

# PROPOSED REPLACEMENT OF RENEWABLE ENERGY PLANT

**Natura Impact Statement**

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## BASIS OF REPORT

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## 1.0 INTRODUCTION

SLR Consulting Ireland (SLR) was commissioned by Medite Europe DAC to prepare a Natura Impact Statement (NIS), for the proposed replacement of the existing biomass-fired boilers, biomass-fired thermal fluid heater, and gas-fired thermal fluid heater i.e. the Project.

### 1.1 General Description of the Project Site

The proposed project site (“the Project Site”) is located within a well-established facility which manufactures environmentally produced, sustainable timber panel boards, specifically, medium-density fibreboard (MDF) by Medite Europe DAC. The Project Site is located at Redmondstown, Co. Tipperary within the Planning Authority of Tipperary County Council at approximate Irish Transverse Mercator coordinates 623945, 624141.

The Project Site is situated in an area surrounded by agricultural, residential and industrial lands, located approximately 4 km east of the centre of Clonmel town and approximately 0.9 km north of the N24. The site is accessed through a local road that connects to the N24. The Site is well screened and the existing buildings within the industrial facility are situated 50 m back from the local access road and are largely obscured from view due to the presence of abundant shrub and tree plantations at the site boundaries.

The River Anner flows to the east of the Project Site and connects as a tributary to the River Suir, which is approximately 1 km south of the subject site. A large industrial facility belonging to Bulmers Limited is located just south of the subject site, positioned directly adjacent to the N24 and accessed through entrances positioned along this national primary road.

The proposed Project will be located on three parcels of land within the confines of the existing Medite site. Development Area 1 will accommodate the fuel reception, screening, loading, storage and conveying equipment and will be located at the western side of the Site. Development Areas 2 and 3 will accommodate the Line 1 and Line 2 energy plants, respectively. These energy plants will consist of a wood biomass fired Thermal Fluid Heater (TFH). These will be located to the south and east of Development Area 1, respectively.

Existing arrangements on Site include;

- Medite Europe DAC was granted an Industrial Emission Licence (P0027-04) by the EPA on the 7th March 2017. They set a range of emission limit values (ELVs) for air emissions, dust emissions, noise emissions, and surface water emissions, and they apply parameters regarding monitoring and reporting of the same.
- Schedule A of the licence specifies the limitations on fuel that can be used in the boilers. As highlighted in Note 1, it is a requirement of the Licence that Medite can demonstrate that the wood waste used as a fuel is not hazardous and does not contain halogenated organic compounds or heavy metals as a result of treatment with preservatives or coating.
- Medite’s operations have an Environment Management System Manual (ISO 14001:2015) in place which purpose is to gain a high-level understanding of all relevant internal and external issues that impact or have the potential to impact, positively or negatively, the ability of the EMS to achieve its intended outcomes.
- Sediment traps and the monitoring of water quality, including suspended solid pollution, at the two discharges to surface water, in accordance with the Industrial Emission Licence referenced above.

## 1.2 Proposed project

The proposed project will replace all three existing, aging thermal energy systems serving both of Medite's two production lines, specifically;

- the two wood biomass fired boilers (18MW each) (TFH) (6MW) serving Production Line 1.
- the wood biomass fired Thermal Fluid Heater (19MW) serving Production Line 2.

The proposed Project will also provide the thermal energy currently provided by the natural gas-fired Thermal Fluid Heater (TFH) (6MW) serving Production Line 1, which will be retained for backup purposes.

These systems will be replaced with 2 new renewable energy plants. These renewable energy plants will have rated thermal input capacity of up to 60 MW for the system serving Production Line 1 and 30 MW for the system serving Production Line 2. There will be no increase in current process water usage.

The Project will be located on three development areas within the confines of the existing Medite site. Development Area 1 will accommodate the fuel reception, screening, loading, storage and conveying equipment and will be located at the western side of the Site. Development Areas 2 and 3 will accommodate the Line 1 and Line 2 energy plants, respectively. These energy plants will consist of a wood biomass fired Thermal Fluid Heater (TFH). These will be located to the south and east of Development Area 1, respectively.

## 1.3 Aim of the Report

The purpose of this report is to provide supporting information to assist the competent authority, in this case An Bord Pleanála, to carry out an Appropriate Assessment for adverse effects on the integrity of European sites resulting from the Proposed Replacement of Renewable Energy Plant at Medite, Clonmel, Tipperary.

## 1.4 Evidence of Technical Competence and Experience

Aisling Kinsella prepared this report. Richard Arnold carried out the technical review of this report.

### **Aisling Kinsella BSc (Hons) MSc – Senior Ecologist**

Aisling is a Senior Ecologist with SLR and holds a BSc in Zoology from University College Cork and an MSc in Wildlife Management and Conservation from University College Dublin. Aisling has three years' experience in ecological consultancy. Her experience to date has included a range of survey types (bird, mammal, habitat etc.), project management and the preparation of numerous reports including ornithological, ecological impact assessment, appropriate assessment screening and Natura Impact Statements for a range of different projects and plans including the N22 Baile Bhuirne to Macroom Bypass and Cloghan Wind Farm.

### **Richard Arnold BSc (Hons) MRes MCIEEM CEnv – Technical Director**

Richard has over 25 years of experience as a professional ecological consultant. Richard holds a BSc in Ecology from University of East Anglia and a Msc in Environmental Science from Lancaster University. This experience includes work on some of the largest development projects in the UK and Ireland, as well as some work in the Middle East. Richard has worked on projects in most development sectors and consequently has in depth knowledge of biodiversity legislation and planning guidance relating to nature conservation. Richard has worked on a variety of projects including the N6 Galway City Ring Road, and Seven Hills Wind Farm Phases I and II.

## 1.5 Relevant Legislation

The main pieces of relevant legislation are as follows:

- The Habitats Directive 92/43/EEC.
- The Birds Directive 2009/147/EC.
- European Communities (Birds and Natural Habitats) Regulations 2011 – 2021.

- Planning and Development Acts 2000 to 2023 - PART XAB.

The relevant sections of the legislation are summarised in **Appendix A** of this report.

## 2.0 METHODS

### 2.1 General Approach

The methodology used in this report is based on guidance provided by the National Parks and Wildlife Service (NPWS, 2010), the Office of the Planning Regulator (OPR, 2021) and EC Guidance (EC, 2018), (EC, 2021) on the application of Article 6 of the Habitats Directive.

The 2021 EC guidance describes a series of stages and steps which should be completed when carrying out the assessment and these are followed here with minor modifications. The assessment applies only to European Sites (SCIs, SPAs and SACs). More specifically, it only applies to the qualifying interest features of such sites i.e. the features which are the reason that the site was designated.

### 2.2 Baseline Information

#### *Ecological Desk Study*

An ecological desk study comprising an online search for (i) European sites; (ii) Annex I habitats and Annex II species (of the Habitats Directive) and (iii) Annex I bird species (of the Birds Directive) of the Project site. The desk study area was extended where possible links to European sites and species populations occurred due to emissions to air and water, changes to hydrology, or mobile or migratory species populations by utilising the Source-Pathway-Receptor model.

Online resources included ecology data held by the National Biodiversity Data Centre, the National Parks and Wildlife Service, the Environmental Protection Agency, the Ireland Wetland Bird Survey (IWeBS) and Ordnance Survey Ireland (Geohive).

#### *Field Surveys*

An ecological field survey was conducted on the 1<sup>st</sup> February 2022 and 12<sup>th</sup> July 2022 by SLR Ecologist Aisling Kinsella and on 15<sup>th</sup> and 16<sup>th</sup> September 2022 by SLR Ecologist Jonathon Dunn. These included a habitat survey to identify and map any habitats listed on Annex I of the Habitats Directive, habitats which have a supporting function for such habitats, habitats which may support Annex II species of the Habitats Directive and habitats which may support Annex I species of the Birds Directive. The habitats were classified using 'A Guide to Habitats in Ireland'<sup>1</sup>.

Aquatic surveys were conducted on the River Anner, part of the Lower River Suir SAC, by specialist aquatic ecologists from Triturus Environmental Ltd. These surveys were conducted to establish baseline biological water quality conditions of the River Anner immediately upstream and downstream of the Medite facility. These data were used to inform the potential for impacts to undermine the conservation objectives of the Lower River Suir SAC as a result of the Project.

#### *Limitations*

Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. It is therefore possible that important habitats or protected species not identified during the data search do in fact occur within proximity of the Project Site.

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<sup>1</sup> [A Guide to Habitats in Ireland - Fossitt.pdf \(npws.ie\)](#) (Last Accessed September 2023)

While the last Site visit was conducted on 16<sup>th</sup> September 2022, 16 months from the time this report is being written, the data collected is not considered to be out of date, as it is still within the recommended timeframe (i.e. 12-18 months) for the criteria set out by CIEEM (2019)<sup>2</sup>.

## 2.3 Stage One: AA Screening

Stage One is a screening assessment, the purpose of which is to determine whether a plan or project requires more detailed assessment. There are two principal tests. The first considers whether the plan or project is needed for the management of a European site for the purpose of maintaining or restoring its conservation interest. Any such plans or projects can usually be screened out of further assessment. The second test considers whether the plan or project, without specific mitigation measures, would be likely to have a significant effect on any European Site. This requires consideration of the project on its own and in combination with other plans or projects.

A project can only be screened out of further assessment if it is certain (beyond reasonable scientific doubt and on the basis of the best scientific knowledge) that there would be no significant effects on any European site without mitigation designed specifically to address potential impacts on the qualifying interest of such sites. Significant effects in this assessment are those which could undermine the conservation objectives of a qualifying interest feature. The process is used to determine which European Sites should be included in the later stages of the assessment. It can also be used to determine which qualifying interest features require further assessment.

## 2.4 Stage Two: Appropriate Assessment

Stage Two is a more detailed assessment, known as an “Appropriate Assessment” following the terminology in the legislation. This essentially repeats the second test of the screening assessment but in more detail and considering mitigation measures before reaching a conclusion. At this stage, the test is whether the project or plan will have an adverse effect on the integrity of any European site. This must be done in light of the conservation objectives for each of the sites and qualifying interest features that have been ‘screened in’ by the earlier stage of assessment. Any effect which could undermine the conservation objectives is considered an adverse effect on the integrity of the site, and vice versa. If the project is predicted to lead to adverse effects upon the integrity of the site, further stages of assessment are required before the project can be authorised.

## 2.5 Sources of Information

Sources of information for the assessment of the Project ‘alone’ include:

- Article 17 and Article 12 reports completed by the National Parks and Wildlife Service<sup>3</sup>;
- Site Synopses, Conservation Objectives and Standard Data Forms for the European sites<sup>4</sup>;
- Environmental Protection Agency (EPA) Maps<sup>5</sup>.
- Relevant chapters of the Environmental Impact Assessment Report as part of this application, in particular Chapter 2 – Project Description, Chapter 7 – Hydrology and Hydrogeology and Chapter 8 – Air were also reviewed.

Sources of information for the plans and projects for the ‘in-combination’ assessment were as above and also include:

- Tipperary County Development Plan 2022-2028<sup>6</sup>

<sup>2</sup> [Advice-Note.pdf \(cieem.net\)](#)

<sup>3</sup> <https://www.npws.ie/publications/article-17-reports?msclkid=0c19d260b00a11ecaf5a935da63f219b> (last accessed January 2023)

<sup>4</sup> <https://www.npws.ie/protected-sites> (last accessed January 2023)

<sup>5</sup> <http://gis.epa.ie/> (last accessed January 2023)

<sup>6</sup> [Tipperary County Development Plan 2022- 2028 | www.tipperarycoco.ie](https://www.tipperarycoco.ie) (last accessed January 2023)

- Regional Spatial & Economic Strategy for the Southern Region<sup>7</sup>
- Tipperary County Council planning portal<sup>8</sup>, Waterford County Council planning portal<sup>9</sup>, ePlan<sup>10</sup> and myplan.ie<sup>11</sup> were accessed for information on other projects and plans.

### 3.0 STAGE 1: AA SCREENING

An Appropriate Assessment Screening Report (AASR) has been produced separately. The conclusion set out in the AASR was that likely significant effects arising from unmitigated changes in air and water quality cannot be excluded for the proposed Project, individually or in combination with each other or with other plans or projects, for the following European sites:

- Lower River Suir SAC
- Nier Valley Woodlands SAC
- Comeragh Mountains SAC
- River Barrow and River Nore SAC (Estuary only)

The Project was therefore screened in for further assessment at Stage 2, which will examine the potential for the Project to have adverse effects on the integrity of the four SACs listed above arising from changes in air and water quality, alone and in combination with other Plans and Projects.

### 4.0 STAGE 2: APPROPRIATE ASSESSMENT (NATURA IMPACT STATEMENT)

This NIS was prepared as part of a planning application prepared by Medite Europe DAC for the proposed replacement of the existing biomass-fired boilers, biomass-fired thermal fluid heater, and gas-fired thermal fluid heater at their existing MDF facility at Redmondstown, Clonmel, Co. Tipperary.

The Competent Authority, in this case An Bord Pleanála, may therefore carry out a Stage 2 Appropriate Assessment to determine whether the proposed project would adversely affect the integrity of the Lower River Suir SAC, Nier Valley Woodlands SAC, Comeragh Mountains SAC and River Barrow and River Nore SAC. The *'integrity of the site'* can be defined as *"The integrity of the site involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site's conservation objectives"*<sup>12</sup>.

The headings within the European Commission methodological guidance document on the assessment of plans and projects significantly affecting European sites have been used to provide a framework to examine the potential impacts of the proposed project on Lower River Suir SAC, Nier Valley Woodlands SAC, Comeragh Mountains SAC and River Barrow and River Nore SAC.

