

MONA OFFSHORE WIND PROJECT

Environmental Statement

Volume 7, Annex 3.6: Aquatic Invertebrates Survey Technical Report

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Image of an offshore wind farm

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Glossary

Term	Meaning
Biological Monitoring Working Party (BMWP)	A procedure for measuring water quality using families of macroinvertebrates as biological indicators
Expert Working Group (EWG)	Expert working groups set up with relevant stakeholders as part of the Evidence Plan process
Kick-sampling	A survey method used to sample aquatic invertebrates in flowing water
Rapid Assessment	A survey method used to quickly evaluate the ecological health of a waterbody
Sweep-netting	A survey method used to collect organisms from standing water or vegetation
Species of Principal Importance (SPI)	Species recognised in Welsh policy and afforded due regard in the planning system by the Environment (Wales) Act 2016, Section 7. Public bodies have a legal duty to conserve such species through their work

Acronyms

Acronym	Description
BMWP	Biological Monitoring Working Party
ASPT	Average Score Per Taxon
Defra	Department for the Environment, Food & Rural Affairs
EWG	Expert Working Group
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
MAGIC	Multi-Agency Geographic Information for the Countryside
MLWS	Mean Low Water Springs
SPI	Species of Principal Importance

Units

Unit	Description
cm	Centimetres
°C	Celsius
km	Kilometres
mm	Millimetres

1 AQUATIC INVERTEBRATES SURVEY TECHNICAL REPORT

1.1 Introduction

- 1.1.1.1 This document forms Volume 7, Annex 3.6: Aquatic invertebrate (inc White Clawed Crayfish) survey technical report of the Environmental Statement for the Mona Offshore Wind Project.
- 1.1.1.2 The purpose of this technical report is to present the results of the aquatic invertebrate desk study and site-specific surveys undertaken between July and September 2023 to inform Volume 3, Chapter 3: Onshore ecology of the Environmental Statement.
- 1.1.1.3 The desk study and site-surveys were designed to determine the presence or likely absence of protected and notable aquatic macroinvertebrate species, including white-clawed crayfish *Austropotamobius pallipes*. The surveys were also undertaken to determine the aquatic invertebrate diversity of each waterbody or watercourse.
- 1.1.1.4 Two separate areas have been defined for the purposes of this technical report. These include the 'study area', which describes the geographical extent subject to desk based research, and the 'survey area', which describes the area of land subject to site-specific surveys. The extent of the study area and survey area were selected to ensure all available data was collected for the Mona Onshore Development Area and the surroundings that may support this species group and may reasonably be affected by the Project. The areas were all discussed and agreed with the onshore ecology Expert Working Group (EWG).

1.2 Study area

- 1.2.1.1 The study area comprises the Mona Onshore Development Area, landward of Mean Low Water Springs (MLWS) and a 2 km buffer ('the aquatic invertebrate study area').
- 1.2.1.2 The location and geographic extent of the aquatic invertebrate study area is presented in Figure 1.1 of this technical report.

1.3 Survey area

- 1.3.1.1 Following the commencement of the aquatic invertebrate surveys, the Mona Onshore Development Area has been refined and now occupies a smaller geographical area. As such, the area of land subject to aquatic invertebrate surveys ('the aquatic invertebrate survey area') extends beyond the current iteration of the Mona Onshore Development Area. This includes an earlier iteration of the Mona Onshore Development Area and a 250 m buffer. The results from surveys undertaken beyond the Mona Onshore Development Area (i.e. surveys undertaken based on an earlier design iterations) have been included in this technical report because they provide further context regarding the ecological sensitivity of the wider area and to inform Volume 3, Chapter 3: Onshore ecology of the Environmental Statement (where relevant). All the ecological data collected as part of the Environmental Statement for the Mona Offshore Wind Project has been made publicly available through the relevant data records centre.
- 1.3.1.2 Adopting a survey area that is greater in extent than the Mona Onshore Development Area is in accordance with the precautionary approach. It ensures that the Environmental Statement is accurately informed with data from within the Mona Onshore Development Area (i.e. that may be subject to direct impacts) and data from

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outside the Mona Onshore Development Area (i.e. that may be subject to indirect impacts).

- 1.3.1.3 The location and geographic extent of the aquatic invertebrate survey area is presented in Figure 1.1 of this technical report.

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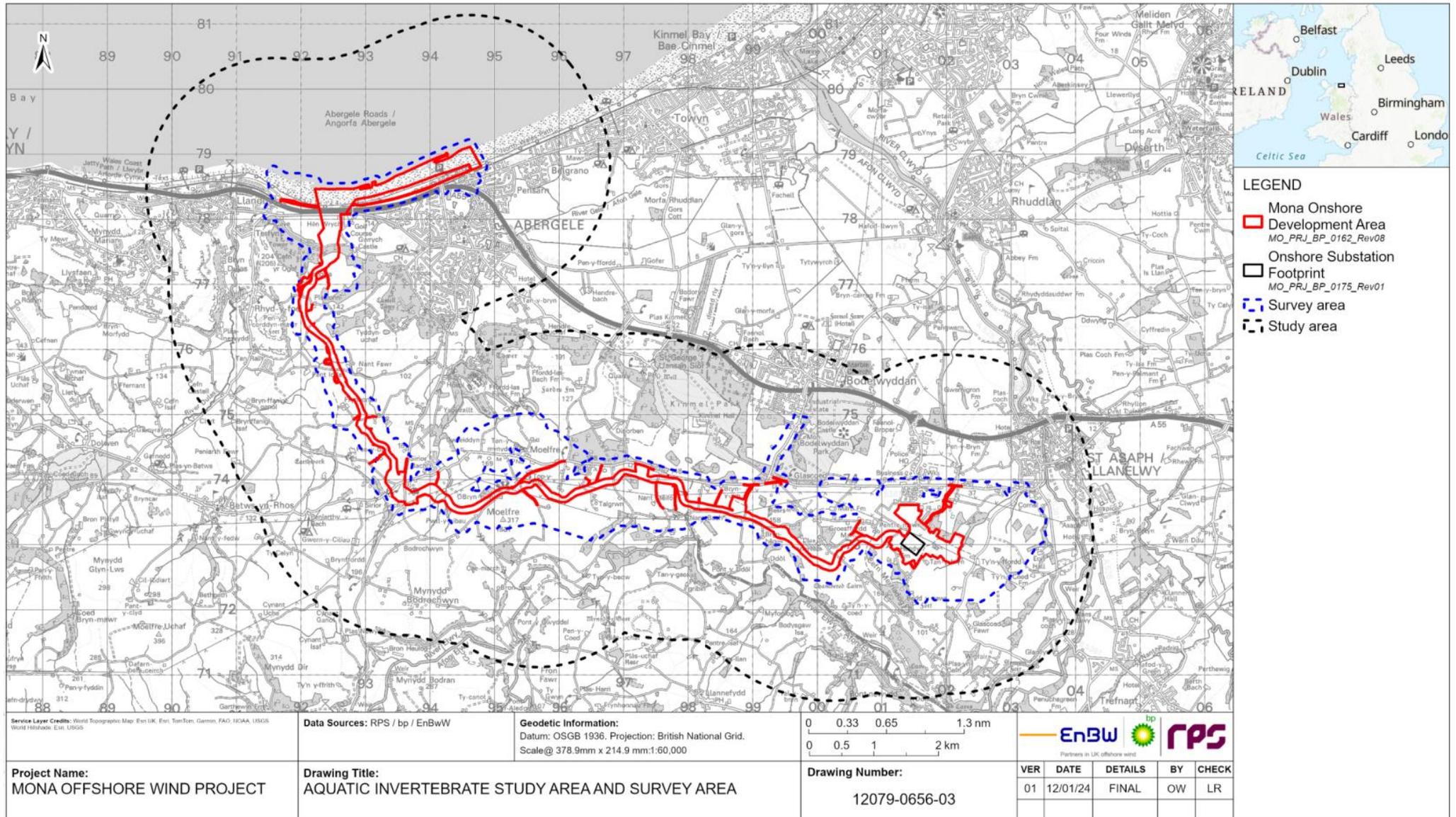


