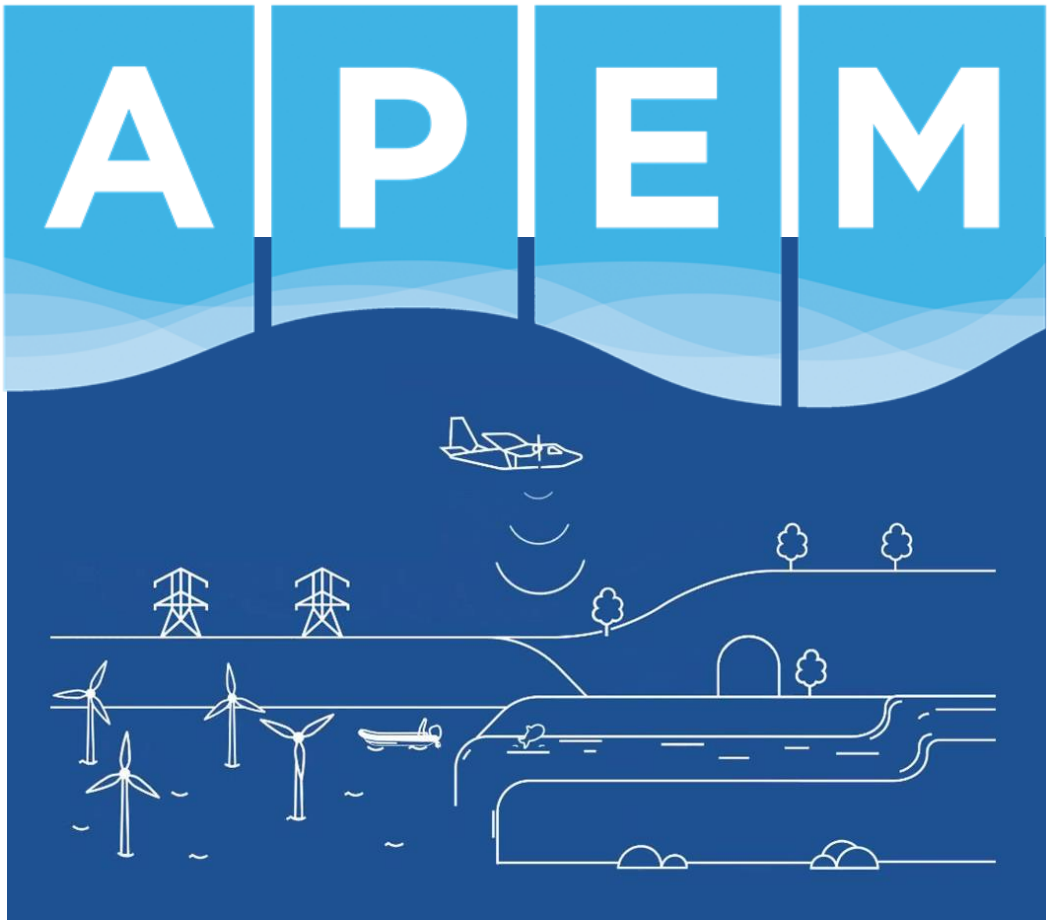

Newport Effluent Pipe Replacement Scheme – Phase 2 Marine Works

Water Framework Directive Assessment Report

APEM Ref: P00012364

June 2023

Nick O'Brien, Carter Rippon

Client:	**Kaymac Marine & Civil Engineering Ltd**
Address:	**Unit 1 Osprey Business Park,**
	Byng Street,
	Landore,
	Swansea
	SA1 2NR
Project reference:	**P00012364**
Date of issue:	**June 2023**

Project Director:	**Dr Marc Hubble**
Project Manager:	**Nick O'Brien**

APEM Ltd
Riverview
A17 Embankment Business Park
Heaton Mersey
Stockport
SK4 3GN

Tel: 0161 442 8938
Fax: 0161 432 6083

Registered in England No. 02530851

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Contents

Executive Summary i

1. Background Information for the Proposed Works 1

1.1 Introduction to the WFD assessment 1

1.2 Location and context 1

1.3 WFD assessment objectives 3

1.4 Summary of the Proposed Works 3

1.4.1 Outfall installation – offshore phase 4

1.4.2 Outfall installation – intertidal zone 5

1.4.3 Pipe laying and installation of outfall 5

1.4.4 Laying of concrete mattresses and backfilling 7

1.4.5 Removal of existing outfall pipe and stone causeway 7

2. Water Framework Directive requirements 9

2.1 Water Framework Directive 9

2.1.1 Overview 9

2.1.2 Transitional Water Bodies 12

2.1.3 Severn Lower Current WFD Status 13

3. Methods 14

3.1 Screening 14

3.2 Scoping 14

3.3 Impact Assessment 15

4. WFD Assessment 16

4.1 Screening 16

4.2 Scoping 16

4.3 Impact Assessment 17

4.3.1 Biology – Habitats (higher sensitivity: Saltmarsh) 17

4.3.2 Biology - Fish 18

4.3.3 Water Quality 19

4.3.4 Protected Sites 23

4.3.5 Invasive non-native species (INNS) 24

5. In-combination Effects Assessment 27

6. Summary 29

7. References 30

Appendix I Scoping Template 32

Appendix II Biosecurity Plan 37

Appendix III Cefas Action Levels and Sediment Contaminant Data 38

List of Figures

Figure 1: Location of the proposed works within the Severn Lower transitional water body 2
Figure 2: Footprint of the proposed work area. 8
Figure 4: WFD classification elements – Bringing all of the strands of evidence together 10
Figure 5: Classification hierarchy for surface waters. 11

List of Tables

Table 1. Cycle 3 classifications for the Severn Lower water body. 13

Table 2 Proposed vessels to be used during construction 24

Table 3 Plans, projects or strategies to be assessed in-combination 29

Executive Summary

The replacement of an effluent pipe and sea outfall at Newport, South Wales has been proposed. The pipe crosses the intertidal zone and discharges below mean low water spring. The works involve the excavation of a trench adjacent to the existing pipeline in which the new pipe will be installed. The existing pipe will be decommissioned and an above ground section of pipe and associated rock armour will be removed.

The works are within the Severn Lower Water Framework Directive (WFD) transitional water body (ID: GB530905415401).

This WFD Assessment report is required to determine if the proposed works could affect the current status / potential (or future objective status / potential) of relevant WFD supporting elements in the Severn Lower WFD water body.

The assessment considered the biological, hydromorphological and chemical quality elements potentially affected by all aspects of the proposed works and has been conducted following the Environment Agency's 'Clearing the Waters for All' guidance, which was developed specifically to assess the effects of activities in transitional and coastal waters in relation to WFD targets.

The assessment approach is based on the following three stages: Screening, Scoping and Impact Assessment. Screening determined that the proposed activities were not classed as low risk activities and as such the assessment proceeded to the Scoping stage. At the Scoping stage the receptors Hydromorphology, Biology – Lower sensitivity habitats (intertidal soft sediments) and Water Quality (in terms of phytoplankton, harmful algae, and release of chemicals to a mixing zone) were scoped out from further assessment following criteria in the 'Clearing the Waters for All' guidance.

The receptors taken forward to the Impact Assessment stage were Biology – Higher sensitivity habitats (saltmarsh); Biology - Fish, Water Quality (physico-chemical parameters, chemicals on the Environmental Quality Standards Directive (EQSD), and chemicals above CEFAS Action Level 1); WFD protected areas; and Invasive non-native species. For these receptors, available evidence was assessed to determine if there could be any effects of the works on the status and potential of the Severn Lower WFD water body.

Various work design measures and mitigation measures to lower the risk of adverse effects were considered in the assessment. This included the implementation of a Construction Environmental Management Plan (CEMP) to include a range of measures to minimise the chances of accidental pollution from spillage of chemicals and the implementation of a Biosecurity Plan to reduce the potential for the introduction or spread of invasive non-native species. The design of the works has also been optimised to avoid any interaction with the higher sensitivity saltmarsh habitat present at the site.

Overall, the assessment concluded that the proposed works (either alone or in-combination with other projects/plans) will produce negligible effects on the biological, hydromorphological and chemical quality elements of the Severn Lower WFD water body. It is not expected that

the works would cause deterioration in the WFD status / potential of any of the receptors and the attainment of the water body's target status / potential would not be put at risk.

