme scenarios were considered in this aquatic ecology assessment:

- A. The river will be left in its current channel route, with the new channel taking only flood flows;
and
- B. The river is diverted in full to the new channel.

7.4.1 Scenario A (using existing and new flood channel)

This option would result in the creation of a new flood overflow channel that would take flows during a flood event only. It is understood that the existing Mall River channel would take the first $5.5 \text{ m}^3 \text{ sec}^{-1}$ in the river, with the rest of the water (up to $16.13 \text{ m}^3 \text{ sec}^{-1}$) diverted through the new channel. It is envisaged that a small flow ("Sweetening Flow") would be allowed to continue down the flood channel during flows of $5.5 \text{ m}^3 \text{ sec}^{-1}$ or less.

The new diversion channel will consist of a 805m long channel (with a 6.5m base width) that will begin in Shortt's Field and finish approximately 230m downstream of Small's Bridge. There will be a 60m-long inlet channel with Debris and Gravel Traps and a small Drop Weir. There will also be a requirement for re-grading of the channel from the new confluence to 740m below Small's Bridge. The re-profiled river section will run for approximately 480m downstream of the proposed confluence. The full-sized (7.5m) river-widening will run for 450m, followed by a transition of 250m (or so) back to the river's typical 4.5m base width. This option would also require 'maintenance' of the Mall River downstream of these works to the River Suir confluence.

It is understood that if this option is chosen that the channel will be designed as a flood conveyance channel only, and will not be enhanced for ecology or fisheries. However, the possibility of enhancing this channel, while continuing to meet the flood conveyance objectives, will be explored.

Construction Phase

This option would result in localised disturbances during construction works of the Mall River corridor at the points where the flood overflow channel would join the Mall River at the upstream and downstream end. In-stream works, including regrading of the river bed and rock armouring, would be required in these locations. Runoff could also occur from the excavations of the new flood channel, including from any stockpiles of excavated material and spoil repository areas. A concrete regulating weir would also be constructed at the upstream junction of the flood relief channel to regulate flows into the flood channel. These proposed construction works would have the potential to cause the release pollutants into the Mall River. Such pollutants would include uncured concrete, oils and construction debris. Machinery working within and near the river has the potential to produce pollutants both indirectly (from leaking fuels, oil spills, runoff from new channel construction area) and directly, as a result of the localised in-stream works (i.e. suspended solids, leaks from machinery etc.). Any pollutants or accidental spills could potentially run untreated into the Mall River and potentially the River Suir with serious negative consequences.

The proposed river scheme would potentially result in the physical removal of both habitats (i.e. spawning gravels, salmonid nursery areas) and protected species (crayfish, lampreys, salmonids) from the Mall River in the localised areas of the Mall River where the flood channel joins, including upstream

and downstream areas which will need to be re-graded and armoured. For salmonids, the ova and early juvenile stages are most sensitive. Although spawning takes place in winter, fry do not emerge until mid-late May. Therefore any in-stream works or releases of pollutants during the period October to May would potentially have an impact on salmonids. Brook lampreys spawn in the spring and early summer months. Juvenile lampreys remain in their nursery areas for up to five years and would therefore be potentially vulnerable to works. However the works are localised and would not be expected to directly affect any lamprey nursery habitats. Lamprey numbers are very low in the Mall River and in-stream works and/or releases of pollutants from the works areas during the lamprey spawning season could potentially impact on the status of this species in the river. White-clawed crayfish mate during late autumn and the female, remaining fairly inactive, incubates the ova for 8-10 months. Hatching takes place during June or July and the hatchlings remain attached to the female until their second molt. The hatchlings then become independent and the female resumes active feeding. Because of the long reproductive process, low fecundity (60-80 ova per year), and residential behaviour, this species would also be particularly vulnerable to localised direct impacts and indirect water quality impacts from the proposed works.

No exotic invasive flora was recorded from the study site however there is the potential for machinery working on the site to import non-native or invasive species from a previous work site into the river corridor.

There would also be a localised loss of riparian trees, hedgerows and other vegetation in the areas where the new flood channel joins the Mall River.