Figure 1.1: Aquatic invertebrate study area and survey area

1.4 Relevant legislation

- 1.4.1.1 Three key pieces of legislation are relevant for aquatic invertebrates under Welsh and UK law: the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations), the Wildlife and Countryside Act 1981 (as amended), and the Environment (Wales) Act 2016.
- 1.4.1.2 The Conservations of Habitats and Species Regulations 2017 (as amended) protects one species of aquatic invertebrate, the lesser whirlpool ram's-horn *snail Anisus vorticulus* Under Schedule 2 it is an offence to:
- Deliberately kill, injure, disturb or capture them
 - Deliberately destroy their eggs
 - Damage or destroy their breeding sites and resting places (even when invertebrates are not present) possess, control or transport them (alive or dead).
- 1.4.1.3 The Wildlife and Countryside Act 1981 (as amended) protects more than 10 species of aquatic invertebrate including the white clawed-crayfish, freshwater pearl mussel *Magaritifera margaritifera* and lesser silver water beetle *Hydrochara caraboides*. The full list is included within Appendix A. For these species, it is an offence under Schedule 5 of the Wildlife and Countryside Act 1981 to:
- Intentionally kill, injure, or take the animal from the wild
 - Damage or destroy any structure used by that species for shelter and protection including obstruction of its use or disturbing the animal
 - Possess the species (dead or alive)
 - Damage or destroy any structure used by that species for shelter and protection. Plus, obstruction of its use or disturbing the animal
 - Trading, advertising or selling the species, dead, alive or any derivatives.
- 1.4.1.4 All aquatic invertebrate species listed on the Wildlife and Countryside Act 1981 (as amended) and Section 7 of the Environment (Wales) Act 2016 are listed in Appendix A of this technical report. Other species of aquatic invertebrate are only protected against sale and have no specific habitat protections.
- 1.4.1.5 Some species of aquatic invertebrate such as the lesser silver water beetle *Hydrochara caraboides*, southern damselfly *Coenagrion mercurial* and fen raft spider *Dolomedes plantarius* are afforded due regard in the planning system in Wales under Section 7 of The Environment (Wales) Act 2016. Section 7 is a list of Species of Principal Importance (SPI) in Wales. Public bodies and local planning authorities have a legal duty to have regard for conserving SPI when exercising their duties.

1.5 Consultation

- 1.5.1.1 The scope, methodology and findings of the aquatic invertebrate surveys, including those undertaken beyond the current Mona Onshore Development Area, were discussed, and agreed with stakeholders via regular Onshore Ecology EWG Meetings. Further detail regarding consultation undertaken with respect to onshore ecology, including terrestrial invertebrate surveys can be found in Volume 3, Chapter 3: Onshore ecology of the Environmental Statement and the Consultation Report (Document reference: E.3).

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1.6 Methodology

1.6.1 Overview

1.6.1.1 A combination of desk studies and field surveys were undertaken to ascertain the presence or likely absence of aquatic invertebrate species and the diversity of these species within the aquatic invertebrate study area.

1.6.1.2 The results of the desk study are presented in Volume 7, Annex 3.1: Onshore ecology desk study of the Environmental Statement and summarised below.

1.6.2 Desktop study

1.6.2.1 Aquatic invertebrate species data was collected from existing desktop studies and datasets. These are summarised in Table 1.1 below.

Table 1.1: Summary of key desktop sources.

Title	Source	Year	Author
Historical biological records	Cofnod	2023	Cofnod
DataMapWales	Welsh Government	2023	Welsh Government
Multi-Agency Geographic Information for the Countryside (MAGIC)	Department for the Environment, Food & Rural Affairs (Defra)	2023	Defra
UK Protected Area Joint Nature Conservation Committee (JNCC)	JNCC website	2023	JNCC
Red List	International Union for the Conservation of Nature	2023	IUCN

1.6.3 Site-specific surveys

Extended phase 1 habitat surveys

1.6.3.1 Extended phase 1 habitat surveys undertaken between May 2022 and September 2023 identified waterbodies and watercourses with the potential to support protected or notable aquatic invertebrates and that should be subject to further surveys (see Volume 7, Annex 3.2: Extended phase 1 habitat surveys technical report of the Environmental Statement).