This section of the report sets out the potential implications of the project (both alone or in combination with other projects or plans) on the integrity of the European site with respect to the conservation objectives of the site and to its structure and function. The precautionary principle should be applied when considering the potential implications and the focus should be on demonstrating, with supporting evidence, that there

<sup>7</sup> [Southern Regional Assembly \(southernassembly.ie\)](https://www.southernassembly.ie/) (last accessed January 2023)

<sup>8</sup> [Select Search Type \(eplanning.ie\)](https://www.eplanning.ie/) (last accessed January 2023)

<sup>9</sup> [Waterford City & County Council : Online Planning Enquiries \(waterfordcouncil.ie\)](https://www.waterfordcouncil.ie/)

<sup>10</sup> [ePlan::Find a planning application \(eplanning.ie\)](https://www.eplan.ie/) (last accessed January 2023)

<sup>11</sup> <https://myplan.ie/> (last accessed January 2023)

<sup>12</sup> [Managing Natura 2000 sites - Publications Office of the EU \(europa.eu\)](https://ec.europa.eu/eia/) (last accessed January 2023)

will be no adverse effects on the integrity of Lower River Suir SAC, Nier Valley Woodlands SAC, Comeragh Mountains SAC and River Barrow and River Nore SAC. Where this is not the case, adverse effects must be assumed.

#### 4.1 Step 1: Description of the European sites concerned

A description of each of the European sites Lower River Suir SAC, Nier Valley Woodlands SAC, Comeragh Mountains SAC and River Barrow and River Nore SAC, is provided in **Table 1** below and detail on the conservation objectives for each site are provided below.

**Table 1 European sites and their qualifying interest**

European Site	Distance from Project Site	Brief Description (from Synopsis)	Qualifying Interests	Conservation objectives
Lower River Suir SAC 002137	<1km	The Lower River Suir SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary.	<ul style="list-style-type: none"> <li>• Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]</li> <li>• Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</li> <li>• Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and Callitriche-Batrachion vegetation [3260]</li> <li>• Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]</li> <li>• Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]</li> <li>• 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]</li> <li>• <i>Taxus baccata</i> woods of the British Isles [91J0]</li> <li>• <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029]</li> <li>• <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]</li> <li>• <i>Petromyzon marinus</i> (Sea Lamprey) [1095]</li> <li>• <i>Lampetra planeri</i> (Brook Lamprey) [1096]</li> <li>• <i>Lampetra fluviatilis</i> (River Lamprey) [1099]</li> <li>• <i>Alosa fallax fallax</i> (Twaite Shad) [1103]</li> <li>• <i>Salmo salar</i> (Salmon) [1106]</li> <li>• <i>Lutra lutra</i> (Otter) [1355]</li> </ul>	<p>To maintain or restore the favourable conservation condition of the habitats and species listed as qualifying interests for Lower River Suir SAC, which is defined by a specific list of attributes and targets. See Table 2.</p> <p>Detailed conservation objectives can be accessed at: <a href="https://www.npws.ie/protected-sites/sac/002137">https://www.npws.ie/protected-sites/sac/002137</a></p> <p>See Table 2.</p>
Nier Valley Woodlands SAC 000688	>9km	Nier Valley Woodlands comprises an area of mixed semi-natural deciduous forest lying on the flanks of the Nier Valley, 3 km east of Ballymacarbry in Co. Waterford. It consists of several separate tracts of woodland which were once joined up but have now been fragmented.	<ul style="list-style-type: none"> <li>• Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</li> </ul>	<p>To restore the favourable conservation condition of the habitat listed as a qualifying interest for Nier Valley Woodlands SAC, which is defined by a specific list of attributes and targets that can be found at:</p>

European Site	Distance from Project Site	Brief Description (from Site Synopsis)	Qualifying Interests	Conservation objectives
				<a href="https://www.npws.ie/protected-sites/sac/000668">https://www.npws.ie/protected-sites/sac/000668</a> See Table 3.
Comeragh Mountains SAC 001952	>9km	Comeragh Mountains are situated approximately 11 km south-west of Carrickon-Suir in Co. Waterford. The central plateau of the Comeragh Mountains is at an altitude of about 700 m and supports areas of blanket bog. Alpine, wet and dry heath are also present.	<ul style="list-style-type: none"> <li>• Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110]</li> <li>• Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]</li> <li>• Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]</li> <li>• European dry heaths [4030]</li> <li>• Alpine and Boreal heaths [4060]</li> <li>• Blanket bogs (* if active bog) [7130]</li> <li>• Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110]</li> <li>• Calcareous rocky slopes with chasmophytic vegetation [8210]</li> <li>• Siliceous rocky slopes with chasmophytic vegetation [8220]</li> <li>• <i>Hamatocaulis vernicosus</i> (Slender Green Feather-moss) [6216]</li> </ul>	To maintain or restore the favourable conservation condition of the habitats and or species listed as qualifying interests for Comeragh Mountains SAC has been selected, which is defined by a specific list of attributes and targets that can be found at:  <a href="https://www.npws.ie/protected-sites/sac/001952">https://www.npws.ie/protected-sites/sac/001952</a> See Table 4.
River Barrow and River Nore SAC 002162	>44km	The freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford.	Qualifying interest screened <b>in</b> at Stage 1. <ul style="list-style-type: none"> <li>• Estuaries [1130]</li> <li>• Mudflats and sandflats not covered by seawater at low tide [1140]</li> <li>• Reefs [1170]</li> <li>• Salicornia and other annuals colonising mud and sand [1310]</li> <li>• Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]</li> <li>• Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</li> <li>• <i>Petromyzon marinus</i> (Sea Lamprey) [1095]</li> <li>• <i>Lampetra fluviatilis</i> (River Lamprey) [1099]</li> <li>• <i>Alosa fallax fallax</i> (Twaite Shad) [1103]</li> <li>• <i>Salmo salar</i> (Salmon) [1106]</li> <li>• <i>Lutra lutra</i> (Otter) [1355]</li> </ul> Qualifying interest screened <b>out</b> at Stage 1.	To maintain or restore the favourable conservation condition of the habitats and or species listed as qualifying interests for Comeragh Mountains SAC has been selected, which is defined by a specific list of attributes and targets that can be found at:  <a href="https://www.npws.ie/protected-sites/sac/002162">https://www.npws.ie/protected-sites/sac/002162</a> See Table 5.

European Site	Distance from Project Site	Brief Description (from Site Synopsis)	Qualifying Interests	Conservation objectives
			<ul style="list-style-type: none"> <li>• Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and Callitriche-Batrachion vegetation [3260]</li> <li>• European dry heaths [4030]</li> <li>• Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]</li> <li>• Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]</li> <li>• Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</li> <li>• 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]</li> <li>• <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]</li> <li>• <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029]</li> <li>• <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]</li> <li>• <i>Lampetra planeri</i> (Brook Lamprey) [1096]</li> <li>• <i>Trichomanes speciosum</i> (Killarney Fern) [1421]</li> <li>• <i>Margaritifera durrovensis</i> (Nore Pearl Mussel) [1990]</li> </ul>	

### 4.1.1 Lower River Suir SAC 002137

As noted above, the conservation objectives (COs) for Lower River Suir SAC are as follows:

*To maintain or restore the favourable conservation condition of the habitats and species listed as qualifying interests.*

Table 2 lists the qualifying interests and their specific COs (i.e. maintain or restore their favourable conservation condition) as well as the attributes and targeted objectives relevant to the potential impacts arising from the proposed development that were identified at Stage 1 i.e changes in air quality, water quality and water quantity.

**Table 2 Qualifying interests of the Lower River Suir SAC and their specific conservation objectives**

Qualifying Interests	CO	Attributes	Targeted Objectives
Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> ) [1330]	Restore	N/A <sup>13</sup>	N/A
Mediterranean salt meadows ( <i>Juncetalia maritimi</i> ) [1410]	Restore	N/A	N/A
Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]	Maintain	1. Hydrological regime: river flow. 2. Substratum composition: particle size range 3. Water quality	N/A
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	Maintain	Hydrological regime: Flooding depth/height of water table	N/A
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	Restore	Woodland structure: community diversity and extent	Maintain diversity and extent of community types
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]	Restore	Woodland structure: community diversity and extent	Maintain diversity and extent of community types
<i>Taxus baccata</i> woods of the British Isles [91J0]	Restore	Woodland structure: community diversity and extent	Maintain diversity and extent of community types

<sup>13</sup> Not applicable – no targeted objectives directly relevant to the identified potential impact factors

Qualifying Interests	CO	Attributes	Targeted Objectives
<i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029], relevant to the Clodiagh Catchment only	Restore	1. Water quality: macroinvertebrate and phytobenthos (diatoms) 2. Substratum quality: sediment 3. Substratum quality: oxygen availability 4. Hydrological regime: flow variability	N/A
<i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]	Maintain	Water quality	N/A
<i>Petromyzon marinus</i> (Sea Lamprey) [1095]	Restore	N/A	N/A
<i>Lampetra planeri</i> (Brook Lamprey) [1096]	Restore	N/A	N/A
<i>Lampetra fluviatilis</i> (River Lamprey) [1099]	Restore	N/A	N/A
<i>Alosa fallax fallax</i> (Twaite Shad) [1103]	Restore	Water quality: oxygen levels	No lower than 5mg/l
<i>Salmo salar</i> (Salmon) [1106]	Restore	Water quality	At least Q4 at all sites sampled by EPA
<i>Lutra lutra</i> (Otter) [1355]	Maintain	N/A	N/A

#### 4.1.2 Nier Valley Woodlands SAC 000688

The COs for Nier Valley Woodlands SAC are as follows:

*To maintain or restore the favourable conservation condition of the habitats and species listed as qualifying interests.*

Table 3 lists the qualifying interests and their specific COs (i.e. maintain or restore their favourable conservation condition) as well as the attributes and targeted objectives relevant to the potential impacts arising from the proposed development that were identified at Stage 1.

**Table 3 Qualifying interests of the Nier Valley Woodlands SAC and their specific conservation objectives**

Qualifying Interests	CO	Attributes	Targeted Objectives
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	Restore	Woodland structure: community diversity and extent	Maintain diversity and extent of community types

### 4.1.3 Comeragh Mountains SAC 001952

The COs for Comeragh Mountains SAC are as follows:

*To maintain or restore the favourable conservation condition of the habitats and species listed as qualifying interests.*

Table 4 lists the qualifying interests and their specific COs (i.e restore or maintain their favourable conservation condition) as well as the attributes and targeted objectives relevant to the potential impacts arising from the proposed development that were identified at Stage 1.

**Table 4 Qualifying interests of the Comeragh Mountains SAC and their specific conservation objectives**

Qualifying Interests	CO	Attributes	Targeted Objectives
Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> ) [3110]	Maintain	1. Nutrients 2. Phytoplankton biomass 3. Phytoplankton composition 4. Acidification status	N/A
Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]	Maintain	Water quality	N/A
Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]	Restore	Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges
European dry heaths [4030]	Restore	Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges
Alpine and Boreal heaths [4060]	Restore	Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges
Blanket bogs (* if active bog) [7130]	Restore	Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges
Siliceous scree of the montane to snow levels ( <i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i> ) [8110]	Restore	Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges
Calcareous rocky slopes with chasmophytic vegetation [8210]	Restore	Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges

Qualifying Interests	CO	Attributes	Targeted Objectives
Siliceous rocky slopes with chasmophytic vegetation [8220]	Restore	Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges
<i>Hamatocaulis vernicosus</i> (Slender Green Feather-moss) [6216]	Restore	Population size	No decline, subject to natural processes

#### 4.1.4 River Barrow and River Nore SAC 002162

The COs for River Barrow and River Nore SAC are as follows:

*To maintain or restore the favourable conservation condition of the habitats and species listed as qualifying interests.*

The following table lists the qualifying interests and their specific COs (i.e. maintain or restore their favourable conservation condition) as well as the attributes and targeted objectives relevant to the potential impacts arising from the proposed development that were identified at Stage 1.

As described at Stage 1 the Lower River Suir SAC forms a confluence with the River Barrow and River Nore SAC where it is a tidal estuary, therefore, effects on the QIs and their COs of freshwater and terrestrial habitats can be excluded as there is no hydrological pathway. The freshwater and terrestrial QIs are therefore excluded from Table 5.

**Table 5 Relevant Qualifying interests of the River Barrow and River Nore SAC and their specific conservation objectives**

Qualifying Interests	CO	Attributes	Targeted Objectives
Estuaries [1130]	Maintain	N/A	N/A
Mudflats and sandflats not covered by seawater at low tide [1140]	Maintain	N/A	N/A
Reefs [1170]	Not available	N/A	N/A
Salicornia and other annuals colonising mud and sand [1310]	Maintain	N/A	N/A
Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> ) [1330]	Restore	N/A	N/A
Mediterranean salt meadows ( <i>Juncetalia maritimi</i> ) [1410]	Restore	N/A	N/A
<i>Petromyzon marinus</i> (Sea Lamprey) [1095]	Restore	N/A	N/A
<i>Lampetra fluviatilis</i> (River Lamprey) [1099]	Restore	N/A	N/A

Qualifying Interests	CO	Attributes	Targeted Objectives
<i>Alosa fallax fallax</i> (Twaite Shad) [1103]	Restore	Water quality: oxygen levels	N/A
<i>Salmo salar</i> (Salmon) [1106]	Restore	Water quality	N/A
<i>Lutra lutra</i> (Otter) [1355]	Restore	N/A	N/A

## 4.2 Step 2: Assessment of Effects of Project or Plan Alone on the Integrity of European site

### 4.2.1 Air Quality

There is the potential for indirect impacts on the Lower River Suir SAC, Nier Valley Woodlands SAC, Comeragh Mountains SAC and River Barrow and River Nore SAC as result of atmospheric dispersal of air and dust emissions from the Site and subsequent deposition of nutrients/pollutants within the aforementioned European sites.

Deposition of nutrients/pollutants in this way has the potential to impact water quality through changes in chemical composition resulting in effects on the growth and condition of the vegetation and faunal species which make up the Lower River Suir SAC and River Barrow and Nore SAC as well as nutrient and pH level changes that may negatively affect the growing conditions of heaths and blanket bogs in the Comeragh Mountains SAC or result in changes in vegetation composition within the Nier Valley Woodlands SAC.