1. Background Information for the Proposed Works

1.1 Introduction to the WFD assessment

A pipeline, approximately 1,360 m long, is currently in place to safely discharge effluent from Eastman Chemicals in Newport, South Wales, into the Severn Estuary and it has reached the end of its operational lifecycle. The pipeline crosses the intertidal zone and discharges below mean low water spring (MLWS). To continue to safely discharge effluent into the Severn Estuary the current pipeline needs to be replaced to reduce risks associated with the structure's integrity and to reduce the likelihood of any future leaks. Therefore, Solutia UK propose to replace the current effluent pipeline and sea outfall to ensure that effluent continues to discharge safely into the estuary. The decommissioning and removal of part of the existing pipe will be undertaken during the same period as the installation of the new pipe.

Kaymac Marine & Civil Engineering Ltd. (hereafter referred to as Kaymac) have been commissioned by Solutia UK to carry out the pipeline and sea outfall replacement works, which will involve the installation of the new effluent pipe adjacent to the existing pipe.

The works are within the Severn Lower Water Framework Directive (WFD) transitional water body (ID: GB530905415401).

This Water Framework Directive (WFD) Assessment Report has been provided to support the Band 3 marine licence application for the works and is required to determine if the proposed works could affect the current status / potential (or future status / potential) of associated WFD supporting elements in the Severn Lower water body.

1.2 Location and context

The location of the proposed works within the Severn Lower water body is indicated in Figure 1 below.

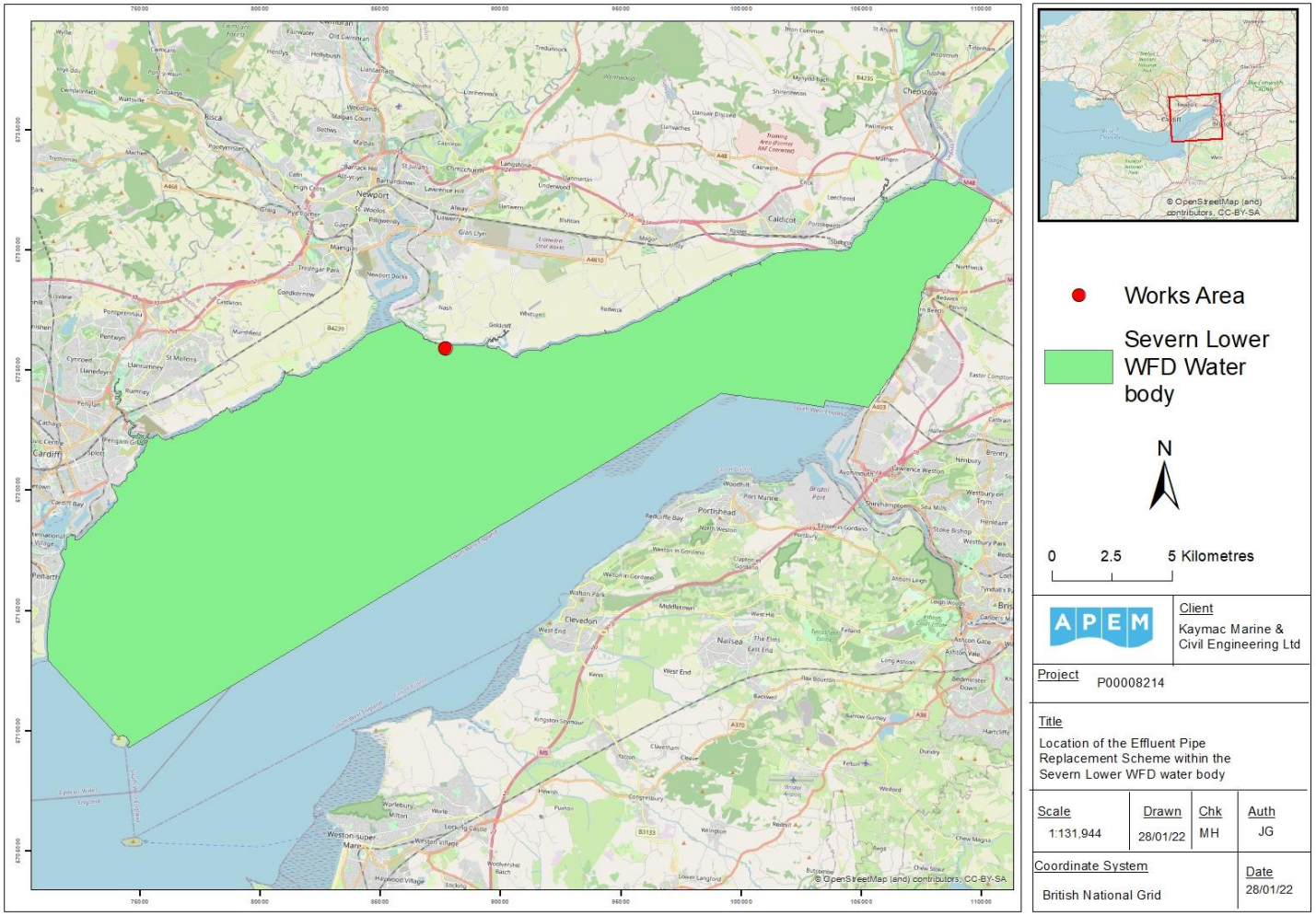

Figure 1: Location of the proposed works within the Severn Lower transitional water body

1.3 WFD assessment objectives

The objective of this assessment is to consider the available data for WFD supporting elements in the Severn Lower water body in accordance with the Environment Agency's (EA) 'Clearing the Waters for All' guidance (EA 2017), and in this context, consider the potential effects of the proposed works on the status / potential of the following WFD parameters:

- Ecological potential:
  - Biological supporting elements
  - Physicochemical supporting elements (and Specific Pollutants[1])
  - Hydromorphological considerations
- Chemical status:
  - Priority Substances[1]
  - Other Pollutants[1]
  - Priority hazardous substances[1]

1.4 Summary of the Proposed Works

A full description of the activities and methods associated with the proposed works is provided in Kaymac's method statements (2023). A summary of key aspects of relevance to this assessment is provided below.

The proposed works involve the installation of the new effluent pipe adjacent to the existing pipe and outfall. The works will be contained within a footprint of approximately 1,290 m by 100 m (0.129 km^2) (Figure 2) and involve activities in both the intertidal and subtidal zones. The volume of excavated material will total circa 7,057 m^3. The works also involve the decommissioning and removal of the existing pipe where it lies above ground and removal of the associated rock armour that protects the pipe along this section.

The proposed works can be defined under three main activities:

- Outfall Installation – offshore phase;
- Outfall Installation – intertidal zone; and
- Removal of existing outfall pipe and stone causeway

The primary plant required for the works are:

- Backhoe dredger or excavator on barge – offshore trench excavation;
- Landing craft;
- 1 x Crane barge;

[1] Limited to chemicals on Environmental Quality Standards Directive (EQSD) list for WFD (as provided in EA 2017). Environmental thresholds are summarised in Defra (2015).

- 2 x Multicats (for manoeuvring barge above);
- 2 x Smaller support/crew boats;
- 2 x general support (RIB & Dory)
- 1 x 15t 360˚ tracked amphibious excavator with Bio Oil and digging bucket;
- 1 x 18t 360˚ tracked amphibious excavator with Bio Oil and digging bucket;
- Suitably sized wheeled dumper;
- Emergency stretcher for recovery to Boat Road;
- GPS and surveying equipment;
- Surface supplied diving equipment;
- Fuel bowser;
- Navi mats;
- Small hand tools (i.e., shovels etc.); and
- Cat and Genny

The excavation of the trench works will largely be undertaken on the flood tide by an excavator mounted on the floating barge, which will be maintained in position by the vessels' spud legs. Approximately 900 m of the trench will be excavated in this way with the remainder of the trench in the upper intertidal excavated in the dry using amphibious excavators.