Sections of in-stream, bank side vegetation and hedgerows would also be cleared during the channel maintenance works downstream of the confluence of the new and existing channels, leading to a loss of aquatic and riparian habitats that have naturalised within Templemore Town and also downstream to the confluence with the Suir River.

As there would be no works on Templemore Lake there would be no direct effects on this water body. It is also unlikely that there would be any indirect effects on this water body.

Operational Phase

Diversion of flows above $5.5 \text{ m}^3 \text{ sec}^{-1}$ into the flood channel will essentially act as an abstraction to the stretch of the Mall River affected by the diversion. This could potentially impact the 'ecological status' of the stretch in a number of ways.

As the Mall River currently receives discharges from storm runoff and other sources, a reduction of flow in this river stretch:

- Will cause a reduction in its waste assimilation capacity. This could potentially result in the existing channel becoming more polluted as these discharges will now be more concentrated.
- Could, during flood events, potentially impact on hydro-geomorphological processes in the river affecting natural channel maintenance and sediment transport processes.

In Scenario A, it is envisaged that a flow ("Sweetening Flow") would be allowed to continue down the flood channel during flows of $5.5 \text{ m}^3 \text{ sec}^{-1}$ or less. OPW (2014) has considered a value of $0.5 \text{ m}^3 \text{ sec}^{-1}$ flow, which is a significant amount in terms of summer flow in the existing Mall River. This would effectively act as an abstraction from the Mall River and it would reduce flows in the river during normal and low flows. This could result in particularly severe impacts on the river during 90%ile and 95%ile flows, as the Mall River currently runs very low under drought conditions. A Flow Duration Curve (developed for the Hydrometric Station at Small's Bridge) estimates that flows greater than $0.5 \text{ m}^3/\text{s}$ occur 27.3% of the time at Templemore. So, with a Sweetening Flow of $0.5 \text{ m}^3/\text{s}$ in the Mall, river water in excess of this would flow in the diversion channel for a total of about 100 days, and clearly for a greater overall total in a wet year.

The Water Framework Directive Risk Assessment Working Group in Ireland has adopted a four category risk classification scheme (Anon, 2004). This scheme is presented below in Table A7.10 (refer to Volume 3, Appendix 7.2). The hydrological risk assessment threshold for rivers from the same report is provided in Table A7.11 (refer to Volume 3, Appendix 7.2). Based on these tables it would be required that the "abstraction" does not result in a change of more than 10% of the natural 95%ile flow in the river to ensure that the river maintains a status of at least Category 2a, or 'probably not at Risk'.

Using the UKTAG (2008) hydrological risk assessment methodology for salmonid spawning and nursery areas, the maximum permitted amount of change from the natural flow during flows of less than QN_{80} (natural 80%ile flow) during the period November to March is 7.5% for maintaining 'Good Ecological Status'. The corresponding maximum change permitted during the period April to October is 10%. The higher standard for the period November to March is primarily designed to protect spawning and early life history stages of salmonids.

However, it is noted that the affected stretch of river is less than 1km in length and the "abstraction" is not consumptive (i.e. the water is returned to the river downstream). Therefore the influence on the river of the diversion can be considered to be below a geographical scale where these effects would be considered significant on the water body. The Mall River currently does not have adequate flood conveyance capacity so the effect on hydro-geomorphological processes is unlikely to be significant. It is noted that the "Sweetening Flow" can be removed, and it is recommended that this is not used in this scenario as it has the potential to result in the affected stretch of the Mall River running too low during drought conditions.

When flows are being taken into the flood relief channel, fish and macroinvertebrates will be attracted into it and will drift down along it. When flood flows reduce, this would result in stranding of aquatic life. As this would be an ongoing effect, it would be potentially significant. Flood flows are more likely to occur during the winter months (the salmonid spawning season) and it is likely that a proportion of adult salmon and trout will be attracted into the flood channel and will spawn there. This would result in the ova/fry or indeed adults themselves being stranded in the flood channel. Salmon numbers in Mall River are already very low and an ongoing impact such as this could result in the loss of salmon from this component of the River Suir catchment. If a small percentage of the flow is allowed to flow down the new flood channel to reduce the possibility of fish, lamprey and macroinvertebrate becoming stranded there, then impacts will occur along the existing Mall River corridor, due to its reduced flows.