1.6.3.2 All waterbodies and watercourses identified as being potentially suitable to support protected and notable aquatic invertebrates from the extended phase 1 habitat data were subsequently assessed by competent aquatic invertebrate survey specialists. The assessments scoped each waterbody and watercourse either in or out for a detailed rapid assessment aquatic invertebrate survey. The suitability of a watercourse or waterbody was informed by their extent, structure, ability to hold water and macrophyte cover.

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1.6.3.3 Each waterbody was given a unique identification number that consisted of the letter 'P' for pond and a number (e.g. P148, P172 etc). Watercourse locations were assigned an individual letter. A sequential naming pattern was followed for all watercourse locations surveyed. If watercourse locations or waterbodies were dry or ephemeral, they were assessed as unsuitable and were not subject to a detailed rapid assessment surveys.

Rapid assessments

1.6.3.4 Site-specific surveys comprised a series of rapid assessments that involved sampling watercourses and waterbodies for aquatic invertebrates to identify the presence or likely absence of protected and notable species. The rapid assessment method was also used to assess the aquatic invertebrate diversity. Invertebrate diversity was used as an indicator to assess biological water quality and naturalness of watercourses and waterbodies and was based on the Biological Monitoring Working Party (BMWP) system (BMWP, 1997).

1.6.3.5 The rapid assessment methodology for waterbodies comprised sweep netting and visual searches of the waterbody perimeter, to sample aquatic invertebrate diversity. A rectangular net, with a net depth of 30 cm and a 1 mm mesh was used. Standing at the waters' edge the surveyor netted the vegetation by making short jabbing thrusts into dense emergent and raft forming plants (where present), making occasional longer strokes into submerged plants and over bare substrate in deeper water. The number of netting jabs varied between waterbodies, but each netting jab was no longer than three minutes in duration.

1.6.3.6 The diversity of the aquatic invertebrate assemblage was then analysed at the bankside. If large numbers of different invertebrate families were present, samples were sent for laboratory analysis. Surveys of waterbodies were in line with guidance set out in Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation (Natural England, 2007).

1.6.3.7 The rapid assessment methodology for watercourses comprised the sampling of aquatic invertebrates using a three-minute kick sampling technique. Kick-sampling was undertaken on all habitat features within each suitable and accessible watercourse. Habitat features included plants, stony substrate, and crevices (where possible). The surveyor stood in the water facing downstream with a 1 mm mesh net in front of them. Sediment was then disturbed immediately upstream of the net, upturning stones and displacing gravel with their feet.

1.6.3.8 The surveyor then moved backwards, upstream, from one side of the watercourse to the other so that the banks were sampled as well as midstream. Pools and shallower riffle were included where possible.

1.6.3.9 The watercourse kick-sampling method was undertaken in accordance with ISO 10870:2012 Water Quality – Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in freshwater (British Standards Institution, 2012) and Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation (Natural England, 2007).

1.6.3.10 As part of the assessment of watercourses, habitat suitability was also assessed for white-clawed crayfish. Suitable habitat for white-clawed crayfish includes slow flowing watercourses and quarry pools, which comprise a mosaic of features, such as stones, rocks and tree roots. If a watercourse was dry or did not comprise suitable habitat features for white-clawed crayfish refuge, white-clawed crayfish surveys were scoped

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out. The white clawed-crayfish habitat assessments were undertaken in accordance with Guidance on Habitat for White-Clawed Crayfish (Peay, 2003).

Aquatic invertebrate sample analysis.

- 1.6.3.11 Aquatic invertebrate samples obtained from sweep netting and kick-sampling were analysed at the bankside to determine the presence or likely absence of protected or notable species. The samples were also analysed to identify the aquatic invertebrate families present within the sample. The samples were identified to family level (and to species level, where possible). The sample data was used to generate BMWP scores and Average Score Per Taxon (ASPT) values.
- 1.6.3.12 The BMWP system assigns numerical values (between 1 and 10) to more than 50 different aquatic invertebrate taxa according to their sensitivity to pollution. The larger the numerical value of the family, the more sensitive the family is to pollution. The sum of the values in each population provides an indication of the ecological status of a waterbody or watercourse and how polluted they are likely to be. A higher score indicates a waterbody supports animals typical of high quality waterbodies, and lower scores indicate a waterbody is in poorer condition.
- 1.6.3.13 To supplement the biological quality of a watercourse or waterbody the BMWP scores are averaged to generate the ASPT. Lower ASPT numbers indicate a waterbody or watercourse is likely to be in poorer condition. The BMWP and the ASPT results are useful when assessed together as they provide an index of how polluted a waterbody or watercourse may be.
- 1.6.3.14 A watercourse or waterbody with good water quality is indicated by a diverse variety of taxa, especially those that are sensitive to pollution (such as mayflies, stoneflies and dragonflies). Poorer quality is indicated by a smaller than expected number of taxa, particularly those that are less sensitive to pollution (worms and midges). BMWP scores and ASPT values are listed in Table 1.2 below (as per Armitage *et al.*, 1983; Chapman, 1996; and Mason, 2002). The individual BMWP numerical values for aquatic invertebrate families are listed in Table Apx in Appendix C.

Table 1.2: BWMP and ASPT scores.

BMWP score	ASPT value	Interpretation of Biological Water Quality
Over 100	Over 5.4	Very good biological quality
71-100	4.8 – 5.4	Good biological quality
41 – 70	4.3 – 4.8	Fair biological quality
11 – 40	3 – 4.3	Poor biological quality
0 – 10	3.0 or less	Very poor biological quality

1.6.4 Limitations

- 1.6.4.1 Not all aquatic invertebrate species that colonise watercourses and waterbodies are present throughout the year. Therefore, some species may have been overlooked when surveying in a single season. Further, other species that may be present at other times of year, sporadically or in low numbers may not have been recorded.
- 1.6.4.2 However, this is not considered a major limitation as standard methods were applied, and the data collected are considered representative of the conditions present and appropriate for assessment of the value of each waterbody and watercourse.
- 1.6.4.3 Access was not granted to all identified watercourses within the aquatic invertebrate survey area and as a result some watercourses could not be fully surveyed. Where access was granted to upstream or downstream sections of these watercourses they were surveyed accordingly.
- 1.6.4.4 If aquatic invertebrates were identified in the accessible sections of a watercourse the precautionary approach was applied and presence was assumed within the entire stretch of the watercourse. Two watercourses within the aquatic invertebrate survey area were not accessible and neither were surveyed. These were the Nant Luke watercourse and an unnamed watercourse, which were both tributaries of the River Elwy. The watercourses were located outside the Mona Onshore Development Area, south, and southwest of Groesffordd Marli.