The distance from the Site to the nearest European site, the Lower River Suir SAC, is less than 1km. Given this proximity, air and dust emissions, as a result of the proposed project, may result in nutrient and pollutant deposition in the Lower River Suir SAC.

The River Barrow and Nore SAC is connected to the Lower River Suir SAC downstream of the Site. However, there is a distance of at least 44km between the Site and this confluence. Any nutrients/ pollutants that may enter the Lower River Suir SAC from the Site will be significantly diluted by the time they reach the River Barrow and Nore SAC.

The distance from the Site to the Nier Valley Woodlands SAC and the Comeragh Mountains SAC is more than 9 km. There is no direct ecological or hydrological connectivity between the Project Site and the Nier Valley Woodlands SAC or the Comeragh Mountains SAC i.e via surface water pathways. Deposition at these sites would have to occur as a direct result of atmospheric dispersal. Both Nier Valley Woodlands SAC and Comeragh Mountains SAC are located south of the Site. Therefore, these sites are not within the path of the prevailing south-westerly winds from the Site. As a result and given the distance of more than 9km between these European sites and the Site, any emissions reaching the Nier Valley Woodlands SAC and the Comeragh Mountains SAC will be intermittent and well-diluted.

### 4.2.2 Air Quality Modelling

#### Background

Sites of nature conservation importance are provided environmental protection with respect to air quality, through the application of standards known as Critical Levels (CLe) for airborne concentrations and Critical Loads (CLo) for deposition to land from air.

#### Critical Levels (CLe)

CLe are a quantitative estimate of exposure to one or more airborne pollutants in gaseous form, below which significant harmful effects on sensitive elements of the environment do not occur, according to present

knowledge. Cle for the protection of vegetation and ecosystems are specified within relevant European air quality directives and corresponding Irish air quality regulations (see Table 6).

**Table 6 Critical Levels for the Protection of Vegetation and Ecosystems**

Pollutant		Critical Level ( $\mu\text{g}/\text{m}^3$ )	Habitat	Averaging Period
Nitrogen oxides	NO <sub>x</sub>	30	All ecosystems	Annual mean
		75	All ecosystems	Daily mean

### Critical Loads (CLo)

CLo are a quantitative estimate of exposure to deposition of one or more pollutants, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. CLo are set for the deposition of various substances to sensitive ecosystems.

In relation to combustion emissions, CLo for eutrophication and acidification are relevant which can both occur via wet and dry deposition. Wet deposition occurs due to rainout (within cloud) scavenging and washout (below cloud) scavenging, whereas dry deposition occurs when particles are brought down to the surface by gravitational settling and turbulence. For the assessment of short-range emissions, dry deposition is the predominant removal mechanism. Wet deposition can therefore be discounted from further assessment<sup>14</sup>.

CLo for the habitats and species of relevance to this assessment have been obtained from relevant guidance and literature based upon the known qualifying Annex 1 habitat type present. The most sensitive habitat listed has been used to facilitate a worst-case assessment. Further details are presented below.

To provide certainty with respect to the assessment outcomes, wherever possible, this assessment has incorporated a number of conservative assumptions, which will result in an overestimation of predicted ground level concentrations. As such, the actual predicted ground level concentrations are expected to be lower than this and, in some cases, significantly lower, with the operation of the new thermal energy systems.

### 4.2.3 Results

#### Critical Levels

Table 7 details the predicted impacts on long term and short term CLe, respectively, at the identified ecological sites for the Project alone. All short and long-term process contributions (PCs) are substantially below the relevant designation-specific assessment criteria. Effects are therefore unappreciable and would not undermine the conservation objectives for any of the three European sites.

**Table 7 Predicted Impacts on Critical Levels**

Site	NO <sub>x</sub> 24-Hour Mean CLe ( $75\mu\text{g}/\text{m}^3$ )		NO <sub>x</sub> Annual Mean CLe ( $30\mu\text{g}/\text{m}^3$ )	
	PC ( $\mu\text{g}/\text{m}^3$ )	PC as % CLe	PC ( $\mu\text{g}/\text{m}^3$ )	PC as % CLe
Lower River Suir SAC	<0.1	<0.1	<0.1	<0.1
Comeragh Mountains SAC	4.8	6.4	<0.1	0.2
Nier Valley Woodlands SAC	0.4	0.5	<0.1	<0.1

#### Critical Loads

The predicted nitrogen and acid deposition CLo impacts at the identified ecological sites are presented Table 8 and Table 9, respectively. All long-term PCs are substantially below the relevant designation-specific

<sup>14</sup> AQTAG06 – Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air. Environment Agency, March 2014 version.

assessment criteria. Effects are therefore unappreciable and would not undermine the conservation objectives for any of the three European sites.

**Table 8 Maximum Predicted Nutrient Nitrogen Deposition Impacts at Ecological Receptors**

Site	Applied C <sub>Lo</sub> (Min N)	PC N	PC as % C <sub>Lo</sub> (Min N)
	kg/ha/yr		
Lower River Suir SAC	3	<0.1	<0.1
Comeragh Mountains SAC	10	<0.1	0.1
Nier Valley Woodlands SAC	5	<0.1	<0.1

**Table 9 Maximum Predicted Acid Deposition Impacts at Ecological Receptors**

Site	Applied C <sub>Lo</sub> (CLmaxN)	PC	PC as % C <sub>Lo</sub> (CLmaxN)
	keq/ha/yr		
Lower River Suir SAC	1.157	<0.1	<0.1
Comeragh Mountains SAC	1.157	<0.1	0.1
Nier Valley Woodlands SAC	1.157	<0.1	<0.1

The River Barrow and River Nore SAC was not included in the air emissions assessment. However, the results from the assessment determined that there would be no appreciable effect on the Lower River Suir SAC which is the pathway between the Site and the River Barrow and River Nore SAC. It can therefore be determined that air emissions from the Site as a result of the proposed project would not undermine the conservation objectives for the River Barrow and Nore SAC.

As air quality is expected to improve as a result of the Project because introduction of policy and legislation, and availability of cleaner technologies/fuels, therefore as QI's are largely in a favourable condition the Project will not undermine the conservation objectives of the European Sites.

### 4.3 Dust Emissions Assessment

Following the construction dust assessment, (Appendix C) the application site is found to be at worst 'Low Risk' in relation to dust soiling effects on people and property and human health impacts in the absence of mitigation and 'Medium Risk' in relation to ecological impacts. Moreover, potential dust effects during the construction phase are temporary in nature and will only arise at particular times (i.e. certain activities and/or meteorological conditions). Nonetheless, commensurate with the above designation of dust risk, there is a risk that dust entering the River Anner affects water quality and therefore undermines the conservation objectives. Mitigation measures, as identified by IAQM guidance may therefore be required to ensure that any potential impacts arising from the construction phase of the Development are reduced and, where possible, completely removed.

### 4.4 Surface and Ground Water Quantity and Quality

#### 4.4.1 Surface Water Abstraction

The Conservation Objective document (NPWS, 2017) confirms that the river habitat (3260) is currently in favourable condition including the river flow attribute, with the target (and objective) to maintain an appropriate (natural) hydrological regime.

The site water usages for 2022 are set out in the Annual Environmental Report (AER) and are shown in Table 10. The mains supply water is for a potable supply to the site while the main portion of water is used in processing at the site is abstracted from the Anner River.

**Table 10 Annual Site Water Usage (2022)**

Source	m <sup>3</sup> /year	m <sup>3</sup> /day
Groundwater	300	0.8
Surface Water (Anner River)	396,000	1,084.2
Public Water Supply (Mains)	11,581	31.7
<i>Total</i>	407,881	1,116.7

The Project will not increase or decrease the current water usage at the site. Given the target for river flow is currently being met, adverse effects on the integrity of European sites from water abstraction can be excluded for the Project Alone.

#### 4.4.2 Surface Water Discharge

There are two existing surface water discharges from the Medite site. The first existing discharge comprises surface water from the north of the site, i.e. from the log yards, which is collected in an open drain and flows to a point adjacent to the North gate where it is piped under road and into a settlement pond that outflows at discharge point SW1 into the River Anner. This discharge is monitored under IE Licence P0027-04, as described below. The second existing discharge is surface water from the main process area which is subject to both coarse and fine screening before discharge into three large interceptor settling lagoons. Surface water can also be diverted into an Emergency Holding tank, which is one of the three surface water lagoons. The surface water from these settling lagoons flows through an oil interceptor before meeting the clarified effluent from the WWTP. The combined flow is measured and monitored under IE Licence P0027-04 before discharge at SW2 to the River Anner, as described below. There will be an increase in water discharged at SW2 due to the additional hardstanding areas associated with the proposed Project.

#### 4.4.3 Existing Surface Water Management, Treatment and Monitoring

Surface Water Management will largely remain unchanged except for draining three areas of additional hard standing to facilitate the development of both energy plants and fuel infrastructure. There are existing treatment measures in place at the site to manage and treat storm surface water runoff and process water at the site.

Existing treatment measures, designed to reduce the potential impacts associated with the operation of the site to acceptable levels, presenting a low risk to the receiving environment, are identified in this section. These measures, which are designed to either reduce the likelihood of an event occurring or the magnitude of the consequences should the event occur will remain in place during the installation and operation of the proposed new boilers at the site.

The summary discharge water quality results from SW1 and SW2 for 2022 and 2023 (to September) are shown in Table 11 and Table 12 below.

**Table 11  
 SW1 Summary Discharge Results for Suspended Solids (2022 and 2023)**

Parameter	Units	Emission Limit Value	Average 2022	Average 2023
Suspended Solids	mg/l	40 (Yearly Average Limit)	49	51.7

The discharge at SW1 was not compliant with the Emission Limit Value (ELV) in the Industrial Emission Licence. However, Medite have installed two in line silt traps on the discharge line to SW1 in order to treat the runoff discharge waters to remove suspended solids. Ongoing monitoring of the discharge waters at SW1 during 2024 will indicate if the suspended solids are in compliance with ELV as set out in the licence, or if additional treatment measures are required for suspended solids.

**Table 12 SW2 Summary Discharge Results for 2023 (January to September)**

Parameter	Units	Emission Limit Value	Sample Count	Maximum	Average
Temperature	°C	<25	36	24	-
pH		6-9	36	9	-
BOD	mg/l	50	33	45	-
COD	mg/l	150 (Yearly Average Limit)	36	-	104
Suspended Solids	mg/l	35 (Yearly Average Limit)	36	-	30
Nitrates as N	mg/l	15	24	13.40	-
Ammonia as NH3	mg/l	5	24	1.58	-
Total Orthophosphate as P	mg/l	1.5	21	1.2	-

The combined storm water runoff and treated process water discharge results at SW2 indicate that the discharge is in compliance with the emission limit values as set out in the IE licence for the period 2022 and 2023 (to September). The drainage from the additional hard standing areas i.e. the Project will go through SW2 and all water at SW2 will continue to go through the onsite WWTP.

The Conservation Objectives for the Lower River Suir SAC include the following targets for water quality:

- For watercourse habitat 3260 – Maintain appropriate water quality to support the natural structure and functioning of the habitat
- For freshwater pearl mussel 1029 – Restore water quality – macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93 which relates to the Clodiagh Catchment only which is not connected by downstream water flows from the Project Site and therefore not relevant to the Project.
- For white-clawed crayfish 1092 – At least Q3-4 at all sites sampled by EPA, applies to the whole catchment.
- For Atlantic salmon 1106 – At least Q4 at all sites sampled by EPA, applies to the whole catchment.

The aquatic ecology surveys (see Appendix E) demonstrated that the biological water quality at all five survey sites on the River Anner collected on the 4<sup>th</sup> April 2022 attained 'good status' water quality ( $\geq$ Q4; EQR  $\geq$ 0.8). This indicates that the water quality targets were being met at that time. However, a decline in biological water quality was observed across all five survey sites from samples collected on the 5<sup>th</sup> August 2022. Survey site 1 obtained Q3 (poor status) biological water quality while survey sites 2, 3, 4 and 5 recorded an EPA Q rating of Q3-4 (moderate status). Sites 1 and 2 are upstream of Medite while Sites 3, 4 and 5 are at or downstream from the Medite site. This confirms that, while the water quality targets are not being met for the River Anner, this is not due to water quality issues associated with discharge of water from Medite. Rather, nutrient enrichment from agricultural run-off appears to be the most likely cause, given the prevalence of agriculture upstream.

Since the discharge from the Project will be via SW2 and be treated in the same manner as now, it is expected that this discharge will remain within its ELV during operation of the Project and therefore could not undermine the conservation objectives of the Lower River Suir SAC and the River Barrow and River Nore SAC on its own. The risk of exceedance, and therefore undermining the conservation objectives, is greater during the construction phase and therefore requires further mitigation and monitoring.

There are monitoring programmes currently in place at the site as per the IE licence for both surface water and groundwater quality. Surface water quality in the Anner River will continue be monitored upstream and downstream of these discharge points on a quarterly basis. Surface water quality results are screened against the environmental quality standards outlined in the Surface Waters Regulations 2009 (as amended). The results will be available for inspection by the EPA or TCC as required. Groundwater monitoring under the conditions of the facility's IE licence will also continue on a quarterly basis at all monitoring wells (AGW1 – AGW10). Annual groundwater monitoring reports are produced based on this monitoring and will continue to be submitted to the EPA.

## 5.0 STEP 2 PART 2: 'IN COMBINATION' EFFECTS

There is potential for air and water emissions from the project alone and in combination with other plans and projects to undermine the conservation objectives of the Lower River Suir SAC, the Comeragh Mountains SAC, the Nier Valley Woodlands SAC and the River Barrow and River Nore SAC. These developments, identified in Stage 1, are presented in Table 13 below.