The proposed management of the scheme going forward will also involve the ongoing "maintenance" of the Mall River from the confluence of the flood channel down to the River Suir. This will have ongoing impacts on aquatic flora and fauna communities. These works in particular have the potential to impact on the brook lamprey and white-clawed crayfish populations of the river.

There would be no operational phase impacts on Templemore Lake.

7.4.2 Scenario B (river is diverted into new channel)

Construction Phase

Scenario B would have the same potential water quality impacts during the construction phase as outlined above for Scenario A. In addition, the flooding of the new channel would result in significant short-term water quality impacts when suspended solids and any contaminants on the bed of the new channel will be mobilised.

This scenario will result in the total loss of the existing Mall River channel on the diverted stretch, as a result of dewatering or infilling. This would result in the loss of most of the aquatic life along this stretch. Juvenile salmon, trout, brook lampreys and white-clawed crayfish would also be affected. Larvae of mayflies, caddisflies, true flies and beetles as well as adult beetles, snails and freshwater shrimp would be removed from the ecosystem. However, it is envisaged that fish, lampreys and crayfish would be translocated out of this stretch, therefore reducing the scale of the impact.

Operational Phase

The 'old' channel may be filled in and any storm water outfalls and discharges would be piped downstream and released into the Mall River at the junction of the 'old' channel and new channel. This would result in a number of discharges into the river becoming one point discharge. This may cause localised pollution of the Mall River downstream of the scheme due to the slight loss of assimilation capacity which would result from replacing a diffuse pollutant loading with a combined point discharge.

However, there is scope to also provide some water treatment here, and in particular the provision of an oil/water separator is recommended.

The proposed scheme will require the diversion of a number of services including foul and storm water diversions. At present a 600mm Combined Sewer Outfall (CSO) discharges to the Mall River adjacent to Smalls Bridge. While the frequency of discharge to the Mall River is unknown, it is understood to discharge storm flow from buildings, roads and hardstand areas to the west of Templemore Town. As no upgrade works are planned for the CSO, it is proposed to connect the CSO to the new diversion channel. The impact of the full diversion would have a negligible/neutral potential impact on the Mall River. CSOs typically coincide with periods of high river flows which would mitigate the potential impact however the discharge characteristics are not known for the CSO.

The outflow from Templemore Lake is into the affected reach of the Mall River, via a perched pipe. This pipe (and upstream sluice) is not considered to be passable by fish. However, under flood conditions, it is possible that some fish move from the lake into the Mall River and *visa versa*. It is likely that the pike that was recorded during the current survey came from the lake, for example. It is also possible that the culvert and sluice could currently become passable to fish moving in the opposite direction during floods; however, it is clear that significant upstream movement does not occur. Under Scenario B, the outfall from the lake is to be redirected to the new channel upstream of defences.

It is also being considered that the 'old' Mall River channel will be left open and it is envisaged by OPW (2014) that a flow of 0.5 m³/s would be left in the 'old' Mall River (a "Sweetening Flow"). This level of a flow is significant in terms of the low summer flows which the Mall River experiences. This would then result in an 'abstraction' from the new channel, and the hydro-ecological impacts on the new channel would be similar to those described for the existing Mall River in the impacts section for Scenario A above.

It is envisaged that the new channel would be designed to be a two stage channel with scope for significant aquatic ecological mitigation. The existing Mall River channel is highly modified and there is significant scope to provide a channel which is significantly superior in terms of physical and riparian diversity. In the medium term, this would bring significant benefits to aquatic and riparian ecology. Brown trout and white-clawed crayfish would benefit significantly from a salmonid type two stage "thawleg" type channel, as proposed. It is also recommended that specific measures be put in place to assist brook lampreys, which have different habitat requirements from salmonids. It is noted that "a 'Fish Channel' (*Thalweg*) will be dug and partially backfilled with gravels", this is unlikely to provide nursery habitat for brook lampreys and white-clawed crayfish. It is also noted that the channel will "be designed and constructed in consultation with the region's Fishery Board" when this may not be adequate to allow for features for lampreys and crayfish to be introduced into the channel. However, it

is clear that it would be very easy to provide much improved habitats when compared with the existing degraded and modified Mall River channel. It is noted that the use of a "Sweetening Flow" diverted into the 'old' channel will affect the ecological status of this new channel, as there will not be adequate water available for both channels in low flow / drought years.