*1.4.1 Outfall **i**nstallation – **o**ffshore **p**hase*

Excavation of trench

The 'Offshore Phase' relates to the section of pipe that lies beneath MLWS. The discharge point within the Estuary is at chainage 1470 m and the pipe becomes visible above the seabed at chainage 567 m. The floating plant (e.g. a backhoe dredger or an excavator on a barge) will be used to excavate a trench, adjacent to the existing outfall pipe in which the new pipe will be laid. Precast concrete mattresses will be lowered from a crane barge over the new pipe for protection and to prevent future movement. The trench throughout this section will be approximately 900 m in length with a depth of approximately 1.5 m.

If the water level at low tide is higher than the existing pipe at the corresponding chainage (i.e., the pipe is fully submerged) the marine vessel will be positioned above the trench in a suitable position to enable the excavator onboard to reach and dig the trench. Onboard GPS and surveying equipment will be utilised to accurately determine the position, line, and level of the trench from the water's surface. A Backhoe dredger may be used instead or in conjunction with the excavator and barge, this will be confirmed after contract award and prior to commencement on site. The trench will be excavated ensuring all sides are battered back to a suitable angle of repose to prevent collapse and to prevent any material from falling back into the trench. All excavated bed material will be side-cast adjacent to the trench.

It is estimated that the lowest 900 m of the trench, from approximately chainage 1,470 m to chainage 570 m, will be excavated on the flood tide. The trench will be excavated to a depth of approximately 1.5 m with a cross section of circa 5.4 m^2. As such, if circa 900 m of the trench is excavated on the flood tide, the total volume of excavated material in this area will be circa 4,860 m^3.

1.4.2 Outfall installation – intertidal zone

Excavation of trench

The primary activity of the intertidal works is the excavation of the trench for the new pipe. The trench will be adjacent to the existing pipe, offset by circa 10 m and will be excavated in 150 m sections.

This section is within the intertidal zone between chainages 567m and 176m. This beach area will dry out during low water periods and will be accessible by landing craft. This section can be excavated either from the floating plant during high water periods or from the beach using amphibious plant during low water periods. A combination of the two will be used to maximise the working windows. The pipe will be laid within the trench and will be covered with precast concrete mattresses for protection.

If the water level at low tide is lower than the existing pipe at the corresponding chainage (i.e., the pipe is dry), the landing craft will ground itself within the vicinity of the new pipe, with the first section of the new pipe being placed at chainage 176 m. The marine plant will position itself to maximise the working window before the tide comes back in. The plant and equipment will be checked for any leaks before any items are tracked off the landing craft and onto the beach. In a methodical manner, the trench will be excavated ensuring all sides are battered back to a suitable angle of repose to prevent collapse and to prevent any material from falling back into the trench. All excavated bed material will be side-cast adjacent to the trench. Side-casting the material will also provide a more efficient backfilling process later, by reducing the requirement to transport material to and from site. The trench excavation and the subsequent pipe installation will not be completed during one low water period, therefore, an element of re-work of the trench will need to be carried out prior to works commencing on the following low water period.

The trench in the upper intertidal zone is expected to be excavated during an ebb tide. In this case, the excavator will be delivered to the beach by the landing craft and excavation will occur in the dry. The landing craft will deliver plant to site and land as high up the beach as possible to maximise the available working window as the tide falls.

The trench in this area will be excavated along a length of 460 m and to a depth of approximately 1.5 m with a cross section of circa 5.4 m^2. The total volume of excavated material in the upper intertidal area will be circa 2,484 m^3. The excavated material will be side-cast and later used to backfill the trench.

1.4.3 Pipe laying and installation of outfall

The pipe sections will be transported to site by the landing craft. The pipe laying technique will depend on the state of tide and the tidal level at the time the pipe is ready to be laid. It will either be sunk into the trench with the falling tide, or the sinking valve will be opened, and the pipe allowed to fill with water to aid sinking into position. The outfall section at the terminus of the pipe will be lowered from the landing craft using the excavator and installed by a dive team.

Once a 125 m section of the trench is prepared and the line and level has been checked by the Site Manager/Engineer, the first 125 m length of pipe will be pulled into position by a marine vessel during a high tide. The weather forecast will be frequently monitored prior to transportation to ensure the pipe is only transported during calm weather. The pipe will be towed into position specifically during a rising tide to ensure that the maximum amount of time is available to position and secure the pipe above the trench prior to submerging.

The planned 'sinking route' will be marked clearly with floating buoys to the surface to ensure the pipe is placed accurately. A line of ten temporary timber piles (approximately 300 mm diameter) will be driven to a depth of approximately 3 m parallel to the trench, over 250 m at a time, at 25 m centres with the amphibious excavator. These are to assist with locating the pipe during the submerging process and will be removed when the pipe has been located within the trench.

Three temporary cylindrical pin piles (approximately 300 mm diameter, hollow steel piles) will be driven approximately 5 m into the seabed at strategic positions along the length of the proposed pipeline. These will anchor the landward end of the pipe in position while the workboat will anchor the seaward end via a winch cable. During the sinking procedure, the cable will be made taught to offer sufficient tension to maintain the position of the pipe.

The geotechnical survey undertaken in 2022 indicated soft sediment at the site. As such, both timber and steel piles will be pushed into the sediment using the amphibious excavator. There will be no requirement for percussive piling methods. Pin piles will be pushed to a depth of approximately 5 m and timber piles to a depth of approximately 3 m. The steel pin piles will be installed in the intertidal zone in the dry (when the tide is out). The timber piles will be installed during both low and high tide periods as required.

The workboat supervisor will assess the weather forecast and make the decision as to whether it is safe to begin the sinking procedure. There should be minimal wind and waves during this process. The pipeline will be positioned to follow the correct route by the supporting vessels on site. The 'landward' end will be connected to the excavator via a suitably tested and certified winch line. The 'seaward' end will then be attached to the winch on-board the workboat, to offer the necessary 'pulling force' required during the sinking process.

Divers will enter the water to open the inlet and outlet valves to the sinking lid on the 'seaward' end, which will allow the pipe to be sank in accordance with the manufacturer's sinking procedure. The inlet valve will be used to flood the pipe with water, whilst the outlet valve will allow air to escape to the surface via a suitable length of hosing, when required. The sinking process will be carried out following the manufacturer's recommended procedure.

On completion of the submerging process, divers will be deployed to check that the pipe is located within the trench in accordance with the contract drawings. If the pipe is out of line, then the excavator on board the floating plant will be able to adjust the position accordingly prior to placing the concrete mattresses over the top.

This process will be repeated until all the lengths of pipe have been installed.

1.4.4 Laying of concrete mattresses and backfilling

Once in the trench, the pipe sections will be maintained in position using concrete mattresses, which will run the length of the pipe. Once the pipe is in position the concrete mattresses will be placed on top of the pipe using the excavator. Once the mattresses are in position, the trench will be backfilled using the side-cast material.

Due to the required slope of the pipe, some matressing will remain above surface level for a length of 76.4 m and a width of 3 m (total area of 229.2 m^2). In addition, there will also be an area of 853.8 m^2 (284.6 m length x 3 m width) where the backfilled sediment will not reach a depth of at least 300 mm above the matressing.

*1.4.5 Removal of **e**xisting **o**utfall **p**ipe and **s**tone **c**auseway*

To mitigate benthic habitat loss, which may occur due to the installation of the new pipeline, the redundant pipeline and stone causeway will be removed to allow the habitat to return to its natural state. Therefore, on completion of the outfall replacement works, the redundant exposed section of the outfall in the intertidal zone between chainage 184m and 554m will be removed.

To negate the need to have plant tracking across the intertidal zone, all decommissioning works will be undertaken from the landing craft, materials handling barge and the stone causeway. The landing craft will beach perpendicular to the causeway with navi mats placed between the bow door and the stone causeway to allow the dumper to access the causeway without tracking across the intertidal zone. The pipe, rock and concrete mattresses will be removed by an amphibious excavator operating from the landing craft or from the causeway.

The dumper will transport the removed material to the top of the causeway, where it will be placed into a materials handling barge by a second excavator. This process will be repeated until such time as the tide comes back in, or the barge is full. It is assumed that an average of approximately 20 meters of the causeway will be removed each day between tides and that the surface of the beach underneath the causeway should be regraded and levelled to match the surrounding landscape prior to leaving every day.