1.7 Results

1.7.1 Desk study

- 1.7.1.1 No records of protected or notable aquatic macro-invertebrates were identified as part of the desk study.

1.7.2 Site-specific surveys

- 1.7.2.1 The extended Phase 1 habitat survey data identified 20 waterbodies and six watercourses within the aquatic invertebrate survey area. Experienced and competent aquatic invertebrate survey specialists subsequently surveyed the waterbodies and watercourses to confirm which could support protected or notable aquatic invertebrates.

Waterbodies

- 1.7.2.2 A total of 20 waterbodies within the aquatic invertebrate survey area were identified, of which six were confirmed to be suitable for aquatic invertebrates and subject to a rapid assessment. The remaining 14 waterbodies were assessed as unsuitable to support protected or notable species. Unsuitable waterbodies were those that were dry or were too shallow.
- 1.7.2.3 None of the six waterbodies confirmed to be suitable for aquatic invertebrates and subject to a rapid assessment were within the Mona Onshore Development Area. All six were, however, close to the Permanent Access Route, to the southeast and northwest respectively.
- 1.7.2.4 All six waterbodies were subject to rapid assessment surveys. A total of 14 different invertebrate families were identified during the surveys, no protected or notable aquatic invertebrate species were recorded. A summary of survey results, including list of aquatic invertebrate families and associated BMWP and ASPT score is

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presented in Table 1.3 below. Information on waterbodies assessed as unsuitable are provided in Appendix B of this technical report.

1.7.2.5 A diverse assemblage of aquatic invertebrates were recorded within four of the surveyed waterbodies, these were waterbodies P148, P151, P152, and P155 (as shown in Figure 1.2). These waterbodies contained at least 10 or more aquatic invertebrate families. The *Libellulidae* family (dragonflies), considered to be highly sensitive to polluted waterbodies (as per BWMP indices), were recorded within waterbodies P148, P151, P152 and P155. These four waterbodies supported at least six aquatic invertebrate families with higher sensitivity to pollution, (a BWMP score of five and above). These families were *Gammaridae* shrimp, *Libellulidae* dragonflies, *Notonectidae* backswimmers, *Corixidae* waterboatmen, *Gerridae* pondscaters and *Dytiscidae* diving beetles. The four waterbodies with a diverse assemblage of aquatic invertebrates were a series of established mitigation waterbodies associated with the existing Burbo Bank Extension Offshore Wind Farm (onshore infrastructure). These waterbodies are located outside of the Mona Onshore Development Area, just outside of the Permanent Access Route.

1.7.2.6 The diversity of the aquatic invertebrate assemblage was lower in P153 than in waterbodies P148, P151, P152 and P155. Seven families were recorded indicating poorer water quality. The diversity of aquatic invertebrates within waterbody P172 was the lowest, with two aquatic invertebrate families identified during the aquatic invertebrate surveys.

Table 1.3: Waterbody survey results.

Waterbody ID	Waterbody description	BWMP	ASPT	Biological water quality index
P148	Northernmost Pond south of Bodelwyddan Substation. Recently established waterbody, created for the Burbo Bank Offshore Wind Farm (onshore infrastructure). Waterbody was dominated by bulrush <i>Typha latifolia</i> and hardrush <i>Juncus inflexus</i> . Diverse macroinvertebrate assemblage that included 14 aquatic invertebrate families: <i>Gammaridae</i> , <i>Daphniidae</i> , <i>Calopterygidae</i> , <i>Libellulidae</i> , <i>Notonectidae</i> , <i>Corixidae</i> , <i>Gerridae</i> , <i>Dytiscidae</i> , <i>Chironomidae</i> , <i>Hydrobiidae</i> , <i>Lymnaeidae</i> <i>Planorbidae</i> , <i>Assellidae</i> , <i>Hirudidae</i> .	51	4.3	Moderate biological water quality.
P151	Northernmost Pond in the Series of Three North-East of Cord Coed. Recently established waterbody, created for the Burbo Bank Extension Offshore Wind Farm (onshore infrastructure). The habitat and macroinvertebrate assemblage is the same as P148. Diverse macroinvertebrate assemblage which included 12 aquatic invertebrate families: <i>Gammaridae</i> , <i>Daphniidae</i> , <i>Calopterygidae</i> , <i>Libellulidae</i> , <i>Notonectidae</i> , <i>Corixidae</i> , <i>Gerridae</i> , <i>Dytiscidae</i> , <i>Chironomidae</i> , <i>Hydrobiidae</i> , <i>Lymnaeidae</i> <i>Planorbidae</i> , <i>Assellidae</i> , <i>Hirudidae</i> .	43	4.3	Moderate biological water quality.
P152	Central Pond in the Series of Three North-East of Cord Coed. Recently established waterbody, created for the Burbo Bank Extension Offshore Wind Farm (onshore infrastructure). The habitat and macroinvertebrate assemblage is the same as P148. Diverse macroinvertebrate assemblage which included 14 aquatic invertebrate families: <i>Gammaridae</i> , <i>Daphniidae</i> , <i>Calopterygidae</i> , <i>Libellulidae</i> , <i>Notonectidae</i> , <i>Corixidae</i> ,	51	4.3	Moderate biological water quality.