Relevant existing emission points across the wider Mediate site (i.e. those that emit the same pollutants as the biomass plant) have been included in the air quality assessment and are available in Appendix C (to facilitate a cumulative assessment). Furthermore, the modelling exercise has incorporated local baseline datasets (where available) to ensure other relevant local emission sources are accounted for. As such, the dispersion modelling exercise and associated outcomes are inherently cumulative in nature.

Notwithstanding the above, in accordance with England's Environment Agency and Defra guidance, due consideration has been given to process contributions (PCs) generated by the project initially. According to this guidance, cumulative effects can be discounted where process contributions (PCs) are:

<1% of the Critical Loads and long-term Critical Levels

<10% of the short-term Critical Levels

As shown in Tables 7, 8 and 9, PCs for all Critical Levels and Critical Loads are below these thresholds and can therefore be screened out from requiring further assessment (i.e. without the need to consider cumulative impacts) and described as insignificant. There is no potential for air quality from the proposed Project to result in cumulative effects with the existing operations at the site.

Water quality was also assessed for its potential to result in cumulative adverse effects with the existing operations at the site. There will be an increase in water discharged at SW2 due to the additional hardstanding areas associated with the proposed project. All water at SW2 undergoes a rigorous treatment process, outlined above, and will now be compliant with ELVs. This discharge will continue to be monitored under licence conditions. The increase in water discharge would therefore not result in cumulative adverse effects on the integrity of any European site. The discharge at SW1 was exceeding ELVs but this has now been rectified and there will be no increase in the amount of water discharged at this point because of the proposed project.

**Table 13 Planning Applications considered to have potential for In Combination Effects**

Development	Planning Register Reference	Status	Potential for In Combination Effects (Y/N) <sup>15</sup>	Pathway	Likely Significant Effects After Mitigation Measures Applied
MSD Ireland  Ballydine, Kilsheelan, Clonmel, Co. Tipperary	P. REF. <a href="#">21407</a>  EIA Portal Ref. 2021056	Grant Date: 05/09/2021	Y	Water and air quality	No – Mitigation measures will ensure no appreciable effects on European sites. MSD is located > 10 km downstream of the Project Site. With no appreciable effects from the Project alone, and the distance between the developments, there is no potential for in-combination effects. Furthermore, an NIS will accompany the MSD application to ensure that there will be no appreciable effects from the MSD project, further evidencing that there will be no potential for in-combination effects
MSD Ireland (Ballydine)	P. Ref. <a href="#">211365</a>	Grant Date: 08/02/2022	Y	Air quality (dust)	No – Mitigation measures will ensure no appreciable effects on European sites. MSD is located > 10 km downstream of the Project Site. With no appreciable effects from the Project alone, and the distance between the developments, there is no potential for in-combination effects. Furthermore, an NIS will accompany the MSD application to ensure that there will be no appreciable effects from the MSD project, further evidencing that there will be no potential for in-combination effects
Allez Farms  Sladagh, Lisronagh, Clonmel, CO. Tipperary	P. Ref. <a href="#">22505</a>	Decision Date: 27/09/2022  Third Party Appeal Lodged on 11/10/2022  <a href="#">ABP-314803-22</a>	Y	Water quality	No - Mitigation measures will ensure no appreciable effects on European sites. Allez Farms is located > 10 km upstream of the Project Site. With no appreciable effects from the Project alone, and the distance between the developments, there is no potential for in-combination effects. Furthermore, an NIS will accompany the Allez Farms application to ensure that there will be no appreciable effects from the Allez Farms project, further evidencing that there will be no potential for in-combination effects

<sup>15</sup> Y for yes; N for No

## 6.0 STEP 3: MITIGATION MEASURES

### 6.1 Existing Environmental Management Measures at the Site

In order to mitigate against impacts on water quality and any risk of pollution as a result of air and dust emissions from the current operation, the following measures are currently implemented:

- Medite Europe DAC was granted an Industrial Emission Licence (P0027-04) by the EPA on the 7th March 2017. They set a range of emission limit values (ELVs) for air emissions, dust emissions, noise emissions, and surface water emissions, and they apply parameters regarding monitoring and reporting of the same.
- Schedule A of the licence specifies the limitations on fuel that can be used in the boilers. As highlighted in Note 1, it is a requirement of the Licence that Medite can demonstrate that the wood waste used as a fuel is not hazardous and does not contain halogenated organic compounds or heavy metals as a result of treatment with preservatives or coating.
- Medite's operations have an Environment Management System Manual (ISO 14001:2015) in place which purpose is to gain a high-level understanding of all relevant internal and external issues that impact or have the potential to impact, positively or negatively, the ability of the EMS to achieve its intended outcomes.
- Mitigation measures, as identified by IAQM guidance, to ensure that any potential impacts from dust emissions arising from the construction phase of the Development are reduced and, where possible, completely removed. These mitigation measures are outline Combustion emissions will be continuously monitored and controlled with use of BAT, in accordance with the site's IED Licence – governed by the EPA.
- There are two in line silt traps on the discharge line to SW1 in order to treat the runoff discharge waters to remove suspended solids. The silt traps are monitored visually on a regular basis by Medite and will be cleaned out as and when required to maintain capacity.

### 6.2 Proposed Mitigation Measures

Mitigation measures are proposed at the Medite facility to minimise effects on the receiving environment in relation to air quality.

- Detailed construction dust mitigation measures are outlined in Appendix B. In accordance with the outcomes of the construction dust assessment, monitoring is required to be undertaken throughout the construction phase to monitor the effectiveness of the dust controls.

To mitigate against the risk of pollution to groundwater and surface water occurring during the construction stage at the site the following management measures will be implemented:

- If any contaminated soils / material is identified during excavations then the material will be set aside and bunding provided to ensure the material and water does not enter the site water management system, once the material has been tested and characterised and will be dealt with according the results of the characterisation;
- Any excavated soils, subsoils or C&D material will be managed to ensure that no suspended solids runoff and go into the site water management system;
- No refuelling of plant or machinery will take place in the proposed development areas to prevent accidental leakage/spillages reaching surface water or groundwater at the site;
- Any extensive / non-routine maintenance of plant and machinery will take place on a hard stand area within the overall land holding to ensure no accidental spillages or leakages of oils or lubricants will reach the surface water or groundwater;

- Ongoing monitoring of the discharges at SW1 and SW2 with further controls implemented in the unlikely event of an exceedance which would undermine the conservation objectives of the Lower River Suir SAC.
- all plant will be regularly maintained and inspected daily for leaks of fuels, lubricating oil or other contaminating liquids to reduce the chance of any leakages;
- a spill kit and drip trays will be kept on site and will be deployed if there is an accidental leak from any plant/machinery, to prevent any materials going to surface water or groundwater;
- no petroleum-based products (lubricating oils, waste oils, greases etc.) will be stored within the construction area at the site thereby eliminating any associated pollution risk arising from accidental leakages/spillages going to surface water or groundwater;
- plant operators will be briefed during 'toolbox' talks and site induction on where the spill kit is kept and how and when it should be deployed; and
- a site construction traffic management system will be put in place to reduce the potential accidents between vehicles and the potential for fuel leaks/spills.

After mitigation measures are applied, the project will not result in any appreciable effects on European Sites. Given this, and the distance between the Project Site and the developments identified in Table 14, the Project would not act in-combination with other plans or projects to give rise to adverse effects on the integrity of European Sites.

## 7.0 CONSIDERATION OF FINDINGS

This Natura Impact Statement, based on the best scientific information, shows that the proposed project at the Medite facility will not result in adverse impacts on the integrity of Lower River Suir SAC, Nier Valley Woodlands SAC, Comeragh Mountains SAC, River Barrow and River Nore SAC or any other European site, either alone or in-combination with other projects or plans.

Based on the information set out in this report we submit that the competent authority has sufficient information to allow it to determine that the proposed replacement of the existing biomass-fired boilers, biomass-fired thermal fluid heater, and gas-fired thermal fluid heater at the Medite facility, individually or in combination with other plans or projects, will not have an adverse impact on the integrity of any European sites.

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## Appendix A Relevant Legislation

### European Nature Directives (Habitats and Birds)

The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) forms the basis for the designation of Special Areas of Conservation. Similarly, Special Protection Areas are classified under the Birds Directive (Council Directive 2009/147/EEC on the Conservation of Wild Birds). Collectively, Special Areas of Conservation (SAC) and Special Protection Areas (SPA) are referred to as the Natura 2000 network. In general terms, they are considered to be of exceptional importance for rare, endangered or vulnerable habitats and species within the European Community.

Under Article 6(3) of the Habitats Directive an appropriate assessment must be undertaken for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An appropriate assessment is an evaluation of the potential impacts of a plan or project on the conservation objectives of a Natura 2000 site<sup>16</sup>, and the development, where necessary, of mitigation or avoidance measures to preclude negative effects.

Article 6, paragraph 3 of the EC Habitats Directive 92/43/EEC (“the Habitats Directive”) states 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. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public”*

The Habitats Directive is transposed into Irish law by the EC (Birds and Natural Habitats) Regulations 2011 – 2015. Part XAB of the Planning and Development Acts 2000 to 2023 transposes Article 6(3) and 6(4) of the Habitats Directive in respect of land use plans and proposed projects requiring development consent.

### EC (Birds and Natural Habitats) Regulations 2011 (as amended) – Part 5

Part 5 of the EC (Birds and Natural Habitats) Regulations 2011 – 2015 sets out the circumstances under which an ‘appropriate assessment’ is required. Section 42(1) requires that *‘a screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site.’*

Section 42(2) expands on this, stipulating that a public authority must carry out a screening for Appropriate Assessment before consent for a plan or project is given, or a decision to undertake or adopt a plan or project is taken. To assist a public authority to discharge its duty in this respect, Section 42(3)(a) gives them the authority to direct a third party to provide a Natura Impact Statement and Section 42(3)(b) allows them to request any additional information that is considered necessary for the purposes of undertaking a screening assessment.

Section 42(6) requires that *‘the public authority shall determine that an Appropriate Assessment of a plan or project is required where the plan or project is not directly connected with or necessary to the management*

<sup>16</sup> Also referred to as European Sites in the Planning and Development Acts 2000 – 2020.

*of the site as a European Site and if it cannot be excluded, on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site’.*

## Planning and Development Acts 2000(as amended)<sup>17</sup> - PART XAB

The relevant sections of Part XAB of the Planning and Development Acts 2000 – 2020 are set out below.

### **Screening for appropriate assessment**

Section 177U requires that— (1) *A screening for appropriate assessment of a draft Land use plan or application for consent for proposed project shall be carried out by the competent authority to assess, in view of best scientific knowledge, if that Land use plan or proposed project, individually or in combination with another plan or project is likely to have a significant effect on the European site.*

(2) *A competent authority shall carry out a screening for appropriate assessment under subsection (1) before—*

*(a) a Land use plan is made including, where appropriate, before a decision on appeal in relation to a draft strategic development zone is made, or*

*(b) consent for a proposed project is given.*

(3) *In carrying out screening for appropriate assessment of a proposed project a competent authority may request such information from the applicant as it may consider necessary to enable it to carry out that screening, and may consult with such persons as it considers appropriate and where the applicant does not provide the information within the period specified, or any further period as may be specified by the authority, the application for consent for the proposed project shall be deemed to be withdrawn.*

(4) *The competent authority shall determine that an appropriate assessment of a draft Land use plan or a proposed project, as the case may be, is required if it cannot be excluded, on the basis of objective information, that the draft Land use plan or proposed project, individually or in combination with other plans or projects, will have a significant effect on a European site.*

(5) *The competent authority shall determine that an appropriate assessment of a draft Land use plan or a proposed project, as the case may be, is not required if it can be excluded, on the basis of objective information, that the draft Land use plan or proposed project, individually or in combination with other plans or projects, will have a significant effect on a European site.*

(6) (a) *Where, in relation to a proposed project, a competent authority makes a determination that an appropriate assessment is required, the competent authority shall give notice of the determination, including reasons for the determination of the competent authority, to the following—*

*(i) the applicant,*

*(ii) if appropriate, any person who made submissions or observations in relation to the application to the competent authority, or*

*(iii) if appropriate, any party to an appeal or referral.*

*(b) Where a competent authority has determined that an appropriate assessment is required in respect of a proposed project it may direct in the notice issued under paragraph (a) that a Natura impact statement is required.*

*(c) Paragraph (a) shall not apply in a case where the application for consent for the proposed project was accompanied by a Natura impact statement.*

<sup>17</sup> <http://revisedacts.lawreform.ie/eli/2000/act/30/revised/en/html> (Updated to 24 September 2020)

(7) A competent authority shall, as soon as may be after making the Land use plan or making a decision in relation to the application for consent for proposed project, make available for inspection by members of the public during office hours at the offices of the authority, and may also publish on the internet —

(a) any determination that it makes in relation to a draft Land use plan under subsection (4) or (5) as the case may be, and reasons for that determination, and

(b) any notice that it issues under subsection (6) in relation to a proposed project.

(8) In this section ‘consent for proposed project’ means, as appropriate —

(a) a grant of permission,

(b) a decision of the Board to grant permission on a planning application or an appeal,

(c) consent for development under Part IX,

(d) approval for development that may be carried out by a local authority under Part X or Part XAB or development that may be carried out under Part XI,

(e) approval for development on the foreshore under Part XV,

(f) approval for development under section 43 of the Act of 2001,

(g) approval for development under section 51 of the Roads Act 1993, or

(h) a substitute consent under Part XA.

(9) In deciding upon a declaration or a referral under section 5 of this Act a planning authority or the Board, as the case may be, shall where appropriate, conduct a screening for appropriate assessment in accordance with the provisions of this section.

(10) In deciding upon an application under section 176A or a determination review or an application referral under section 176C, a planning authority or the Board, as the case may be, shall, where appropriate, conduct a screening for appropriate assessment in accordance with the provisions of this section.

### **Natura impact report and natura impact statement**

Section 177T states that— (1) ( a ) A Natura impact report means a statement for the purposes of Article 6 of the Habitats Directive, of the implications of a Land use plan, on its own or in combination with other plans or projects, for one or more than one F722 [ European site ] , in view of the conservation objectives of the site or sites.