Within the Engineering Report, it is stated that "*the small weir-like structure just upstream of the diversion is just 0.5m (or so) in height. Despite this, a Fish Pass may be necessary. This is a matter for the region's Fishery Board*". It is noted that brook lampreys can neither jump or crawl over obstacles and a 0.5m drop will definitely be a barrier to movements to these species. It is also likely that a 0.5m drop will prevent upstream movements of eels and crayfish. If this is just a matter for the "*region's Fishery Board*", it is possible that the requirements for lampreys, eels and crayfish at this location will not be met. Mitigation for these species is provided in this chapter, and it is recommended that a small rock ramp is installed below this drop to address the requirements of other non-salmonid fauna in the river.

7.5 Mitigation Measures

7.5.1 Scenario A (using existing and new flood channel)

Mitigation by design

It is recommended that the flood channel will be designed to have a consistent gradient with no areas of pooled water where fish may become trapped after a flood event. It will also be designed to ensure that there is no flow during normal operating circumstances; it will empty in its entirety. Following a flood event, any fish that may end up in the culvert can be expected to drop back to the main channel when flows recede. Although there will inevitably be some ongoing non-significant impacts in this regard.

The junction between the downstream end of the flood channel and the river should be designed to be a spillway with a drop. This will aim to prevent / discourage salmonids, eels, lampreys and crayfish ascending into the flood channel. The use of a physical barrier (i.e. screens) in this area is not considered feasible, as it would become clogged with debris. Likewise, there would be technical and practical difficulties in employing an electrical barrier at this site.

Flows into the upstream end of the flood channel will be controlled using a spillway designed to be at flood level.

It is possible that fish would drop over such a structure during a flood event however if the above design is followed this would not result in standing of fish. The upper end of the flood channel will also be designed in such a way that any fish accidentally entering the flood channel (i.e. adult salmon jumping the drop spillway, or any fish descending into the culvert during flood conditions) will be able to ascend

back through the upper spillway during a flood event. The provision of a physical, electrical or behavioural barrier in this area would also not be considered feasible. It is important that the detailed final designs be approved by Inland Fisheries Ireland (IFI) and the NPWS.

Where appropriate, riprap will be used instead of gabions for bank armouring works. The provision of rip rap has significant benefits for fish (O'Grady, 2006).

Mitigation by avoidance

The timing of the works would be agreed in advance with the NPWS and Inland Fisheries Ireland (IFI). The works are located within a river corridor used by salmonids and lampreys for spawning. To protect salmon and trout it will be necessary to time works outside the window of October to May. Brook lampreys spawn in the spring and early summer months and the timing of works should also take this species into account.

Work areas will be limited as far as possible. No in-stream excavations or other works involving interference with the bed, bank or soil should take place outside of the immediate areas where the flood channel joins the Mall River.

No works are proposed for Templemore Lake and this area will be avoiding during all construction works.

Mitigation by remedy

The appointed contractor will be required to provide a detailed method statement showing how water quality impacts and habitat loss during the works will be minimised. The methodology will be approved by both the IFI and the NPWS prior to any works taking place. The requirement of any fish, lamprey and crayfish translocation operation will be discussed with a suitably qualified aquatic Ecologist. It is noted that crayfish cannot be captured effectively by electrofishing and lampreys cannot be removed using standard IFI fish salvage methods. A specialist contractor will have to be engaged to do this work.

A suitable Environmental Management System will be used to control sediments during the works; this will include the installation of properly designed silt curtains and a monitoring programme for suspended solids in the river, to be agreed with the NPWS and IFI.