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Waterbody ID	Waterbody description	BWMP	ASPT	Biological water quality index
	<i>Gerridae, Dytiscidae, Chironomidae, Hydrobiidae, Lymnaeidae Planorbidae, Assellidae, Hirudidae.</i>			
P153	Solo Pond North of Cord Coed. Recently established waterbody, created for the Burbo Bank Extension Offshore Wind Farm (onshore infrastructure). The habitat and macroinvertebrate assemblage is the same as P148. Aquatic invertebrate assemblage not as diverse as other waterbodies within cluster, which included seven aquatic invertebrate families: <i>Gammaridae, Daphniidae, Notonectidae, Corixidae, Gerridae, Dytiscidae, Chironomidae, Hydrobiidae, Assellidae.</i>	21	4	Poor biological water quality.
P155	Southernmost Pond in the Series of Three North-East of Cord Coed. Recently established waterbody, created for the Burbo Bank Extension Offshore Wind Farm (onshore infrastructure). The habitat and macroinvertebrate assemblage is the same as P148 and included 12 families. <i>Gammaridae, Daphniidae, Calopterygidae, Libellulidae, Notonectidae, Corixidae, Gerridae, Dytiscidae, Chironomidae, Hydrobiidae, Lymnaeidae Planorbidae.</i>	42	4.6	Moderate biological water quality.
P172	North Pond of the Pair West of Eryl Hall Caravan Park. Heavily poached waterbody in an improved grassland field. Most of the surface was covered with duck weed <i>Lemna sp.</i> The marginal vegetation was dominated by grasses. The aquatic invertebrate diversity assemblage was the lowest with only two aquatic invertebrate families recorded: <i>Hirudidae</i> and <i>Corixidae</i> .	8	4	Poor/very poor biological water quality.

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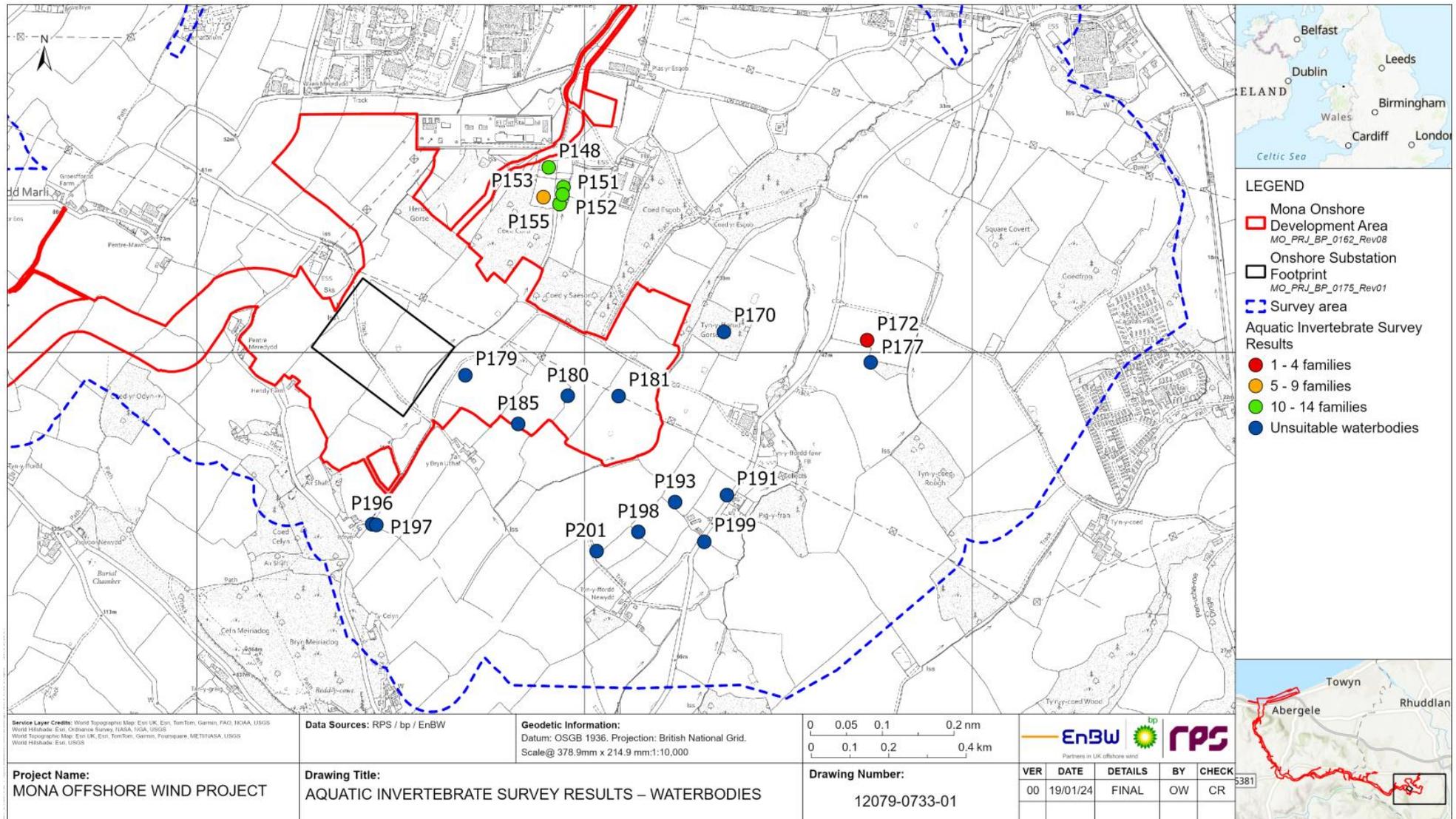


Figure 1.2: Aquatic Invertebrate Survey Results – Waterbodies.

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Watercourses

- 1.7.2.7 A total of six watercourses were identified within the aquatic invertebrate survey area. The six included a tributary of the Afon Dulas, two tributaries of the River Gele, two watercourses connected to Pengwern Drain and a tributary of the Glascoed Stream.
- 1.7.2.8 The six watercourses were sub-divided into 15 different survey locations (i.e. two or three locations at each watercourse) and each survey location was assessed to determine its suitability to support protected and notable invertebrates.
- 1.7.2.9 Of the 15 watercourse survey locations, six were confirmed to be suitable for protected or notable aquatic invertebrates and were scoped in for more detailed rapid assessment surveys. The remaining nine survey locations were assessed as being unsuitable to support aquatic invertebrates. This was based on the watercourses being dry or too shallow to support aquatic invertebrates.
- 1.7.2.10 Of the six watercourse locations assessed as suitable for aquatic invertebrates, three were within the Mona Onshore Development Area; watercourse survey location B, a tributary of the Afon Dulas (to the south west of Rhyd-Y-Foel), and watercourse survey locations K and D, connected to Pengwern Drain which were located along the Permanent Access Route.
- 1.7.2.11 The results of the rapid assessment surveys identified two aquatic invertebrate families only, these were *Gammaridae* and *Aselidae*. No protected or notable aquatic invertebrate species were recorded. Freshwater shrimp *Gammarus pulex* and water hoglouse *Asellus aquaticus* were the only aquatic invertebrate species identified. Given the low numbers of aquatic invertebrates identified at each the six watercourse locations, BWMP scores and ASPT values were not calculated.
- 1.7.2.12 The survey results are presented in Table 1.4 below. Locations of all suitable and unsuitable watercourse survey locations are displayed on Figure 1.3 and Figure 1.4. Watercourse locations not subject to rapid assessments are listed in Appendix C of this technical report.