The total length of pipe to be removed is 370 m. The area of associated rock armour and matressing to be removed is 370 m in length and 3.75 m in width. As such, the total area of existing pipe and rock armour to be removed is 1,387.5 m^2.

Figure 2: Footprint of the proposed work area (Image supplied by Kaymac Marine & Civil Engineering Ltd).

2. Water Framework Directive requirements

2.1 Water Framework Directive

2.1.1 Overview

The WFD establishes a framework for the management and protection of Europe's water resources. It is implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the Water Framework Regulations)[2]. Central to the WFD is the philosophy to make water bodies better through sustainable development for the joint benefits of aquatic habitats and the human environment.

Ecological status is an expression of the quality of the structure and functioning of surface water ecosystems as indicated by the condition of a number of 'quality elements'. These include biological and chemical indicators. Where a water body is defined as a Heavily Modified Water Body (HMWB), ecological status is replaced by ecological potential.

The development and implementation of strategic long-term River Basin Management Plans (RBMPs) is a key requirement of the WFD. They include a programme of measures outlining the on-going monitoring and management actions required for water bodies to achieve future objectives.

Proposed developments or activities that have the potential to affect the water environment require a WFD Assessment. In this context, compliance with the WFD means prevention of deterioration (of ecological status, chemical status and supporting element status) and avoiding prevention of ability to achieve future targets. However, WFD Article 4.7 provides legislation for exemption conditions that could allow implementation of schemes that cause deterioration in ecological status, for example for reasons of overriding public interest.

The subsequent Priority Substances Directive to the WFD sets out Environmental Quality Standards (EQSs; 2008/105/EC) for priority substances which is known as the EQS Directive and there have been subsequent amendments (2013/39/EU; Defra, 2015 and EA, 2015). The environmental objectives of the WFD and its associated directives include the following:

- to prevent deterioration of aquatic ecosystems;
- to protect, enhance and restore water bodies to 'good' status; based on ecology (with its supporting hydromorphological and physico-chemical factors) and chemical factors for surface waters; and
- to progressively reduce pollution from priority substances and cease or phase out discharges of priority hazardous substances.

The default objective of the WFD is for all rivers, lakes, estuaries, groundwater and coastal water bodies to achieve 'good' status by 2027 at the latest. Where it is not possible to achieve

[2] At this stage, following Brexit, existing EU environmental legislation will continue to operate under the policy of "roll-over", however, decisions made by the EU will no longer be binding for courts in the UK.

this, alternative objectives can be set. The existing status, and measures required to achieve the 2027 status objective are set out for each water body in the relevant RBMPs. The plans set out the current baseline condition of the water environment at the time of publication and provide details on the measures needed and timescales required to attain their target status.

For the following surface water bodies: rivers, lakes, estuaries and coastal waters, the overall water body status has both an ecological and a chemical component. Good 'ecological status' is defined as a 'slight variation from undisturbed natural conditions, with minimal distortion arising from human activity'. The ecological status of water bodies is determined by examining biological elements (e.g. fish, invertebrates, plants) and a number of supporting elements and conditions, including physico-chemical (e.g. metals and organic compounds), and hydromorphological (e.g. depth, width, flow, and 'structure') factors.

A flow chart illustrating how quality elements are combined (Cycle 2) to provide an overall water body status/potential is provided in Figure 3. The classification hierarchy for surface waters (for Cycle 2) is illustrated in Figure 4. Only biological supporting elements have classification boundaries defined for 'high' through to 'bad' (Figure 3). Chemicals supporting 'chemical status' that do not meet EQS concentrations are classified as 'Failing to achieve Good' (Figure 3).

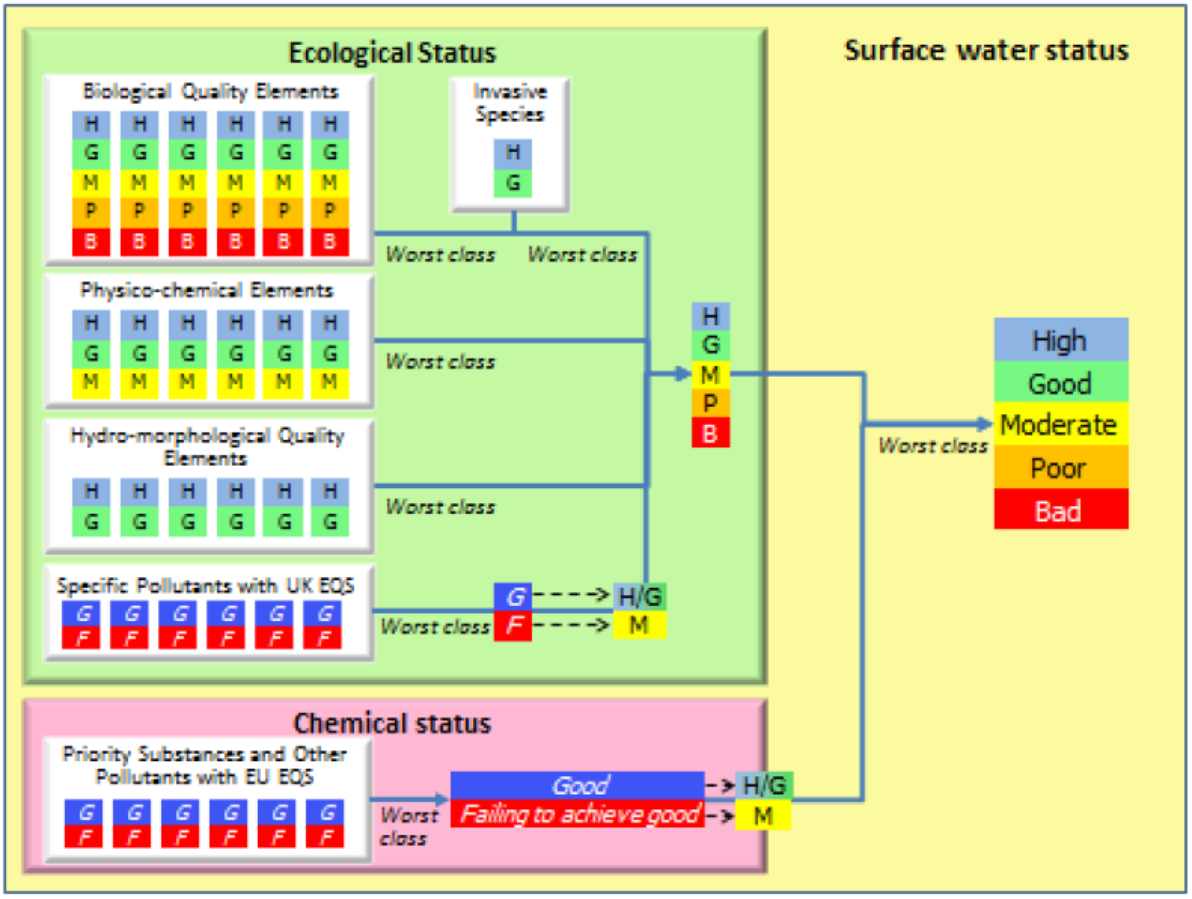

Figure 3: WFD classification elements – Bringing all of the strands of evidence together (Environment Agency 2015).