( b ) A Natura impact statement means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed project, on its own or in combination with other plans or projects, for one or more than one F722 [ European site ] , in view of the conservation objectives of the site or sites.

(2) Without prejudice to the generality of subsection (1) , a Natura impact report or a Natura impact statement, as the case may be, shall include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one F722 [ European site ] in view of the conservation objectives of the site or sites.

(3) F723 [ As respects a draft National Planning Framework, the Government shall prepare a Natura impact report in relation to a draft Land use plan and the following bodies shall also prepare a Natura impact report in relation to a draft Land use plan ] —

F724 [ (a) as respects a draft regional spatial and economic strategy, the regional assembly for whose area the draft strategy is made, ]

F725 [ ( aa ) as respects a draft National Planning Framework, the Minister. ]

*( b ) as respects a draft planning scheme in respect of all or any part of a strategic development zone, the planning authority (which term shall be construed in accordance with section 168(5) ) for whose area the draft scheme is made,*

*( c ) as respects a draft development plan or draft variation of a development plan, the planning authority for whose area the draft plan or draft variation is made, and*

*( d ) as respects a draft local area plan, the planning authority in whose area the local area concerned is situate.*

*(4) The applicant for consent for proposed project may, or if directed in accordance with subsection (5) by a competent authority, shall furnish a Natura impact statement to the competent authority in relation to the proposed project.*

*(5) At any time following an application for consent for proposed project a competent authority may give a notice in writing to the applicant concerned, directing him or her to furnish a Natura impact statement F726 [ ... ] .*

*F722 [ (6) Where an applicant for consent for proposed project who, having been directed in accordance with subsection (5) , fails to furnish a Natura impact statement within the period specified in the notice, or any further period as may be specified by the competent authority, the application for consent for the proposed project shall be deemed to be withdrawn. ]*

*(7) ( a ) Without prejudice to subsection (1) a Natura impact report or a Natura impact statement shall include all information prescribed by regulations under section 177AD .*

*( b ) Where appropriate, a Natura impact report or a Natura impact statement shall include such other information or data as the competent authority considers necessary to enable it to ascertain if the draft Land use plan or proposed project will not affect the integrity of the site.*

## Project Ireland 2040 – The National Planning Framework (2018)

The National Planning Framework (NPF) sets the overarching context for planning policy in Ireland and has identified the requirement for growth of approximately one million additional people in Ireland by 2040. This means planning for a substantial increase in the number of people and jobs on the island of Ireland.

For northern and western region assembly area which includes County Mayo this means:

- A target of 150,000-175,000 additional people i.e. a population of around 1 million.
- Around 110,000 additional people in employment i.e. 450,000 in total.

Under the objective of ‘**Securing Compact and Sustainable Growth**’, the NPF states that the physical form of urban development in Ireland is one of our greatest national development challenges. It states that more than anything else, getting the physical form and location of future development right offers the best prospects for unlocking regional potential.

The strategy as set out in the NPF is ‘compact development that focuses on reusing previously developed land. This requires focus on four key areas:

The ‘liveability’ or quality of life of urban places;

Making the continuous regeneration and development of existing built up areas as attractive and as viable as greenfield development;

Tackling legacies such as concentrations of disadvantage in central urban areas;

Linking regeneration and redevelopment initiatives to climate action.

## APPENDIX B CONSTRUCTION DUST MITIGATION MEASURES

Site Application	Mitigation Measures
<b>Highly Recommended</b>	
Construction	Avoid scabbling (roughening of concrete surfaces) if possible.
	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Demolition	Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
	Avoid explosive blasting, using appropriate manual or mechanical alternatives.
	Bag and remove any biological debris or damp down such material before demolition.
	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
	Agree dust deposition, dust flux, or real-time PM <sub>10</sub> continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks, and construction.
	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary, with cleaning to be provided if necessary.
Operating Vehicle / Machinery and Sustainable Travel	Ensure all vehicles switch off engines when stationary - no idling vehicles.
	Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
	Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control

Site Application	Mitigation Measures
	<p>measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).</p> <p>Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).</p>
Operations	<p>Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.</p> <p>Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.</p> <p>Use enclosed chutes and conveyors and covered skips.</p> <p>Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.</p> <p>Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.</p>
Preparing and Maintaining the Site	<p>Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.</p> <p>Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.</p> <p>Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.</p> <p>Avoid site runoff of water or mud.</p> <p>Keep site fencing, barriers and scaffolding clean using wet methods.</p> <p>Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.</p> <p>Cover, seed or fence stockpiles to prevent wind whipping.</p>
Site Management	<p>Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.</p> <p>Make the complaints log available to the local authority when asked.</p> <p>Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.</p> <p>Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport deliveries which might be using the same strategic road network routes.</p>
Trackout	<p>Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.</p> <p>Avoid dry sweeping of large areas.</p> <p>Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.</p>

Site Application	Mitigation Measures
	<p>Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.</p> <p>Record all inspections of haul routes and any subsequent action in a site logbook.</p> <p>Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.</p> <p>Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).</p> <p>Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.</p> <p>Access gates to be located at least 10m from receptors where possible.</p>
Waste Management	Avoid bonfires and burning of waste materials.

## APPENDIX C – DUST EMISSIONS

### Monitored (Adjusted) Period Ambient Concentrations

Site ID	Receptor	NO <sub>2</sub>		NO <sub>x</sub>		NH <sub>3</sub>		SO <sub>2</sub>	
		µg/m <sup>3</sup>	Data Capture %						
AQ1	Lower River Suir SAC	4.2	100.0	6.4	100.0	3.9	100.0	1.4	100.0
AQ2	Residential Dwellings (Roadside of N24)	6.5	100.0	-	-	-	-	2.1	100.0
AQ3	Residential Dwellings (Roadside of N24)	14.3	100.0	-	-	-	-	1.4	100.0
AQ4	Lower River Suir SAC	6.4	66.7	7.9	100.0	3.1	100.0	1.8	100.0
AQ5	Lower River Suir SAC	8.0	100.0	10.6	100.0	4.3	100.0	1.9	100.0
AQ6	Powerstown National School	6.1	100.0	-	-	6.8	100.0	1.4	100.0
AQ8	Residential Dwellings	5.7	66.7	-	-	-	-	1.4	66.7
AQ9	Residential Dwellings	5.3	100.0	-	-	-	-	1.4	100.0
AQ10	Residential Dwellings (Roadside of N24)	18.6	100.0	-	-	-	-	1.4	100.0

## APPENDIX D – AIR QUALITY

The proposed development will include infrastructure for the storage and processing of additional biomass fuels, located within Development Area 1. Infrastructure will include a new fuel reception and storage plant, including the conveying infrastructure to transport the fuel to the energy plants. The fuel reception units, storage plant and conveyors will be covered to minimise any potential dust emissions. Furthermore, three additional fugitive dust emission points will be introduced to Development Area 1, representing proposed silos, where material will be stored in enclosed spaces. These emission points will utilise filters to abate potential fugitive emissions releases. All proposed potential dust sources within Development Area 1 are fugitive. Furthermore, all potential diffuse dust sources associated with the transport, handling and storage of wood materials will be controlled with use of Best Available Techniques (BAT), as prescribed within the site's Dust Management Plan, as per the Wood-Based Panels BAT Conclusions (BATc). The residual dust source emission potential associated with proposed activities in Development Area 1 is there considered to be negligible.

The nearest sensitive human receptor is located >350m from the boundary of Development Area 1. Furthermore, Development Area 1 is currently used for storage of exposed materials in open stockpiles and comprises an existing dust emission point (Edge Trim silo - Air Emission A2-20) (proposed to be removed). The proposed development represents a continuation of operational activities and will not result in an increase in the production of MDF.

# APPENDIX E – AQUATIC ECOLOGY SURVEYS

# Medite Biological Water Quality Report, River Anner, Clonmel, Co. Tipperary



Prepared by Triturus Environmental Ltd. for SLR  
on behalf of Medite DAC Europe

**September 2022**

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## 1. Introduction

### 1.1 Background

Triturus Environmental Ltd. were contracted by SLR consulting Ltd. on behalf of Medite Europe DAC to undertake a biological water quality assessment on the lower River Anner (River Suir tributary), at Clonmel, Co. Tipperary (Figure 2.1).

Medite Europe DAC manufactures environmentally produced, sustainable timber panel boards, specifically, medium-density fibreboard (MDF). The proposed development will replace all four existing aging thermal energy systems serving both of Medite's two production lines, specifically;

- the two-wood biomass fired boilers (18MW each) and the natural gas-fired Thermal Fluid Heater (TFH) (6MW) serving Production Line 1.
- the wood biomass fired Thermal Fluid Heater (19MW) serving Production Line 2.

These systems will be replaced by 2 new renewable energy plants. These renewable energy plants will have rated thermal input capacity of up to 60 MW for the system serving Production Line 1 and 30 MW for the system serving Production Line 2.

By undertaking biological water quality sampling at a total of  $n=5$  sites on the River Anner situated east of the Medite manufacturing facility, the baseline results would identify baseline biological water quality while also summarising Water Framework Directive (2000/60/EC) compliance (i.e. achieving target 'good status' or not). In this respect the EPA Q sampling method has been applied in this study given it is utilised in the River Biological Monitoring Programme by the EPA and facilitates comparisons with historical EPA trends in the lower River Anner catchment. The biological assessment would also establish whether atmospheric deposition was contributing to potential declines in biological water quality based on comparative assessment between upstream and downstream control stations.

The River Anner rises in south Tipperary near the village of Drangan and flows south-west along i.e. 34-kilometre course over a 437km<sup>2</sup> catchment (OPW, 2015). The River Anner forms a confluence with the River Suir east of Clonmel, c. 0.1k south of the N24 road bridge crossing (i.e. immediately east of the Bulmer's orchards). The River Anner is situated 100m east of the Medite facility, flowing in a north south direction (Figure 2.1).

The River Anner is a lowland depositing watercourse (FW2; Fossitt, 2000) which has a semi-natural meandering profile with some localised bank modifications in its lower reaches primarily localised bank reinforcements and flood defences near bridges. Nonetheless, the lower reaches may still be considered a 'C-type' channel (Rosgen, 1996). C-type channels are meandering in character, their banks low enough to provide regular flooding and are typically excellent nursery and spawning rivers for salmonid species. The River Anner supports the Annex I Habitat, 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculus fluitantis* and *Callitriche-Batrachion* (low water level during Summer) or aquatic mosses' (3260). This habitat also known as floating river vegetation, includes characteristic macrophyte plant

species such as water crowfoot which in the swift flowing water of the River Anner supports a range of invertebrate species and acts as an important salmonid nursery mesohabitat.

The River Anner was monitored in 2016 by Inland Fisheries Ireland as part of the national research surveys programme (NRSP) (Kelly et al. 2017) to inform WFD status. Three of five survey sites achieved good status for fish with two sites achieving moderate status based on monitoring south-east of Fethard with variable densities of mixed cohort Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) recorded.

## 1.2 Water Quality in the River Anner

The River Anner (IE\_SE\_16A021100) forms part of the EPA monitoring under the Water Framework Directive (2000/60/EC) (hereafter WFD) and is currently in its 3<sup>rd</sup> cycle (2022-2027). Currently the Lower River Anner catchment (Anner\_060) that is east of the Medite manufacturing facility is considered 'not at risk' of meeting its targets under the WFD. By contrast the middle (Anner\_050) is 'at risk' and the upper Anner catchment (Anner\_040) is 'under review' with pollution pressures primarily relating to agriculture. The River Anner is situated on bedrock of Waulsortian Limestone and Mudstone that influence its water chemistry as a rich alkaline river. The adjoining land uses of the Lower River Anner according to the EPA Corine data are Industrial and commercial areas (121) and Non-irrigated arable land (211) on the east bank of the lower Anner catchment with Forest & semi-natural areas (311) predominating on the west bank. Upstream of the study area the catchment is dominated by Agricultural pasture (231).

The WFD is enforced under the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 which sets targets for Q4 and above (i.e. Q4-5 & Q5) for riverine sites. According to the EPA the biological water quality on the nearest upstream biological water quality monitoring was undertaken near the railway bridge west of Ballynevin (EPA station RS16A021000) c. 2km upstream hydrological distance from the Medite manufacturing facility. However, the last monitoring was undertaken in 1996 when the biological water quality achieved **Q4** (good status). Further upstream at EPA monitoring station RS16A020900, **Q3-4** (moderate status) water quality was recorded by the EPA during 2020. The nearest downstream EPA monitoring area is c. 750m downstream of the Medite manufacturing facility. At this location downstream of the N24 bridge crossing (EPA station RS16A021100) biological water quality was of **Q3-4** (moderate status) when last recorded during 2020.

## 2. Methodology

### 2.1 Desktop review

A desktop review was undertaken to collate and review available information, datasets and documentation sources relating to biological water quality on the Lower River Lee including rare invertebrates and or non-native invertebrate species that present an invasive species threat. Records available on the National Biodiversity Data Centre database and from published and unpublished data sources were also reviewed. These included for example national red list publications for beetles (Foster et al., 2009), stoneflies (Feeley et al., 2020a), mayflies (Kelly-Quinn & Regan, 2012), molluscan fauna (Byrne et al., 2009); Odonata (Nelson et al., 2011) and occasional publications from the Irish Biogeographical Society (e.g. caddisfly; O'Connor 2020).

### 2.2 Q-sampling surveys

Q-sampling was undertaken at  $n=5$  riverine sites on the Lower River Anner between Clonwalsh and Anner Bridge upstream of the River Suir confluence (**Table 2.1 & Figure 2.1**). The surveys were repeated during two periods on the 4<sup>th</sup> April and 5<sup>th</sup> August 2022. The two repeat survey periods facilitated a better understanding in the temporal change of biological water quality between spring and summer in the River Anner.