Table 1.4: Watercourse survey results.

Watercourse location ID	Watercourse description	Within the Mona Onshore Development Area
Watercourse Survey Location B	Heavily poached tributary of the Afon Dulas with low water flow and poor macroinvertebrate assemblage, dominated by freshwater shrimp <i>Gammarus pulex</i> and water hoglouse <i>Asellus aquaticus</i>	Yes
Watercourse Survey Location C	Upstream location of Watercourse A, tributary of the Afon Dulas. Kick sample comprised freshwater shrimp <i>Gammarus pulex</i> and water hoglouse <i>Asellus aquaticus</i> with the same conditions as per Watercourse A.	No
Watercourse Survey Location K	Pengwern Drain running along a boundary between a hedge and a pasture field. Very low flow, holding permanent water in small pools only. Kick sample resulted in low numbers of freshwater shrimp <i>Gammaridae</i> only.	Yes

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Watercourse location ID	Watercourse description	Within the Mona Onshore Development Area
Watercourse Survey Location D	Upstream location of Watercourse K, kick sample dominated by freshwater shrimp <i>Gammaridae</i> .	Yes
Watercourse Survey Location O	Heavily poached section of Glascoed Stream meandering through pasture field. Water hoglouse <i>Asellus aquaticus</i> present.	No
Watercourse Survey Location P	Upstream location of Glascoed Stream. Channel runs through steep gully after exiting woodland. Kick sample dominated by freshwater shrimp <i>Gammaridae</i> .	No

White-clawed crayfish

- 1.7.2.13 All watercourses subject to survey were confirmed not suitable for white-clawed crayfish. The watercourses were either dry or lacked the habitat features such as tree roots, stones, rocks and other varied habitat features that could support white-clawed crayfish. As a result, no further white-clawed crayfish surveys were undertaken.

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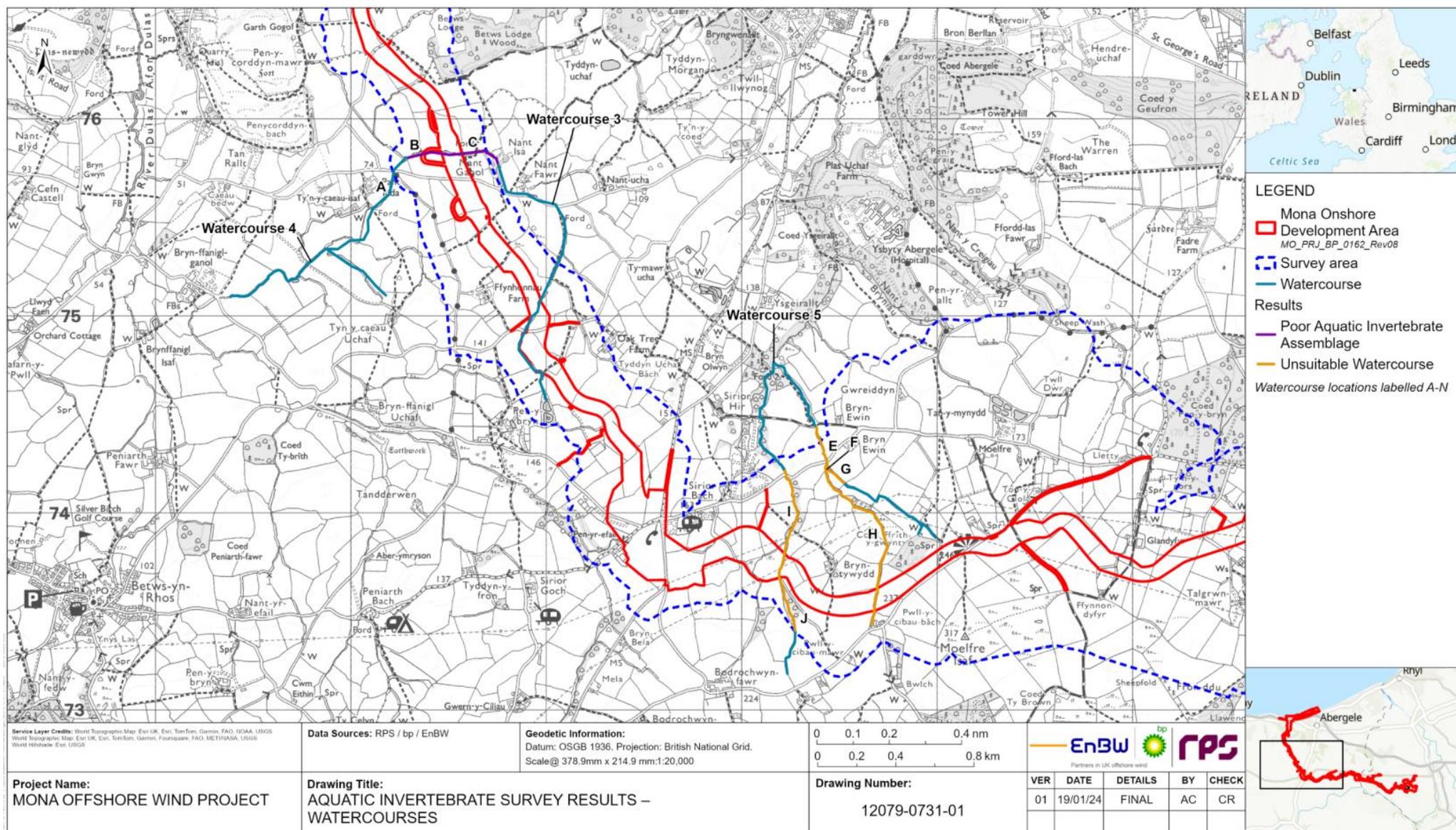


Figure 1.3: Aquatic Invertebrate Survey Results – Watercourses (Sheet 1 of 2).