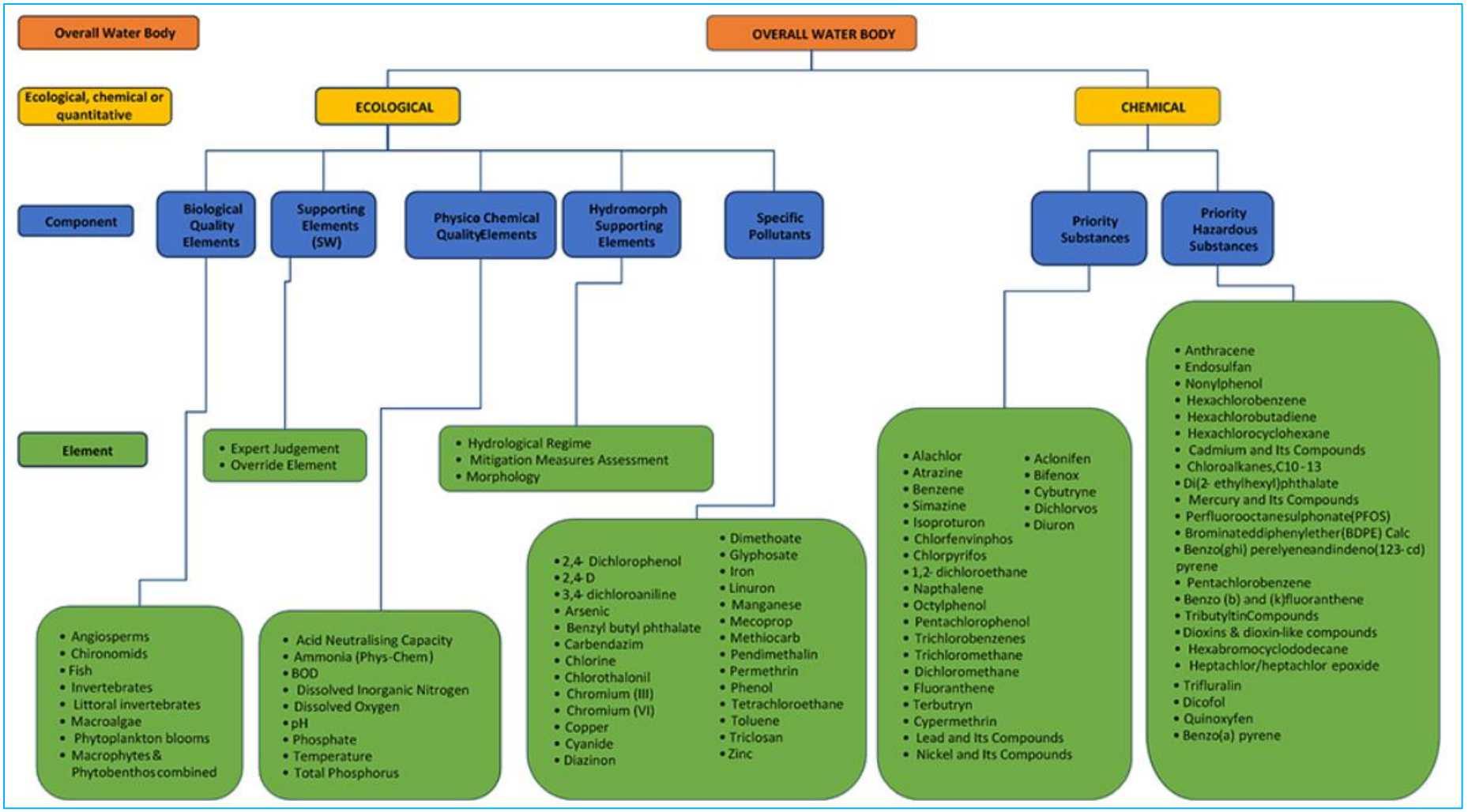

Figure 4: Classification hierarchy for surface waters (extracted from Environment Agency 2018).

2.1.2 Transitional Water Bodies

Transitional water bodies include bodies of surface water in the vicinity of river mouths that typically correspond (in the UK) to estuaries. Therefore, they are influenced by tides and are characterised both by saline water due to their proximity to coastal waters and by freshwater due to inputs of river flows. The proposed works are situated within the Severn Lower WFD transitional water body.

The WFD classification elements for transitional WFD water bodies such as the Severn Lower water body are as follows:

- Hydromorphological:
    - tidal regime:
        - freshwater flow; and
        - wave exposure.
    - morphological conditions:
        - depth variation;
        - quantity, structure and substrate of the bed; and
        - structure of the intertidal zone.
- Biological:
    - phytoplankton;
    - other aquatic flora;
    - benthic invertebrates; and
    - fish.
- Physico-chemical and chemical:
    - transparency;
    - thermal conditions;
    - dissolved oxygen;
    - nutrients;
    - salinity; and
    - pollution by substances being discharged (e.g. chemicals, metals, pesticides).

2.1.3 Severn Lower Current WFD Status

The Severn Lower transitional water body is designated as a Heavily Modified Water Body (HMWB) for 'flood protection'. Where a water body is defined as a HMWB, the term 'ecological status' (combination of multiple biological, physical and some chemical supporting elements) is replaced by 'ecological potential'. The term 'chemical status' (combination of other chemical supporting elements), however, remains unchanged when considering HMWBs. Table 1 shows the current status of the Severn Lower water body based on Cycle 3 (2021) classification data.

Table 1. Cycle 3 classifications for the Severn Lower water body.

Parameter		Year
		2021
Water Body Name		**Severn Lower**
Water Body ID		**GB530905415401**
Water Body Area		**46,597 ha**
Water Body Type		**Transitional Water**
Hydromorphological designation		**Heavily Modified**
Overall Potential		**Moderate**
Chemical Status		**Moderate**
Priority Substances		**High**
Priority Hazardous Substances		**Moderate**
Ecological Potential		**Moderate**
Biological Quality Elements	Angiosperms	**Moderate**
	Fish	**Good**
	Invertebrates	**Moderate**
	Macroalgae	**Not assessed**
	Phytoplankton	**Good**
Physico-chemical Quality Elements	Dissolved Inorganic Nitrogen	**Good**
	Dissolved Oxygen	**High**
Specific Pollutants	Various	**High**

3. Methods

The assessment followed the EA's 'Clearing the Waters for All' guidance (EA 2017), which was developed specifically to assess the effects of activities in transitional and coastal waters in relation to WFD targets. The assessment approach is based on the following three stages:

- Screening;
- Scoping; and
- Assessment.

3.1 Screening

The screening stage is used to determine if the activities for the proposed works are classed as low risk activities. The EA guidance (EA 2017) identifies the following activities to qualify as low risk activities:

- a self-service marine licence activity or an accelerated marine licence activity that meets specific conditions;
- Maintaining pumps at pumping stations;
- Removing blockages or obstacles like litter or debris within 10 m of an existing structure to maintain flow;
- Replacing or removing existing pipes, cables or services crossing over a water body – but not including any new structure or supports, or new bed or bank reinforcement; and
- 'Over water' replacement or repairs to, for example, bridge, pier and jetty surfaces, if you minimise bank or bed disturbance.

Where the proposed works do not fulfil criteria for a low risk activity, the assessment continues to the scoping stage.

3.2 Scoping

The scoping stage is used to determine if the proposed activities pose potential risks to the following receptors based on the quality elements of the water body of concern. The EA guidance (EA 2017) specifies consideration of the following quality elements for transitional water bodies such as the Severn Lower water body:

- Hydromorphology;
- Biology – habitats;
- Biology – fish;
- Water quality;
- Protected areas; and
- Invasive non-native species (INNS)

Scoping for transitional water bodies has been undertaken by using the scoping template provided in the EA guidance (EA 2017). The scoping template identifies a range of criteria

against which proposed activities can be considered to determine whether they pose potential risks to receptors and, therefore, whether there is a requirement to carry out an impact assessment on those receptors.

3.3 Impact Assessment

The impact assessment stage involves determination of the potential impacts of the proposed activities on the specific parameters that are taken forward from scoping (EA 2017).

The assessment involves consideration of whether the proposed activities will have a non-temporary impact on status / potential of WFD quality elements in the Severn Lower water body (i.e. cause deterioration or compromise the achievement of measures set out in the Severn River Basin District RBMP programme of measures and therefore future objective status / potential) (EA 2015). The scope of the assessment was determined following the steps in the impact assessment section of EA (2017).

The WFD assessment has also followed principles of EIA guidance where applicable in that the following aspects have been considered when assessing the potential for a change in WFD status / potential due to impacts on WFD quality elements (CIEEM 2018). Although these aspects have been considered, they are not necessarily referred to directly in the assessment text:

- Nature of effect i.e. beneficial / adverse; direct / indirect;
- Extent of the effect (geographical area e.g. site-wide, local, district, regional and the size of the population affected);
- Likelihood of effect occurring;
- Value and sensitivity of receptor;
- Magnitude of effect;
- Duration:
    - Temporary or permanent effect. If the effect occurs on all of, or a proportion of, a community / population on a continual basis it can be considered to be permanent (e.g. a continual cooling water discharge). If it is not on a continual basis when considering the community / assemblage / population or habitat level it can be described as temporary.