Measures to be used to protect aquatic ecology during the construction works will follow the relevant section of the NRA's documents '*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (NRA, 2005). The fisheries board documents "*Maintenance and protection of the inland fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board*" (Kilfeather, 2007) and '*Requirements for the Protection of Fisheries*

Habitat during Construction and Development Works at River Sites' (Murphy, 2004) would also be followed where relevant.

Water quality impacts during the construction phase would be minimised / avoided by following a method statement agreed in advance with the NPWS and the IFI. A silt fence (or equivalent barrier) would be used to surround the works area. This would be installed in the river prior to any works commencing on site. Material removed would be stockpiled within a bunded area / or within a geotextile barrier. All necessary measures would be taken to prevent the release of oil, fuels or other pollutants into the Mall River. The works will be carried out during dry weather and halted during heavy rainfall to reduce suspended solids in the river. Spoil and removed vegetation material from the river is to be stored no less than 5m back from the river and vegetation within this 5m buffer zone is to be retained, in order to reduce the run-off of suspended solids back into the water course.

No exotic invasive flora was recorded from the study site however as the machines being used to excavate the river may contain fragments of exotic invasive flora they will be cleaned at the start of the excavation of the river.

Disturbed areas will be allowed to re-vegetate naturally. Particular care will be taken when working near mature trees in order to protect roots extending into the works site. Mature trees will be retained and scrub and hedgerow will be retained where possible. The minimum width required for machinery to operate safely will be used so that the least amount of vegetation will be removed.

During the works phase of the project the site will be monitored periodically by an Ecologist to ensure that the measures to protect water quality and aquatic areas are fully implemented by the contractor. The extent of monitoring required will be agreed in advance with the NPWS and the IFI and will be specified in the method statement.

7.5.2 Scenario B (river is diverted into new channel)

Mitigation by design

The flood channel will be designed to be a physically diverse river corridor. Suitable guidance to follow is *'The New Rivers and Wildlife Handbook'* by Purseglove, J. (1995). The river channel should be designed with biodiversity in mind, and not just be aimed at salmonids. However, guidance for designing / enhancing rivers for salmonids can be found in the book *"Channels & Challenges. Enhancing salmonid rivers"* by O'Grady (1996) and elements of this book should also be used to inform the design of the channel.

The 'old' channel will be modified to ensure that fish can no longer enter it and become trapped after a flood event.

Any piped waste water discharges will be assessed in terms of waste assimilation capacity of the receiving water and treatment such as oil/water separation will be provided.

Mitigation by avoidance

The timing of the works would be agreed in advance with the NPWS and IFI. The works are located within a river corridor used by salmonids and lampreys for spawning. To protect salmon and trout it will be necessary to time works outside the window of October to May. Brook lampreys spawn in the spring and early summer months and the timing of works should also take this species into account.

Work areas will be limited as far as possible. No in-stream excavations or other works involving interference with the bed, bank or soil should take place outside of the immediate areas where the flood channel joins the Mall River.

No works are proposed for Templemore Lake and this area will be avoiding during all construction works.

Mitigation by remedy

The appointed contractor will be required to provide a detailed method statement showing how water quality impacts and habitat loss during the works will be minimised. The methodology will be approved by both the IFI and the NPWS prior to any works taking place.

There will be a requirement for a large-scale fish, lamprey and crayfish translocation operation on the 'old' river channel. It is noted that crayfish cannot be removed by electrical fishing and that lampreys cannot be removed by salmonid type electrical fishing operation. It will be therefore necessary to engage with specialist licensed aquatic Ecologists, in addition, to the IFI. A translocation plan will need to be designed and implemented prior to water being diverted into the new channel.

A suitable Environmental Management System will be used to control sediments during the works; this will include the installation of properly designed silt curtains and a monitoring programme for suspended solids in the river, to be agreed with the NPWS and IFI.

Measures to be used to protect aquatic ecology during construction works will follow the relevant section of the NRA's documents 'Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes' (NRA, 2005). The fisheries board documents "Maintenance and protection of the inland fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board" (Kilfeather, 2007) and 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Murphy, 2004) would also be followed where relevant.

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