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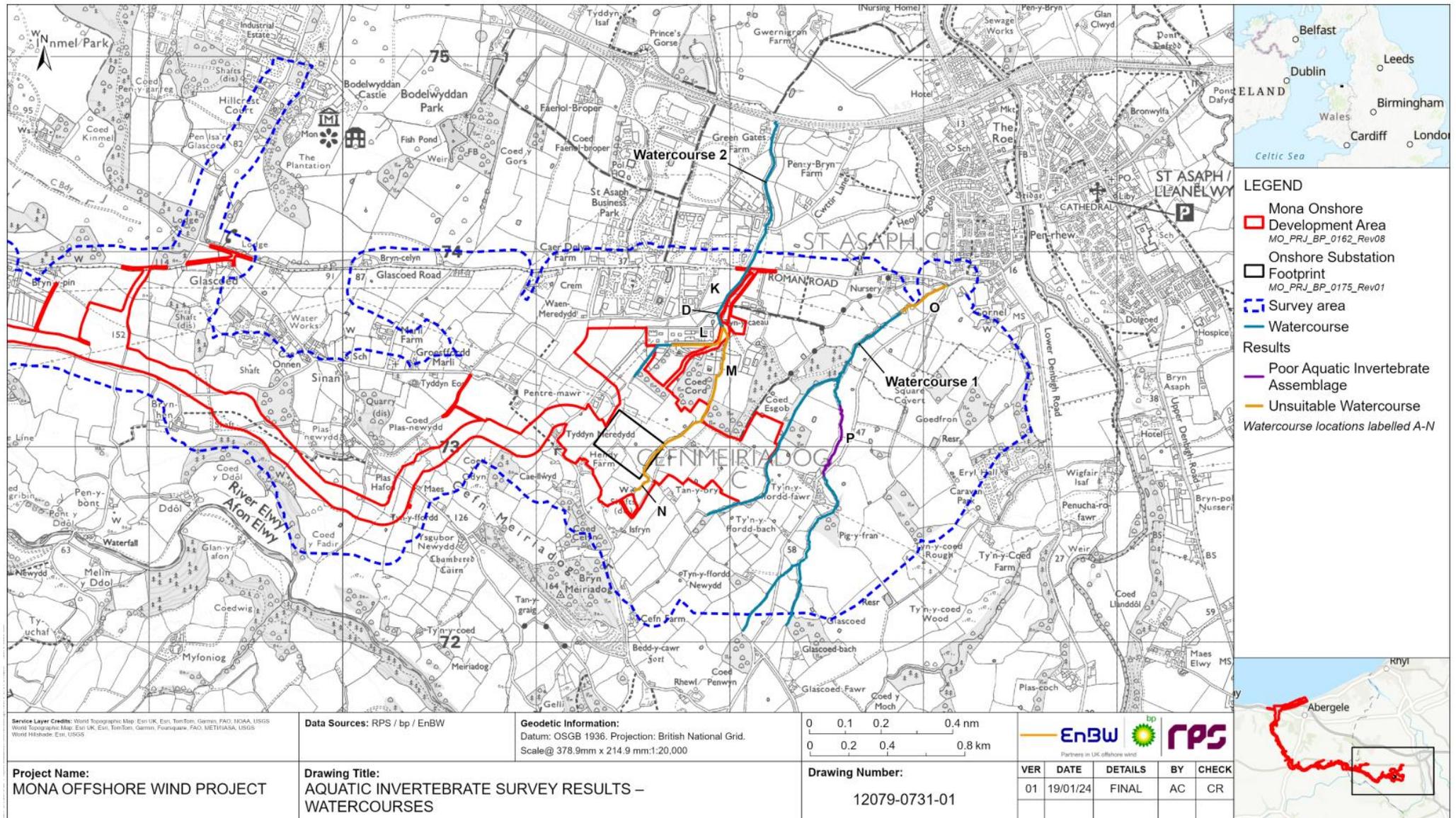


Figure 1.4: Aquatic Invertebrate Survey Results – Watercourses (Sheet 2 of 2).

1.8 Summary

- 1.8.1.1 This technical report presents the results of the aquatic invertebrate desk study and field surveys undertaken between August and September 2023 to inform Volume 3: Chapter 3: Onshore ecology of the Environmental Statement.
- 1.8.1.2 No protected or notable aquatic invertebrate species were identified during the desk study.
- 1.8.1.3 The extended phase 1 habitat survey data identified 20 waterbodies and six watercourses that could be suitable for aquatic invertebrates. The 20 waterbodies and six watercourses were assessed by competent aquatic invertebrate survey specialists and scoped in or out for more detailed rapid assessment surveys.
- 1.8.1.4 Of the 20 waterbodies, four were located within the Mona Onshore Development Area, east of Onshore Substation and 16 were outside. The 16 waterbodies outside of the Mona Onshore Development Area were to the north, east and southwest of the Onshore Substation. The six watercourses were subdivided into 15 watercourse locations to aid the initial scoping assessment.
- 1.8.1.5 Of the 20 waterbodies, six were assessed to be suitable for protected and notable aquatic invertebrates and were subject to rapid assessment surveys. The remaining 14 were considered unsuitable due to being dry or too shallow and were not surveyed. Four of the six waterbodies subject to rapid assessment surveys, P148, P151, P152, and P155, were identified as supporting a diverse aquatic invertebrate assemblage (more than 10 families). This included six aquatic invertebrate families with a BWMP score of five and above which have a greater sensitivity to polluted waterbodies, these were *Gammaridae*, *Libellulidae*, *Notonectidae*, *Corixidae*, *Gerridae* and *Dytiscidae*. Waterbodies P148, P151, P152 and P155 were identified as having moderate biological water quality based on their respective BMWP scores and ASPT values. These waterbodies were located east of the Permanent Access Route. No protected or notable aquatic invertebrate species were identified.
- 1.8.1.6 Two waterbodies (P153 and P172) were identified as having a lower aquatic invertebrate diversity (less than 10 families), with seven families identified in P153 and two families recorded in 172. No protected or notable aquatic invertebrate species were identified in any of the waterbodies.
- 1.8.1.7 Of the 15 watercourse survey locations, six were suitable for protected or notable aquatic invertebrate species, and subject to rapid assessment surveys. Three of the six survey locations were located within the Mona Onshore Development Area. Two within the Permanent Access Route and one to the southwest of Rhyd-Y-Foel. The remaining nine watercourse survey locations were assessed as being unsuitable for aquatic invertebrates.
- 1.8.1.8 Two aquatic invertebrate family species were recorded at the watercourse survey locations, which is reflective of low aquatic invertebrate diversity (a maximum of two families). Assemblages of either freshwater shrimp or water hoglouse, or both, were recorded at all six watercourse survey locations surveyed. BWMP scores and ASPT values were not calculated for these watercourses due to the low number of aquatic invertebrates recorded. No protected or notable species were identified.
- 1.8.1.9 None of the watercourses were suitable for white-clawed crayfish.