**Table 2.1** Location of  $n=5$  Q-sampling survey locations on the River Anner (see also Figure 2.1)

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
1	River Anner	16A02	30m upstream of rail bridge, Clonwalsh	625137	625526
2	River Anner	16A02	Newtownanner Demesne	624055	624768
3	River Anner	16A02	Opposite Medite entrance	624321	624094
4	River Anner	16A02	Redmondstown	624360	623879
5	River Anner	16A02	Anner Bridge (N24)	624401	623219

Macro-invertebrate samples were converted to Q-ratings as per Toner et al. (2005). All riverine samples were taken with a standard kick sampling hand net (250mm width, 500 $\mu$ m mesh size) from areas of riffle/glide utilising a three-minute sample sampling effort. This included the washing of large cobble and or small boulder at each survey site, where present. All samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification.

An Ecological Quality Ratio (EQR) was also calculated for each sample over both survey periods. This allows for the conversion of a Q-rating class to a numerical value to correspond with targets as specified within the European Communities Environmental Objectives (Surface Water) Regulations (S.I. No. 272 of 2009) as amended by the S.I. No. 77/2019. An EQR Ratio is expressed by a numerical value between 0 and 1 in the case of Q-sampling by dividing the recorded Q-rating by the maximum reference value (i.e. Q5 or 1.0 when converted to a numerical value). In the case

of the Surface Water Regulations 2019, minimum targets are specified as 0.75 for the moderate to good class boundary and 0.85 for the good to high status boundary. While these targets are specified for intermediate boundaries, an EQR of 0.8 can be considered as the target for ‘good status’ (Feeley et al. 2020a; see **Table 2.1** below).

The severity of anthropogenic pollution can be determined based on deviation from target reference conditions, as outlined above (Feeley et al. 2020a). In this respect, ‘good or high status’ can be defined as the biological, chemical and morphological conditions associated with limited human pressure, while at the other extreme ‘bad status’ would be representative of severe anthropogenic pressures on a river. Our results are presented in terms of EPA Q-rating and EQR for each survey site.

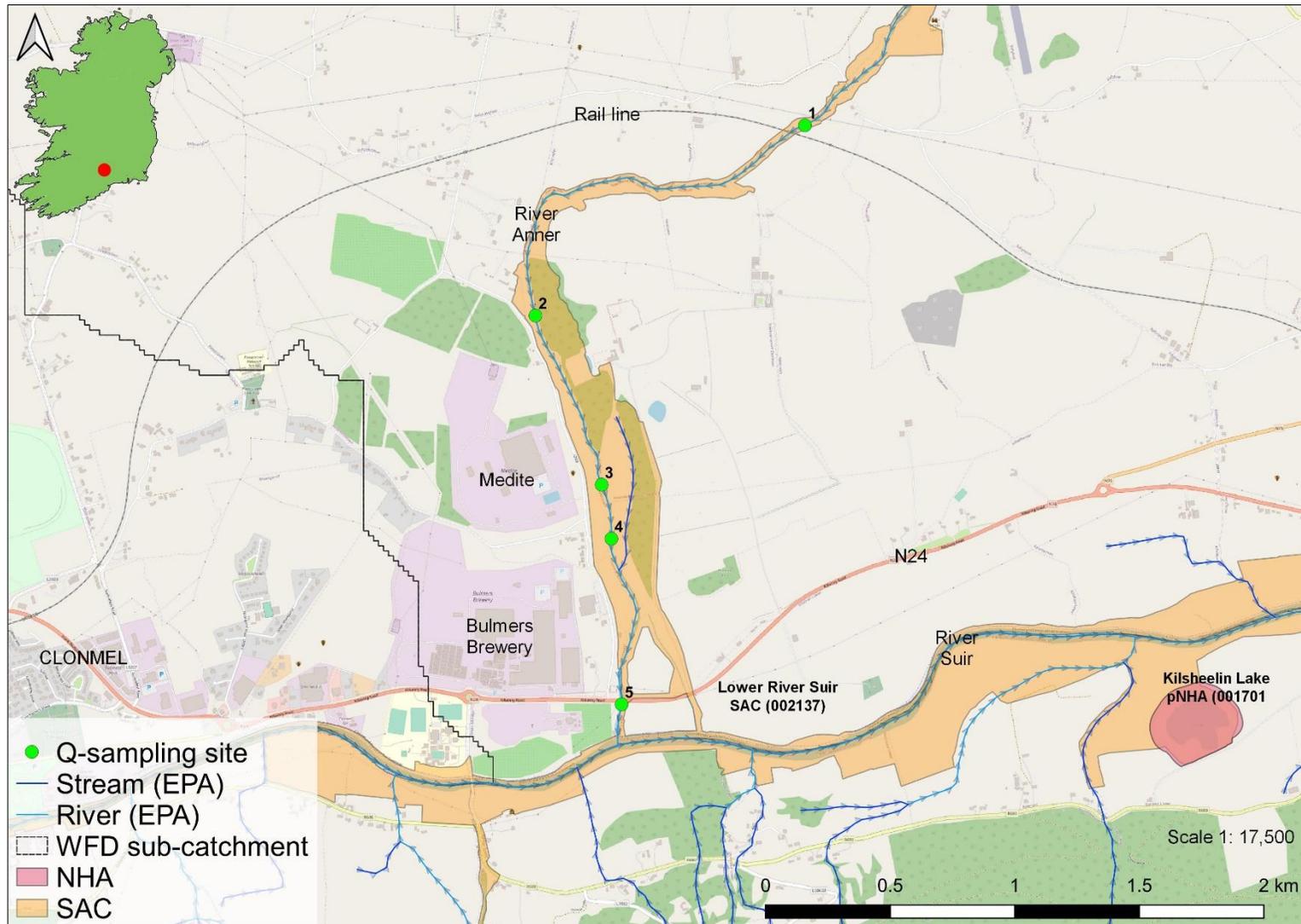
**Table 2.1** Reference Categories for EPA Q-Ratings (Q1 to Q5)

Q-value	EQR	WFD status	Pollution status	Condition
Q5 or Q4-5	≥0.9	High	Unpolluted	Satisfactory
Q4	0.8* <sup>1</sup>	Good	Unpolluted	Satisfactory
Q3-4	0.7	Moderate	Slightly polluted	Unsatisfactory
Q2-3 or Q3	0.5-0.6	Poor	Moderately polluted	Unsatisfactory
Q1, Q1-2 or Q2	0.2-0.4	Bad	Seriously polluted	Unsatisfactory

### 2.3 Biosecurity

A strict biosecurity protocol following Inland Fisheries Ireland best practice (IFI, 2010) in addition to the Check-Clean-Dry approach was employed during the survey. This included visual examination of equipment and the removal of debris and vegetation. Equipment and PPE used was disinfected with a 5% Virkon® solution between survey sites to prevent the transfer of pathogens and/or invasive species between survey areas. Equipment was be dried in sunlight for 72 hours in natural light before and after surveys. Particular cognisance will be given towards preventing the spread or introduction of crayfish plague (*Aphanomyces astaci*) given the known historical distribution of white-clawed crayfish (*Austropotamobius pallipes*) in the wider survey area. Surveys were undertaken at sites in a downstream order (i.e. uppermost site surveyed first etc.) to prevent the upstream mobilisation of invasive propagules and pathogens. All surveyors have University of Leeds aquatic biosecurity training certification.

<sup>1</sup> 0.75 represents the ‘moderate-good class boundary’ according to S.I. No. 77 of 2019, therefore those values equating to 0.8 are considered of ‘good status’ (Feeley et al. 2020a) and meeting the minimum target required under the Water Framework Directive.



**Figure 2.1** Location of the  $n=5$  aquatic survey sites on the Lower River Anner, Clonmel, Co. Tipperary

## 3. Results

### 3.1 Survey Site Descriptions

#### Site 1 Upstream of Railbridge, Clonwalsh

Site 1 was situated in a semi-natural lowland depositing (FW2) reach of the River Anner, c. 2km hydrological distance upstream of the Medite. The channel was c. 16m wide and between 0.4m and 0.6m deep. The flow profile was dominated by a glide with localised deep pool adjoining the railway bridge with no riffle habitat. The bed comprised mixed fine, medium and coarse gravels with abundant sand and localised finer silt deposits. The channel supported limited cobble and boulder substrata. The bed was moderately compacted with moderate to heavy siltation that likely emanated from the drainage associated with heavily improved pasture (GA1) bordering the River Anner. The channel at site 1 supported small patches of water-crowfoot (*Ranunculus* sp.) <5% cover. Where sand and silt deposits had accumulated near the riverbanks, small areas of hemlock water-dropwort (*Oenanthe crocata*) and water mint (*Mentha aquatica*) were present. The filamentous algae cover was high during the August survey period and estimated at 30% cover compared with 1% in April. The presence of moderate algae cover indicated enrichment pressures, likely associated with agricultural improvement. The riparian areas supported mature alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*), crack willow (*Salix fragilis* agg.) and grey willow (*Salix cinerea* sp. *oleifolia*). The channel was considered a good spawning area for salmonids and lamprey (*Lampetra* sp.) species given the presence of mixed gravels albeit moderately bedded. The river also offered very good nursery habitat (i.e. swift flowing broken glide) for both lamprey and salmonids. Holding habitat was also very good with deep pool and glide with tree cover present.



**Plate 3.1** survey site 1 upstream of rail bridge, Clonwalsh

### Site 2 Newtownanner Demesne

Site 2 was located on the c. 400m upstream of the Medite on the River Anner. The river was 20-30m wide and 0.2-0.4m deep. The site was dominated by shallow fast glide and riffle areas with occasional pool. The substrata were dominated by well-mixed gravels and cobble with frequent sand. Small boulder was occasional. The substrata were moderately compacted though areas of looser substrata were present (e.g. riffle areas). Siltation was light to moderate (clay dominated) although depositional areas of sand/silt were present along channel margins. Water-crowfoot (*Ranunculus* sp.) covered 10% of the river with *Potamogeton pusillus* covering 10%. The channel margins supported frequent water mint (*Mentha aquatica*) and occasional hemlock water-dropwort. The duckweed species *Lemna trisulca* was present attached to water crowfoot and pondweed beds. In terms of bryophytes, *Fontinalis antipyretica* was frequent with *Marchantia polymorpha* subsp. *montivagans* on stable cobble and boulder. Water starwort (*Callitriche* sp.) was present but rare in marginal areas. The macrophyte and bryophyte community shared links with the Annex I habitat, 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and Callitriche-Batrachion (low water level during Summer) or aquatic mosses'. Filamentous algae (*Cladophora* sp.) was high during August (40% of the bed) increasing significantly from the 10% cover in April indicating enrichment pressures. The shallow splayed nature of the channel and more limited shading at site 2 exacerbated algae growth. The riparian areas comprised mature mixed woodland on both banks and included beech (*Fagus sylvatica*), alder, crack willow and sycamore (*Acer pseudoplatanus*). The bordering land uses were of amenity grassland (GA2), scrub (WS1) and mature mixed broadleaved woodland (WD1).



**Plate 3.2** survey site 2, 0.4km upstream of Medite illustrating the open splayed and shallow nature of the channel

### Site 3 Opposite Medite

Site 3 was located on the River Anner opposite Medite. Site 3 on the River Anner was representative of a semi-natural lowland depositing (FW2) reach of the river. The channel was of variable width between 15m-18m wide and between 0.1m and 0.5m deep with very swift flowing water. The flow profile was dominated by glide and riffle with deep pool upstream. The bed was

dominated by small boulder and cobble with patches of coarse gravel and occasional sand. The bed was very compacted, but siltation was low due to very swift flowing water. The channel supported occasional *Ranunculus* sp. (c. 10% cover) with hemlock water-dropwort and branched bur-reed locally in the margins. The liverwort species *Pellia endiviifolia* was recorded as occasional with frequent *Marchantia polymorpha* subsp. *montivagans*. The moss species *Fontanlais antipyretica* was also frequent on boulder with occasional *Leptodyctium riparium*. The exposed boulders on the river margins supported occasional *Fissidens* sp. moss. The macrophyte and bryophyte community shared links with the Annex I habitat, 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and Callitricho-Batrachion (low water level during Summer) or aquatic mosses'. The filamentous green algae species *Cladophora glomerata* was present at low cover i.e. <5% during August increasing from the 1% cover recorded during April 2022. The higher shading at site 2 by riparian trees likely reduced the capacity for algae growth inclusive of higher cover of aquatic liverworts. The riparian areas supported mature alder, grey willow with occasional ash and frequent cherry laurel (*Prunus laurocerasus*). The bordering land uses were of improved grassland (GA1) and mature mixed broadleaved woodland (WD1). The channel was considered a good spawning area for salmonids and lamprey species given the presence of well sorted gravels in pool tailings (upstream of survey area). It also offered very good nursery habitat at the sampling location (swift flowing broken glide). Holding habitat was good upstream of the survey site in the deep pool habitat.



**Plate 3.3** River Anner at site 3 opposite Medite

#### Site 4 Redmondstown

Site 4 was located on the River Anner c. 50m downstream of Medite. Site 4 on the River Anner as with other survey areas was situated on a semi-natural lowland depositing reach of the River (FW2). The channel was c. 18m wide and between 0.3m and 0.6m deep. The channel was dominated by a glide profile with no riffle or pool adjoining the survey area. The bed comprised mixed medium and coarse gravels with abundant sand and localised finer silt deposits. The channel supported limited cobble and boulder substrata. The bed was partially compacted with

light to moderate siltation given high flow rates. The channel macrophyte composition was characterised by frequent water crowfoot (*Ranunculus* sp.) (30%) and occasional branched bur-reed (*Sparganium erectum*). The muddy edges of the channel supported patches of Hemlock water dropwort (*Oenanthe crocata*) with very localised common clubrush (*Schoenoplectus lacustris*). The liverwort species *Pellia endiviifolia* was recorded as occasional with frequent *Marchantia polymorpha* subsp. *montivagans*. The moss species *Fontinalis antipyretica* was recorded as occasional. The observed macrophyte and bryophyte community shared links with the Annex I habitat, 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and Callitricho-Batrachion (low water level during Summer) or aquatic mosses'. The filamentous green algae *Cladophora glomerata* was present at low cover <5% cover during August increasing from 1% cover recorded during April 2022. The riparian areas supported mature alder, ash, sycamore, beech, crack willow, grey willow and blackthorn (*Prunus spinosa*). The bordering land uses were improved grassland (GA1) and mixed broadleaved woodland (WD1). The channel was considered a very good spawning area for salmonids and lamprey species given the presence of well sorted gravels. It also offered very good nursery habitat also (swift flowing broken glide). Holding habitat was more limited but many adjoining areas of the river offer holding water for migratory salmonids.