If it were considered that the activity would not affect the potential / status of a given WFD receptor (taking account of any embedded mitigation measures) then no further evaluation or mitigation was required for the WFD assessment for that receptor (WFD supporting element).

If potential adverse effects were identified, then the next step was to identify suitable mitigation measures to address the potential effect (EA 2017).

4. WFD Assessment

4.1 Screening

The proposed activities were compared to the list of low risk activities identified under the EA guidance (EA 2017) and in consultation with NRW it was concluded that they do not qualify as low risk activities and, accordingly, they were taken forward to the scoping stage.

4.2 Scoping

For the Severn Lower water body, the proposed works were scoped for potential risks to hydromorphological, biological (habitats and fish), water quality, protected areas and INNS receptors using the Scoping Templates provided in the EA guidance (EA 2017). The completed scoping templates are presented in this document in Appendix 1 and the findings of the scoping summarised below.

The following receptors were scoped into the requirement for more detailed assessment of the potential effects of the proposed works:

- Biology – Habitats (higher sensitivity):
  - The Lle Geo-Portal for Wales (Lle 2022) and works information and method statements indicate that the works are within 500 m of saltmarsh habitat.

- Biology – Fish:
  - The potential release of contaminants due to accidental spills such as fuel could have an ecotoxicological effect on fish.

  - The potential release of contaminants from the sediment during excavation of the trench could have an ecotoxicological effect on fish.

- Water Quality:
  - The potential to ‘affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)’ has been scoped in taking a precautionary approach. There is potential for water clarity to be affected during the trench excavation works.

  - Potential to release chemicals on the Environmental Quality Standards Directive (EQSD) list. The only potential for release of EQSD list chemicals would be through the accidental release of fuel from the marine vessels or plant.

  - Potential to release chemicals above CEFAS Action Level 1 due to sediment disturbance during excavation of the trenches.

- WFD Protected Areas:
  - Proposed activities are within the Severn Estuary / Môr Hafren Special Area of Conservation (SAC) and the Severn Estuary / Môr Hafren Special Protection Area (SPA).

- Invasive non-native species:
  - Potential introduction or spread of INNS via the movements of marine vessels.

The following receptors were scoped out of the requirement for more detailed assessment for the proposed works (see Appendix 1):

- Hydromorphology:
  - Hydromorphology was scoped out of further assessment because the works are small-scale and temporary and do not have the potential to impact on the hydromorphology of the water body. In addition, the works are not related to flood defence for which the water body is classified as heavily modified and as such further assessment is not triggered via this route.

- Biology – Habitats (lower sensitivity):
  - Lower sensitivity habitats were scoped out of further assessment as the footprint of the works within lower sensitivity habitats (intertidal soft sediments) constitutes less than 1% of the extent of this habitat within the Severn Lower water body (actual percentage is approximately 0.04% of this habitat).

- Water Quality:
  - Phytoplankton is only scoped into further assessment if it has a status of Moderate, Poor or Bad in the WFD water body of interest (see Section 3 of the Scoping Templates in Appendix 1). In the Severn Lower water body it is classed as 'Good' so Phytoplankton was scoped out of further assessment.

  - Harmful algae was scoped out as there is no history of harmful algae in the Severn Lower water body (not monitored).

  - Release of chemicals in a mixing zone was scoped out as although the project includes a mixing zone (outfall discharge), there will be no change to the nature or volume of the current licensed discharge. The only change will be that the current effluent will be discharged from the new pipe and outfall. As such, this has been scoped out of further assessment.

4.3 Impact Assessment

4.3.1 Biology – Habitats (higher sensitivity: Saltmarsh)

Saltmarsh is considered as part of the Angiosperm WFD biological quality element. The current potential for Angiosperms in general, and for saltmarsh specifically, in the Severn Lower water body is Moderate potential (Cycle 3 2021 classification), with a target of Moderate potential for 2027.

The reason for inclusion of higher sensitivity habitats in the impact assessment as outlined in the Scoping Template in Appendix I is that the proposed activities:

- Are within 500 m of the higher sensitivity habitat saltmarsh.

The Lle Geo-Portal for Wales (Lle 2022) shows an area of saltmarsh in the upper intertidal zone extending from Goldcliff, to the east of the site, to the mouth of the River Usk to the west. The northern boundary of the site works area is located within approximately 30 m of this saltmarsh habitat (Figure 2).

Assessment

While the works area boundary is within approximately 30 m of the saltmarsh in the upper intertidal zone, there will be no requirement for works, plant or personnel to be any closer to the saltmarsh than this. The execution of the proposed works has been planned to specifically avoid any interaction with the saltmarsh habitat. Construction plant and personnel will be transported to site on a landing craft that will beach lower down the shore, or via the access roads north of the sea defence wall. This means no access will be required across the saltmarsh in the upper intertidal zone.

The decommissioning and removal of a section of the existing pipe and rock armour will not impact the saltmarsh and no access to the saltmarsh will be required for this phase.

As such, there is no pathway for effects on the saltmarsh and there will be no physical disturbance of the saltmarsh or loss of saltmarsh habitat. Overall, it is concluded that there are not expected to be any effects on the saltmarsh quality element at a local or water body level and the proposed works would not prevent the Severn Lower transitional water body from meeting its WFD objectives for saltmarsh (angiosperms).

4.3.2 Biology - Fish

Release of chemicals

No direct use of chemicals is required as part of the proposed works. Possible routes of release of chemicals include:

- accidental release / spillages of fuels and oils from marine vessels and site plant (excavator and dumper); and
- release of chemicals from the sediment during excavation of the trench.

The potential release of chemicals through these sources could result in ecotoxicological effects on fish that are passing through a contaminated area.

Similarly, the release of contaminants from the sediment during excavation could result in ecotoxicological effects on fish in high enough concentrations.

Assessment

Section 4.3.3 below details the measures that will be implemented to reduce the risk of pollution events from accidental spillages. The implementation of these measures ensures the risk of effects on water quality, and the potential for subsequent effects on fish, from the accidental release of chemicals is considered to be negligible.

Similarly, the sediment contamination data have shown that the risk of effects to water quality from resuspended contaminants, and subsequently to fish, is also negligible (Section 4.3.3) The low contamination concentrations along with the potential for resuspended contaminants to be quickly diluted and dispersed by tides and currents means that increased bioavailability resulting in adverse ecotoxicological effects are not expected, especially given the highly mobile nature of fish enabling them to avoid the area of the works if required.

The transitional fish classification index used to calculate the status of the fish quality element in WFD water bodies is based on the following list of metrics (WFD-UKTAG 2014), none of which would be affected by the proposed works:

- species composition;
- presence of indicator species;
- species relative abundance;
- number of taxa that make up 90% of the abundance;
- number of estuarine resident taxa;
- number of estuarine-dependent marine taxa;
- functional guild composition;
- number of benthic invertebrate feeding taxa;
- number of piscivorous taxa; and
- feeding guild composition.

As such, it is concluded that there are not expected to be any effects on the fish quality element at a local or water body level and the proposed works would not prevent the Severn Lower transitional water body from meeting its WFD objectives for fish.

4.3.3 Water Quality

Effect on physico-chemical parameters

The scoping assessment considered whether the works could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days). Some of these physico-chemical parameters could be affected during the trench excavation works, which are scheduled to last approximately 38 days. As such, following the precautionary principle, this potential impact was scoped into further assessment.

Assessment

The lower 900 m of the trench will be excavated on the flood tide with the excavator mounted on the floating barge. The remaining circa 390 m of trench in the upper intertidal will be

excavated in the dry. During excavation on the flood tide there is the potential for a localised increase in suspended sediment and associated reduction in water clarity. The disturbance of sediment during excavation may also release nutrients into the water column. Excavated sediment will be side-cast adjacent to the trench and may remain there for up to three days before being used to backfill the trench once the pipe is installed. During this time, tidal movements may also mobilise some of this sediment and cause a localised reduction in water clarity.