1.9 References

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Appendix A: Protected/notable aquatic invertebrates (Wales)

Apx Table 1: Protected and notable aquatic invertebrate species in Wales.

Aquatic Invertebrate Species	Scientific name	Wildlife and Countryside Act 1981	Environment (Wales) Act 2016
Lesser silver water beetle	<i>Hydrochara caraboides</i>	Schedule 5	SPI
A stone fly	<i>Isogenus nubecula</i>		SPI
A diving beetle	<i>Hydroporus rufifrons</i>		SPI
A freshwater bryozoan	<i>Lophopus crystallinus</i>		SPI
A caddis fly	<i>Hagenella clathrata</i>		SPI
A reed beetle	<i>Donacia bicolora</i>		SPI
A reed beetle	<i>Donacia aquatica</i>		SPI
A mayfly	<i>Potamanthus luteus</i>		SPI
Water beetle	<i>Paracymus aeneus</i>	Schedule 5	
Norfolk aeshna	<i>Aeshna isosceles</i>	Schedule 5	
Southern damselfly	<i>Coenagrion mercuriale</i>	Schedule 5	SPI
Fen raft spider	<i>Dolomedes plantarius</i>	Schedule 5	SPI
White-clawed crayfish	<i>Austropotamobius pallipes</i>	Schedule 5	
Fairy shrimp	<i>Chirocephalus diaphanus</i>	Schedule 5	
Tadpole shrimp	<i>Triops cancriformis</i>	Schedule 5	
Lagoon sand shrimp	<i>Gammarus insensibilis</i>	Schedule 5	
Pearl mussel	<i>Margaritifera margaritifera</i>	Schedule 5	
De Folin's lagoon snail	<i>Caecum armoricum</i>	Schedule 5	
Sandbowl snail	<i>Catinella arenaria</i>	Schedule 5	
Carthusian snail	<i>Monacha cartusiana</i>	Schedule 5	
Northern hatchet-shell	<i>Thyasira gouldi</i>	Schedule 5	
Medicinal leech	<i>Hirudo medicinalis</i>	Schedule 5	

Appendix B: Unsuitable Waterbodies

Apx Table 2: Waterbodies assessed as unsuitable for aquatic invertebrates.

Waterbody ID	Waterbody description
P170	Waterbody within southeast Region of Coed Esgob. Ephemeral waterbody.
P177	Waterbody south of the Pair West of Eryl Hall Caravan Park. The pond was ephemeral.
P179	Waterbody East of Mona Substation. The pond was dry.
P180	Waterbody southwest of Coed Esgob. The pond was dry.
P181	Waterbody south of Coed Esgob. Heavily poached pond in a pasture field that was ephemeral. Some standing water present but it was covered with duck weed.
P185	Waterbody Northeast of Isolated Buildings at Tan-y-bryn, Cernmeiriadog. Dry/ephemeral pond.
P188	Waterbody was dry.
P191	Waterbody northeast of Isolated Buildings at Tan-y-ffordd-bach, Cernmeiriadog. Dry/ephemeral pond.
P193	Waterbody northwest of Isolated Buildings at Tan-y-ffordd-bach, Cernmeiriadog. Dry/ephemeral pond.
P196	Waterbody west of the Pair East of Coed Celyn. Waterbody was dry.
P197	Waterbody east of the Pair East of Coed Celyn. Waterbody was dry.
P198	Waterbody west of Isolated Buildings at Tan-y-ffordd-bach, Cernmeiriadog. Waterbody was dry.
P199	Waterbody southeast of Isolated Buildings at Tan-y-ffordd-bach, Cernmeiriadog. Waterbody was ephemeral. Only holding water after a recent heavy precipitation.

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Waterbody ID	Waterbody description
P201	Waterbody northeast of Isolated Buildings at Tan-y-ffordd Newydd, Cernmeiriadog. Waterbody was dry.

Appendix C: Unsuitable watercourses

Apx Table 3: Watercourses assessed as unsuitable for aquatic invertebrates

Watercourse location ID	Watercourse description
Watercourse Survey Location M	Stream no longer exists in location. No survey required.
Watercourse Survey Location N	Stream no longer exists in location. No survey required.
Watercourse Survey Location L	Dry modified channel, no survey required.
Watercourse Survey Location J	Stream that was likely ephemeral with an extremely low flow that only held water in occasional pools. Stream was scoped out for further survey.
Watercourse Survey Location F	Same stream as above, surveyed upstream of B5381. At this location water is diverted into a small water treatment works with a filter bed.
Watercourse Survey Location G	Tributary stream of the above unnamed watercourse. This stream was ephemeral and was scoped out for further survey.
Watercourse Survey Location H	Tributary stream of the above unnamed watercourse. This stream was ephemeral and was scoped out for further survey.
Watercourse Survey Location I	Stream was likely ephemeral with an extremely low flow and only holding water in occasional pools. The stream was scoped out for further survey.
Watercourse Survey Location J	Stream was likely ephemeral with an extremely low flow and only holding water in occasional pools. The stream was scoped out for further survey.

Appendix D: BMWP families and BMWP scores

Apx Table 4: BMWP families and scores.

Group	BMWP Family	BMWP Score
Dragonflies	Libellulidae	8
Shrimps	Gammaridae	6
Backswimmers	Notonectidae	5
Waterboatmen	Corixidae	
Pond skaters	Gerridae	
Diving beetles	Dytiscidae	
Mud snails	Hydrobidae	3
Pond snails	Lymnaeidae	
Ramshorn snails	Planorbidae	
Leeches	Hirudidae	
Isopods	Asellidae	
Midges	Chironomidae	2