**Plate 3.4** River Anner at site 4 at Redmondstown



**Plate 3.5** Large woody debris downstream of site 4 at Redmondstown providing important otter habitat, improving natural river hydromorphology and encouraging pool formation

#### Site 5 Anner Bridge (N24)

Site 5 on the River Anner was situated in a lowland depositing reach of the River (FW2) downstream of the N24 road crossing. The channel was c. 16m wide and between 0.2m and 0.4m deep. The channel was dominated by a riffle and glide profile with limited pool habitat. The bed was dominated by mixed fine, medium and coarse gravels with occasional silt and sand. The channel also supported more localised small cobble and very limited boulder substrata. The bed was uncompacted with light to moderate siltation given high flow rates. The channel macrophyte composition was characterised by frequent water-crowfoot (*Ranunculus* sp.) with curly pondweed (*Potamogeton crispus*) recorded as rare. The margins supported localised patches of Hemlock water dropwort (*Oenanthe crocata*) with water mint (*Mentha aquatica*) recorded as rare. The moss species *Fontinalis antipyretica* was recorded as occasional with *Leptodyctium riparium* recorded as rare. The liverwort species *Pellia endiviifolia* and *Marchantia polymorpha* subsp. *montivagans* were recorded as occasional on the bed. The observed macrophyte and bryophyte community shared links with the Annex I habitat, 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and Callitriche-Batrachion (low water level during Summer) or aquatic mosses'. The filamentous green algae *Cladophora glomerata* was present at very low <1% cover during August, not being observed during April 2022. The riparian areas supported mature alder, ash and grey willow with abundant bramble and traveller's joy (*Clematis vitalba*) in the understories. The bordering land uses were improved pasture (GA1), scrub (WS1) and mixed broadleaved woodland (WD1). The channel was considered a very good spawning area for salmonids and lamprey species given the presence of unbedded mixed gravels. It also offered very good nursery habitat also due to the swift flowing broken glide and riffle with *Ranunculus* vegetation. Holding habitat was limited due to the predominance of fast flowing water.



**Plate 3.6** River Anner downstream of the N24 road bridge

### 3.2 Biological water quality (Q-samples)

Q-samples were collected and analysed from the  $n=5$  riverine survey sites. A total of  $n=45$  species across  $n=38$  families were recorded in the riverine kick samples during April and August sampling 2022. A summary of the taxonomic composition of the surveys is presented in **Appendix A**.

The species compositions were converted into Environmental Protection Agency (EPA) Q-ratings by grouping species assemblages into water quality classes based on their known pollution sensitivities. Following the methodology of Toner et al. (2005), the Environmental Protection Agency (EPA) group invertebrates into classes whereby pollution intolerant species are denoted class A, and species with greater pollution tolerance fall into successive classes (B through E, respectively). As such, the presence or absence of these groups and their relative abundance facilitates an assessment of biological river health. Good status (Q4) unpolluted water quality is achieved according to the EPA if at least one Group A taxon is present in, at least, fair numbers (5-10% total sample composition) and Group B taxa (e.g. cased caddis) may be common or absent. The EPA group C invertebrate species, *Baetis rhodani* is often dominant at good status sites (Toner et al. 2005). However, other Group C taxa are never excessive and group D / E taxa are present in small numbers or absent (Toner et al., 2005). Our results are discussed in the context of EPA groups relative to their pollution tolerances in order to interpret the collective macroinvertebrate community composition to determined EPA Q ratings.

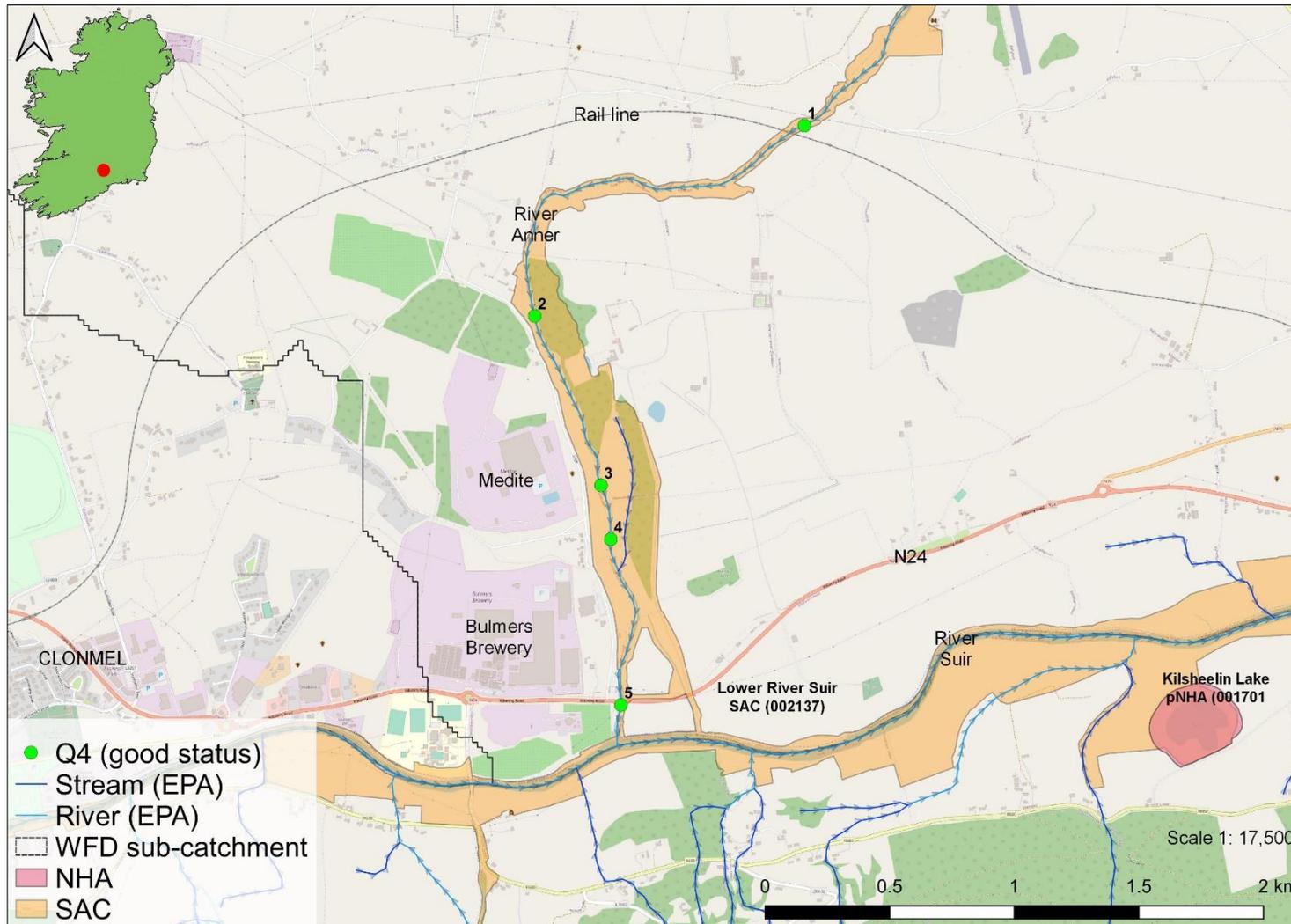
During the 4<sup>th</sup> April 2022 sampling all five of the survey sites achieved **Q4** 'good status' water quality (equivalent EQR of 0.8, **Figures 3.1 & 3.2, Table 3.1**). The survey sites supported EPA group A, clean water indicator mayflies from the families Heptageniidae and Ephemeridae that comprised 5% or higher of total sample abundance (**Appendix A1**). The five survey areas also supported numerous EPA group B clean water indicator cased caddisfly families (i.e. Goeridae, Glossosomatidae, Leptoceridae, Limnephilidae & Seracostomatidae). Furthermore, these sites supported the EPA group B mayfly species *Alainites muticus* and also *Leuctra* sp. stoneflies.

The second round of biological sampling carried out on the 5<sup>th</sup> August 2022 was carried out during low summer flows. The biological water quality results disimproved across all sites during this period (**Table 3.1** below). This was reflected by the very low abundance or absence of EPA group A indicator species (**Appendix A2**). Survey sites 2, 3, 4 and 5 recorded an EPA Q rating of **Q3-4** (moderate status) or equivalent EQR of 0.7 (**Figures 3.1 & 3.2**). This was due to the presence of low numbers of EPA group A taxa (i.e. clean water indicator taxa making up <5% of the compositions) with low numbers group B clean water cased caddis also present (**Figure 3.2 & Appendix A**) and also the dominance by group C taxa. For example, EPA group C taxa made up 87% of the 5<sup>th</sup> of August samples relative to 78% in the 4<sup>th</sup> April sample (Appendix A2).

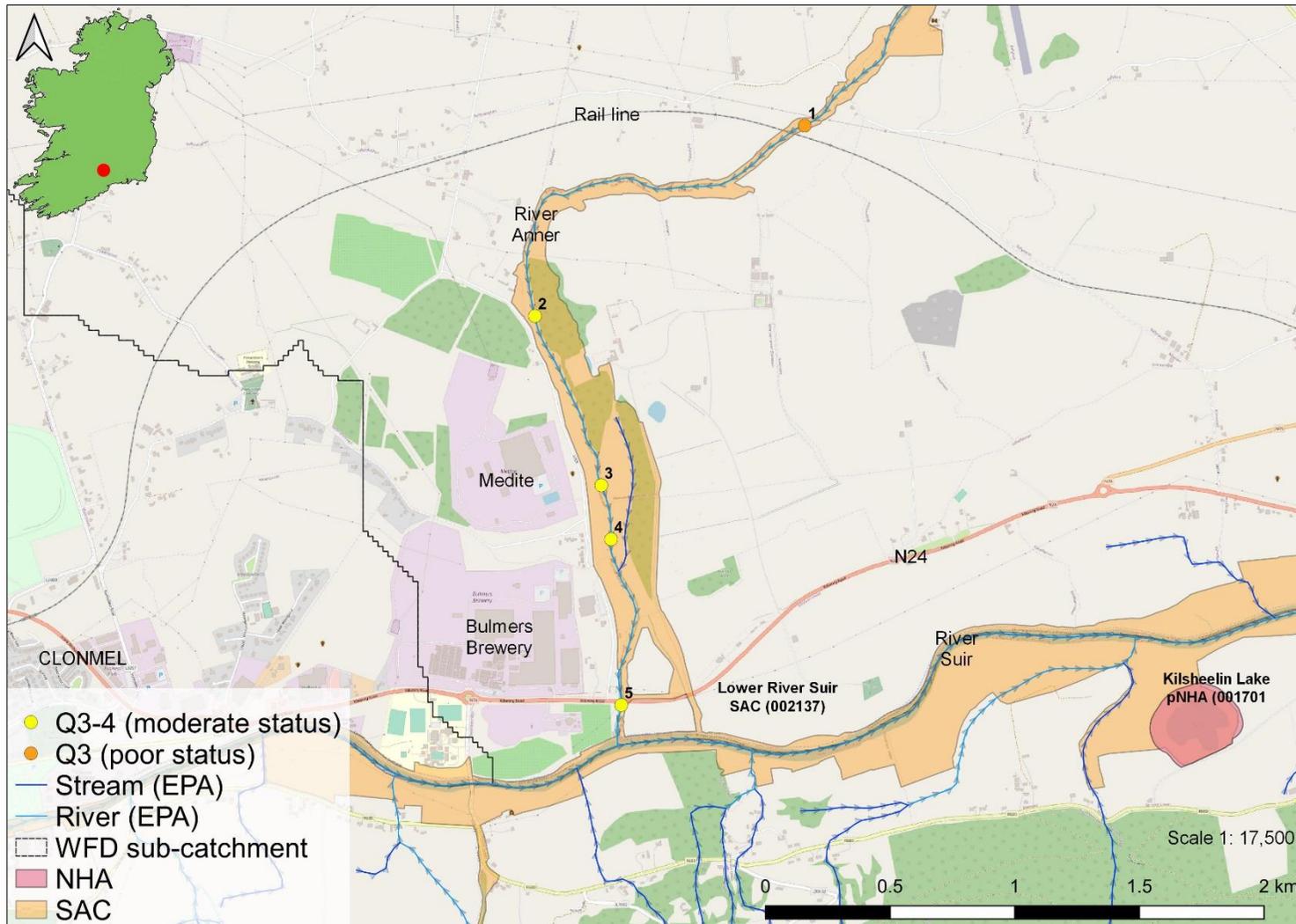
Of the six sampling sites, site 1 attained a Q-rating of **Q3 (poor status)** or an equivalent EQR of 0.6 (**Figures 3.1 & 3.2**) which was the poorest biological water quality recorded within the study area. Site 1 attained a Q3 rating given the absence of EPA group A (clean water indicators) and or low numbers of EPA group B (also clean water indicators) with a dominance of class C species (moderate water quality indicators). In this respect the site was dominated by more pollution tolerant mayflies (i.e. *Seratella ignita* and *Baetis rhodani* species). Site 1 also supported small numbers of pollution tolerant EPA group D gastropod, *Ampullaceana balthica* and EPA group E very pollution tolerant *Chironomus sp.*

**Table 3.1** Summary of Q-ratings for the River Anner on the 4<sup>th</sup> April and 5<sup>th</sup> August 2022

Site no.	Watercourse	Q-rating April 2022	WFD status	Q-rating August 2022	WFD status
1	River Anner	Q4	Good status	Q3	Poor status
2	River Anner	Q4	Good status	Q3-4	Moderate status
3	River Anner	Q4	Good status	Q3-4	Moderate status
4	River Anner	Q4	Good status	Q3-4	Moderate status
5	River Anner	Q4	Good status	Q3-4	Moderate status



**Figure 3.1** Biological water quality status of the  $n=5$  Q sampling sites on the River Anner 4<sup>th</sup> April 2022



**Figure 3.2** Biological water quality status of the  $n=5$  Q sampling sites on the River Anner 5<sup>th</sup> August 2022

## 4. Discussion

### 4.1 Summary of Biological Water Quality

The biological water quality at all five survey sites collected on the 4<sup>th</sup> April 2022 attained 'good status' water quality ( $\geq Q4$ ;  $EQR \geq 0.8$ ) as set out under Water Framework Directive (2000/60/EC) targets. However, a decline in biological water quality was observed across all five survey sites from samples collected on the 5<sup>th</sup> August 2022. Survey site 1 obtained **Q3** (poor status) biological water quality while survey sites 2, 3, 4 and 5 recorded an EPA Q rating of **Q3-4** (moderate status). No regionally or nationally rare invertebrate species were recorded in the Q samples (Feely et al. 2020; Kelly-Quinn et al. 2012; Foster et al, 2009).