Temporary timber piles (approximately 300 mm diameter) will be pushed into the sediment to a depth of approximately 3 m parallel to the trench, over 250 m at a time, at 25 m centres with an amphibious excavator. Timber piles will be installed during both high and low tides. Three temporary cylindrical pin piles (approximately 300 mm diameter, hollow steel piles) will be pushed approximately 5 m into the seabed in the intertidal zone. These will be installed in the dry (during low tide). The installation and subsequent removal of the temporary timber piles may cause slight temporary and localised increases in suspended sediment, but this would not be expected to be significantly different to background concentrations.

Given the total volume of sediment to be excavated, and the fact the trench will be excavated in 150 m sections, any increase in suspended sediment concentrations will be highly localised, temporary and likely to quickly return to the normal background range experienced at this location. In addition, any suspended sediment in the water column will be rapidly diluted and dispersed by tidal movements. Any increase in nutrient concentrations would also be localised and temporary and subject to extensive tidal dilution in the water column. The risk of effects on the Severn Lower water body from an increase in suspended sediment concentrations and a potential release of nutrients is considered to be negligible.

Consequently, it is concluded that there are not expected to be any non-temporary effects on the water quality element in terms of effects on physico-chemical parameters at the local or water body level, and the proposed works would not prevent the Severn Lower transitional water body from meeting its WFD objectives for chemical status.

Release of chemicals

No direct use of chemicals is required as part of the proposed works. Possible routes of release of chemicals include:

- accidental release / spillages of fuels and oils from marine vessels and site plant (excavator and dumper); and
- release of chemicals from the sediment during excavation of the trench.

Assessment

The proposed excavation works will be undertaken by the excavator in the intertidal zone at low tide and from the floating barge when the tide is in flood and the current work section is covered by seawater. As such, any spillages or accidental release of chemicals have the potential to be direct to the water body.

Various measures will be implemented to prevent accidental spillages from plant and the marine vessels used in construction and will be captured in a Construction Environmental Management Plan (CEMP) for the works. Examples of measures include:

- Any plant delivered to site will have been cleaned, properly maintained and will be fit for purpose;
- On arrival at site, the Kaymac Supervisor will inspect all plant for visible signs of fuel / oil leaks before disembarkation from the landing craft;
- All plant will come equipped with spill kits which all site personnel will be trained in the use of;
- All plant / equipment will be appropriately bunded to prevent the release of any accidental spillages;
- No refuelling of plant or marine vessels will be undertaken at sea. All refuelling will take place at the satellite compound at Newport ABP;
- Only biodegradable oils will be used; and
- Best practice guidance will be followed (Guidance for Pollution Prevention 5 – Works and maintenance in or near water).

Given the nature of the works and the above measures to minimise the release of any chemicals from construction plant, the risk of effects on the Severn Lower water body from the accidental release of chemicals is considered to be very small.

During excavation of the trench there is the potential for chemicals in the sediment to be disturbed and released. The lower 900 m of the trench will be excavated on the flood tide with the excavator mounted on the floating barge. The remaining circa 460 m of trench in the upper intertidal will be excavated in the dry. The excavated sediment will be temporarily stored adjacent to the section of trench being excavated for ease of backfilling once the pipeline has been installed.

The trench will be excavated in 150 m sections. The excavation, pipe laying and laying of concrete mattresses will take up to three days for each 150 m section. If the excavation is undertaken on the flood tide then there may be some release of any contaminants present within the sediment into the water column. Whether excavated on a flood tide or during low tide, the excavated sediment side-cast adjacent to the trench would be subject to tidal movements for up to three days, which has the potential to mobilise some of this material and any associated contaminants.

The total volume of sediment to be excavated is circa 7,057 m^3. There will be ten 150 m sections of trench excavated over a period of approximately 38 days.

At the request of NRW, Kaymac have collected six sediment samples from the intertidal zone along the line of the trench that will be excavated for the new pipe. These samples were analysed for the suite of contaminants listed by the Marine Management Organisation (MMO suite) that is commonly used to determine the suitability for dredged sediment to be disposed of at sea. The samples were analysed for the following contaminants:

- Trace metals (arsenic, mercury, cadmium, chromium, copper, nickel, lead, zinc);

- Organotins;
- Polychlorinated biphenyls (PCBs) sum of ICES 7;
- PCBs sum of 25 congeners;
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Dichlorodiphenyltrichlorethane (DDT); and
- Dieldrin.

Comparison of the data against Cefas Action Levels (AL) indicates some minor exceedances of AL 1, but no exceedances of AL 2 (where AL 2 thresholds exist), and a summary is provided below.

PAHs had the largest, albeit relatively minor, exceedances above the respective AL1 threshold (0.1 mg/kg), The analysis considered 22 PAHs with 17 of these found to exceed the AL1 threshold across all six samples. The largest exceedances were for fluoranthene which ranged between 0.37 – 0.48 mg/kg. There is no AL2 for PAHs.

For PCBs (ICES 7) the AL1 is 0.01 mg/kg. This was exceeded in five of the six samples with a maximum concentration of 0.023 mg/kg. There is no AL2 for the ICES 7 group of PCBs. For PCBs (sum of 25 congeners) the AL1 is 0.02 mg/kg. This was exceeded in five of the six samples with a maximum concentration of 0.056 mg/kg recorded. The AL2 for the group of 25 PCBs is 0.2 mg/kg so the maximum concentration recorded is an order of magnitude less than this level.

There were minor exceedances of AL1 in all six samples for the following: Nickel (AL1 = 20 mg/kg; max recorded concentration = 33.8 mg/kg), lead (AL1 = 50 mg/kg; max concentration = 61.3 mg/kg) and zinc (AL1 = 130 mg/kg; max concentration = 203 mg/kg) but they were all an order of magnitude less than the AL2 thresholds, with the exception of zinc which reach up to a quarter of the AL2 of 800 mg/kg.

Arsenic, cadmium, chromium, copper and mercury were all recorded in concentrations below their respective AL1 thresholds.

Similarly, organotins were also all under the AL1 threshold level (AL1 = 0.1 mg/kg; max concentration = <0.005 mg/kg). This was also the case for dieldrin, which was below AL1 (0.005 mg/kg) in all samples.

For DDT there were very minor exceedances in five of the six samples (AL1 = 0.001 mg/kg; max concentration recorded = 0.0015 mg/kg).

The sediment contamination data indicate that, where there are exceedances of AL1, these are only relatively minor and were generally an order of magnitude less than AL2 thresholds where these exist.

Any contaminants resuspended during the excavation works are likely to be rapidly diluted and dispersed with the tide and / or currents. In addition, under normal circumstances, the organic contaminants, such as PAHs, are most likely to remain strongly bound to the sediment with only small concentrations entering the dissolved phase. Metals are more likely to enter

the dissolved phase but given the very minor exceedances of AL1 for some metals and the potential for these to be quickly diluted and dispersed, it is considered that the sediment contamination at the site poses very little risk to water quality. Additionally, the proposed volume of excavated material is considered to be small, so the source of potential contaminants is considered to be limited.

Given the nature of the works, the low levels of contamination in the sediment and the relatively small volume of sediment to be excavated, the risk of effects on the Severn Lower water body from the resuspension of contaminants in the sediment is considered to be very small. Kaymac have also shared the sediment contamination data with NRW technical experts who have confirmed they have no concerns regarding contaminated sediment in the area.

Consequently, it is concluded that there are not expected to be any non-temporary effects on the water quality element in terms of release of chemicals or resuspension of contaminants at local or water body level, and the proposed works would not prevent the Severn Lower transitional water body from meeting its WFD objectives for chemical status.

4.3.4 Protected Sites

The works location is within the WFD protected areas Severn Estuary / Môr Hafren SAC and Severn Estuary / Môr Hafren SPA. A Habitats Regulations Assessment (HRA) Screening Report has been prepared by APEM (APEM 2023), which assessed the potential for the works to adversely impact these protected areas.

The following potential adverse effects were identified that could impact on species or habitats that are interest features of the designated sites:

- Above water noise;
- Abrasion / disturbance of the substrate on the surface of the seabed;
- Changes in suspended solids (water clarity)
- Habitat structure changes – removal of substratum (extraction);
- Penetration and / or disturbance of the substratum below the surface of the seabed, including abrasion;
- Physical loss;
- Smothering and siltation rate change (light);
- Visual disturbance;
- Underwater noise; and
- Introduction of light.