There is no comprehensive evidence to support a decline in biological water quality as a result of atmospheric deposition from Medite based on the observed results. It is considered that the observed declines in biological water quality between April and August 2022 likely result from agricultural enrichment pressures given the lowest biological water quality rating was obtained at site 1 c. 2km hydrological distance upstream of Medite. The temporal decline in biological water quality across the five survey sites between April and August likely relates to low summer flows with associated reduced dilution capacity to assimilate pollutants coupled with increased temperatures.

## 5. Recommendations

The mature woodland on the east bank of the River Anner between sites 3, 4 and 5 evidently has provided water related ecosystem services including the provision of shade (i.e. summer protection from thermal stress), allochthonous material to feed invertebrates and salmonid fish and also water retention and release during dry weather flows. The buffering effect of the woodland would also protect the river from pollution from land uses practices that contribute pollution. The riparian buffer as observed during the survey was narrow on the west bank of the River Anner adjoining and downstream of Medite by contrast with the wooded east bank. There is opportunity to plant native species such as Alder along the riverbanks to increase the width of the existing riparian buffer. Tree planting would also improve the buffer capacity of the river from any atmospheric deposition of contaminants while also providing carbon sequestration. The mature trees of the river also provided an important supply of large woody debris material that was evidently contributing to changes in river hydromorphology by encouraging pool formation while providing resting places for otter as observed during the current survey.

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## **7. Appendix A – Q-sample species composition during April & August 2022**

**Table A1.** Q-sample species composition on the River Anner 4<sup>th</sup> April 2022

Taxon	Family	Binomial name	Site 1	% Total	Site 2	% Total	Site 3	% Total	Site 4	% Total	Site 5	% Total	EPA GROUPS
Ephemeroptera	Ephemeridae	<i>Ephemera danica</i>							2				A
Ephemeroptera	Heptageniidae	<i>Ecdyonurus dispar</i>	3		7		4				3		A
Ephemeroptera	Heptageniidae	<i>Heptagenia sulphurea</i>			4		6		4		6		A
Ephemeroptera	Heptageniidae	<i>Rhithrogena semicolorata</i>	4	<b>6.1</b>		<b>8.3</b>		<b>8.7</b>		<b>5.3</b>	2	<b>17.5</b>	A
Ephemeroptera	Baetidae	<i>Alainites muticus</i>	4		3				2				B
Plecoptera	Leuctridae	<i>Leuctra inermis</i>			2						1		B
Trichoptera	Glossosomatidae	<i>Agapetus fuscipes</i>	2				1		4		2		B
Trichoptera	Goeridae	<i>Silo pallipes</i>					2		1				B
Trichoptera	Lepidostomatidae	<i>Lepidostoma hirtum</i>									1		B
Trichoptera	Leptoceridae	<i>sp. indet. (early instar)</i>	1										B
Trichoptera	Limnephilidae	<i>Drusus annulatus</i>									1		B
Trichoptera	Limnephilidae	<i>Potamophylax latipennis</i>	4		2		1				3		B
Trichoptera	Limnephilidae	<i>sp. indet. (early instar)</i>					2						B
Trichoptera	Sericostomatidae	<i>Sericostoma personatum</i>		<b>9.6</b>	2	<b>6.8</b>	4	<b>8.7</b>	5	<b>10.6</b>	2	<b>15.9</b>	B
Ephemeroptera	Baetidae	<i>Baetis rhodani</i>	2		34		17		3		6		C
Ephemeroptera	Caenidae	<i>Caenis horaria</i>	4		1		2		3				C
Ephemeroptera	Ephemerellidae	<i>Serratella ignita</i>					1						C
Trichoptera	Hydropsychidae	<i>Hydropsyche pellucidula</i>	13		10		14		20		2		C
Trichoptera	Hydropsychidae	<i>Hydropsyche siltalai</i>	5		7		12		6		1		C
Trichoptera	Hydropsychidae	<i>Cheumatopsyche lepida</i>					1						C
Trichoptera	Polycentropodidae	<i>Polycentropus flavomaculatus</i>							1				C
Trichoptera	Rhyacophilidae	<i>Rhyacophila dorsalis</i>									1		C
Trichoptera	Rhyacophilidae	<i>Rhyacophila munda</i>			1								C
Amphipoda	Gammaridae	<i>Gammarus duebeni</i>	9		12		7		19		5		C

Taxon	Family	Binomial name	Site 1	% Total	Site 2	% Total	Site 3	% Total	Site 4	% Total	Site 5	% Total	EPA GROUPS
Arachnida	Hydrachnidae	<i>sp. indet.</i>	8		4		5				3		C
Coleoptera	Elmidae	<i>Limnius volckmari (larva)</i>	12		6		2		1		5		C
Coleoptera	Elmidae	<i>Limnius volckmari (adult)</i>	1						8		1		C
Coleoptera	Elmidae	<i>Elmis aenea (larva)</i>	10		3		7				5		C
Coleoptera	Elmidae	<i>Elmis aenea (adult)</i>	8		6		4				1		C
Coleoptera	Elmidae	<i>Esolus parallelepipedus</i>			1		2				1		C
Coleoptera	Gyrinidae	<i>Gyrinidae larva</i>			1		4		1				C
Coleoptera	Halipidae	<i>Halipus lineatocollis</i>							1				C
Coleoptera	Hydraenidae	<i>Hydraena gracilis</i>	2										C
Diptera	Chironomidae	non-Chironomus spp.	7		8		1		1		4		C
Diptera	Ceratopogonidae	Ceratopogonidae larva	3						1				C
Diptera	Empididae	<i>sp. indet.</i>	3		1		8		2		1		C
Diptera	Limoniidae	<i>Antocha sp.</i>	1		1		2		2				C
Diptera	Simuliidae	<i>sp. indet.</i>			7								C
Mollusca	Neritidae	<i>Theodoxus fluviatilis</i>							5				C
Mollusca	Sphaeriidae	<i>sp. indet.</i>							1		1		C
Mollusca	Tateidae	<i>Potamopyrgus antipodarum</i>	2	<b>78.3</b>	7	<b>83.3</b>	4	<b>80.9</b>	16	<b>80.5</b>	5	<b>66.7</b>	C
Hirudinidae	Erpobdellidae	<i>Erpobdella sp.</i>	1										D
Hirudinidae	Glossiphoniidae	<i>Glossiphonia sp.</i>					1		1				D
Mollusca	Lymnaeidae	<i>Ampullacaena balthica</i>		<b>0.9</b>	2	<b>1.5</b>	1	<b>1.7</b>		<b>0.9</b>		<b>0.0</b>	D
Diptera	Chironomidae	Chironomus spp.	6	<b>5.2</b>		<b>0.0</b>		<b>0.0</b>	3	<b>2.7</b>		<b>0.0</b>	E
Annelidae	Oligochaeta								3		2		Ungrouped
Nematomorpha	Gordiidae	Horsehair worm	1				1						Ungrouped
<b>Total Abundance (excl. ungrouped species)</b>			115		132		115		113		63		
<b>EPA Q Rating</b>			<b>4</b>		<b>4</b>		<b>4</b>		<b>4</b>		<b>4</b>		

Taxon	Family	Binomial name	Site 1	% Total	Site 2	% Total	Site 3	% Total	Site 4	% Total	Site 5	% Total	EPA GROUPS
<b>Ecological Quality Ratio</b>			<b>0.8</b>		<b>0.8</b>		<b>0.8</b>		<b>0.8</b>		<b>0.8</b>		
<b>WFD Status</b>			<b>Good</b>		<b>Good</b>		<b>Good</b>		<b>Good</b>		<b>Good</b>		

**Table A2.** Q-sample species composition on the River Anner 5<sup>th</sup> August 2022

Taxon	Family	Binomial name	Site 1	% Total	Site 2	% Total	Site 3	% Total	Site 4	% Total	Site 5	% Total	EPA Groups
Ephemeroptera	Ephemeridae	<i>Ephemera danica</i>					1						A
Ephemeroptera	Heptageniidae	<i>Ecdyonurus dispar</i>		<b>0.00</b>	1	<b>1.14</b>	1	<b>1.69</b>	1	<b>0.56</b>		<b>0.00</b>	A
Ephemeroptera	Baetidae	<i>Alainites muticus</i>			1								B
Plecoptera	Leuctridae	<i>Leuctra inermis</i>	1		3		2		3		2		B
Trichoptera	Glossosomatidae	<i>Agapetus fuscipes</i>	1		1		1		2		1		B
Trichoptera	Goeridae	<i>Silo pallipes</i>							2		1		B
Trichoptera	Hydroptilidae	<i>Hydroptila sp.</i>			1								B
Trichoptera	Lepidostomatidae	<i>Lepidostoma hirtum</i>					3						B
Trichoptera	Leptoceridae	<i>Athripsodes sp.</i>							1		10		B
Trichoptera	Sericostomatidae	<i>Sericostoma personatum</i>	4		1		3		6				B
Trichoptera	N/A	<i>Cased caddis Pupa</i>		<b>7.59</b>		<b>7.95</b>	2	<b>9.32</b>		<b>7.91</b>	3	<b>10.00</b>	B
Ephemeroptera	Ephemerellidae	<i>Serratella ignita</i>	9		31		30		56		47		C
Ephemeroptera	Baetidae	<i>Baetis rhodani</i>	13		5		24		6		18		C
Trichoptera	Hydropsychidae	<i>Hydropsyche instabilis</i>			1		1		1		3		C
Trichoptera	Hydropsychidae	<i>Hydropsyche siltalai</i>			1		3		1				C
Trichoptera	Polycentropodidae	<i>Polycentropus kingi</i>			1								C
Trichoptera	Rhyacophilidae	<i>Rhyacophila dorsalis</i>	4				1				3		C
Amphipoda	Gammaridae	<i>Gammarus duebeni</i>	11		14		18		27		24		C
Arachnida	Hydrachnidia	sp. indet.									2		C
Coleoptera	Elmidae	<i>Elmis aenea (adult)</i>	1		6		6		6				C
Coleoptera	Elmidae	<i>Elmis aenea (larva)</i>	1		2				2		2		C
Coleoptera	Elmidae	<i>Esolus parallelepipedus</i>							1				C
Coleoptera	Elmidae	<i>Limnius volckmari (adult)</i>	1		1				1				C
Coleoptera	Elmidae	<i>Limnius volckmari (larva)</i>	1		9				2				C

Taxon	Family	Binomial name	Site 1	% Total	Site 2	% Total	Site 3	% Total	Site 4	% Total	Site 5	% Total	EPA Groups
Coleoptera	Halipliidae	<i>Brychius elevatus</i>							1				C
Diptera	Chironomidae	<i>non-Chironomus spp.</i>			1								C
Diptera	Limoniidae	<i>Antocha sp.</i>			5				1		5		C
Diptera	Simuliidae	sp. indet.	22				1		8		10		C
Mollusca	Neritidae	<i>Theodoxus fluviatilis</i>							10		18		C
Mollusca	Planorbidae	<i>Ancylus fluviatilis</i>					2		10		3		C
Mollusca	Tateidae	<i>Potamopyrgus antipodarum</i>	6	<b>87.34</b>	1	<b>88.64</b>	16	<b>86.44</b>	27	<b>90.40</b>	13	<b>87.06</b>	C
Hirudinidae	Glossiphoniidae	<i>Glossiphonia complanata</i>			1								D
Mollusca	Lymnaeidae	<i>Ampullacaena balthica</i>	2	<b>2.53</b>		<b>1.14</b>	2	<b>1.69</b>		<b>0.00</b>		<b>0.00</b>	D
Diptera	Chironomidae	<i>Chironomus spp.</i>	2	<b>2.53</b>	1	<b>1.14</b>	1	<b>0.85</b>	2	<b>1.13</b>	5	<b>2.94</b>	E
<b>Total Abundance</b>			<b>79</b>		<b>88</b>		<b>118</b>		<b>177</b>		<b>170</b>		
<b>EPA Q Rating</b>			<b>Q3</b>		<b>Q3-4</b>		<b>Q3-4</b>		<b>Q3-4</b>		<b>Q3-4</b>		
<b>Ecological Quality Ratio</b>			<b>6.6</b>		<b>0.7</b>		<b>0.7</b>		<b>0.7</b>		<b>0.7</b>		
<b>WFD Status</b>			<b>Poor</b>		<b>Mod.</b>		<b>Mod.</b>		<b>Mod.</b>		<b>Mod.</b>		



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