Screening of these potential effects, with consideration of sources, pathways and effects on receptors concluded that there was potential for likely significant effect (LSE) on the features of the protected sites due to the proposed works. As such, the HRA assessment was taken forward to Stage 2 – Appropriate Assessment. The appropriate assessment concluded there would be no adverse effects on site integrity (AEoI) with the implementation of appropriate mitigation measures.

Consequently, it is concluded that there are not expected to be any non-temporary effects on the Protected Sites at water body level, and the proposed works would not prevent the Severn Lower transitional water body from meeting its WFD objectives for Protected Sites.

4.3.5 Invasive non-native species (INNS)

Introduction and transfer of non-native species (NNS) can occur by the transport and discharge of ballast water, transport of fouling organisms on vessel hulls and via the installation of artificial structures (Nall 2017).

Once NNS become established and disperse within a new habitat they can outcompete local species for space and resources, prey directly on local species, or introduce pathogens (Roy *et al.* 2012). Consequently, the introduction of NNS could potentially affect the ecological functioning of estuarine communities, however, it is important to understand that the majority of non-native species are not 'invasive' non-native species (INNS) (i.e. a non-native species that has the ability to spread causing damage to the environment, the economy and our health (GBNNSS 2021)).

The proposed works involve the installation of a new effluent pipe and diffuser and removal of the existing pipeline. The new pipe will largely be buried in the intertidal zone so will not provide new structure that INNS can colonise. The diffuser will discharge the effluent in the lower intertidal zone. In this area, the outfall structure will not be buried so may provide a small amount of new surface area for the potential colonisation by INNS.

The main risk of introducing or spreading INNS during the works comes from the use of the marine vessels during construction of the new pipe and removal of the existing pipe. The following proposed vessels and their roles are detailed in Table 2 below.

Table 2 Proposed vessels to be used during construction

Proposed vessel	Home port	Role
MTS Terramare 1 – landing craft	Penzance, Cornwall	Delivery of plant, equipment and pipe sections from Newport ABP to project site
Doreen Dorward – floating barge	Poole, Dorset	Excavation of trench. Based at Newport ABP for duration of works
Wilcarry 1500 - Crane Barge	Milford Haven, Pembroke	Outfall installation – offshore phase. Diffuser installation, backfill and placement of concrete mattresses
2 x multicats – Willendeavour and Willsupply	Milford Haven, Pembroke	Vessel to assist in the positioning and manoeuvring of the crane barge
Heather D – fishing boat	Swansea Marina	General support
Sea Venture – work boat	Swansea Marina	General support

2 x tugboats	Norway	Deliver pipe sections from Norway to Newport ABP
2 x Kaymac owned dory	Kept out of water at Kaymac facilities	General support

INNS that can be transferred via hull fouling and which appear on the Welsh Government's Priority Species List as high and medium risk (Welsh Government 2018) include:

- Compass sea squirt *Asterocarpa humilis* – high risk
- Carpet sea squirt *Didemnum vexillum* – high risk
- Red ripple bryozoan *Watersipora subatra* – high risk
- Leathery sea squirt *Styela clava* – medium risk

The compass and leathery sea squirts are also classed as high impact INNS on the WFD UKTAG classification of alien species list (UKTAG 2021).

None of the above species have been recorded in the Severn Lower water body according to records from the National Biodiversity Network Atlas (NBN Atlas 2023).

Assessment

The area of new outfall structure that will not be buried is minimal in size and extent so it is considered that this poses very little risk and will not have any non-temporary effects on the WFD potential of the Severn Lower water body and would not jeopardise the attainment of WFD objectives.

The proposed works involve a number of vessels as indicated in Table 2. The vessels carry different levels of risk in terms of the potential to introduce or spread INNS.

MTS Terramare 1

The Terramare 1 is a landing craft and its homeport is Penzance, Cornwall. The landing craft will sail from Penzance and be based at Newport ABP for the duration of the works. This vessel will be used to deliver plant, equipment and pipe sections to the site from the compound at Newport ABP during the installation of the new pipe and removal of the existing pipe. For the trench excavation in the upper intertidal, the landing craft will beach itself allowing the excavator to disembark and dig the trench while the tide is on ebb and spend up to 12 hours (one tidal cycle) drying out.

Due to the routine operations of landing craft, these vessels frequently dry out for up to 12 hours over a tidal cycle. This greatly reduces the potential for INNS to become established on the vessel's hull. These vessels are not slow moving and do not require ballast water exchange, which also significantly reduces the potential for the spread of INNS.

Doreen Dorward

The Doreen Dorward is a self-propelled spud leg utility vessel. Similar to the Terramare 1, it can be grounded on the beach to load and unload equipment and plant. For this project, it will be used to excavate the trench on the flood tide with the excavator operating from the deck. The Doreen Dorward will sail from its home port of Poole in Dorset and be based at Newport ABP for the duration of the works.

This vessel is not slow moving and does not require ballast water exchange.

Wilcarry 1500

The Willcarry 1500 is a flat top pontoon vessel that will be used during the works. The vessel will be used during the offshore phase of the outfall installation, specifically diffuser installation, backfill and placement of concrete mattresses. It is based at Williams Shipping Yard, Pembroke.

This vessel does not require ballast water exchange.

Willendeavour and Willsupply

The Willendeavour and Willsupply are multicat type workboats that will be used as support vessels during the works. They are based at Williams Shipping Yard, Pembroke.

These vessels do not require ballast water exchange.

Heather D & Sea Venture

The Heather D and Sea Venture are general purpose workboats that will be used as support vessels during the works. Both are based at Swansea Marina, which is also within the Bristol Channel, approximately 40 nautical miles from the Project site.

These vessels do not require ballast water exchange.

Kaymac owned dories

Two Kaymac owned flat bottomed dories will be used as general support boats during the works. These are small support vessels that are kept out of water when not in use.

Norway based tug boats

Two tug boats will deliver the pipe sections from the manufacturer in Norway. These vessels are not slow moving but will be sailing from an origin outside of the UK. Tug boats generally do not require ballast water exchange. However, taking a precautionary approach, the potential for ballast water exchange by these vessels has been considered in the project Biosecurity Plan.

The nature of the type of vessels proposed for the works means that the primary potential pathway of any introduction of NNS would most likely be via hull fouling It is considered that

the primary risk of introduction and therefore spread of INNS is associated with vessel movements between similar biogeographic regions with potential transfer of species adapted to growth and survival in similar water temperatures (e.g. in general the likelihood of colonisation is greater for a species being transported from temperate waters to temperate waters, as opposed to being transported from tropical waters to temperate waters). As such, the highest risk vessels associated with the works are those that will deliver the pipe sections from Norway.

A project-specific Biosecurity Plan with a Biosecurity Risk Assessment has been produced that outlines measures that will be incorporated into construction methods to limit the risk of introduction of non-native species (see Appendix II). In addition, measures taken will include consideration of the following:

- Conforming to guidelines on marine biosecurity planning as advised by NRW, including production of a Biosecurity Plan following best practice guidance as set out in the Natural England and Natural Resources Wales Biosecurity Planning guidance (Payne *et al*. 2015).

- Ports and Harbour protocol:

    - Adherence to legislative guidance for specific port and harbour authorities

- Conforming to industry guidelines:

    - Follow best practice guidance, apply Best Available Technology (BAT)

With the above mitigation measures in place, it is considered that there is minimal risk of the introduction or spread of INNS due to the proposed works.

Consequently, it is concluded that there are not expected to be any non-temporary effects in relation to INNS at water body level, and the proposed works would not prevent the Severn Lower transitional water body from meeting its WFD objectives for INNS.

5. In-combination Effects Assessment

The identification of plans and projects to include in the in-combination effects assessment may include:

- Approved plans;
- Constructed projects;
- Approved but as yet unconstructed projects; and
- Projects for which an application has been made, and currently under consideration and will be consented before the proposed activities begin.

The in-combination effects assessment considers the effects of the proposed activities on the Severn Lower water body supporting elements when combined with the effects of other plans and projects in the area.

To identify the projects and plans and combination of local knowledge, the Lle Geo Portal for Wales, the NRW Public Register and the Newport City Planning Portal was used.

Only projects and plans that have the potential to interact with the water column have been considered further. These are summarised in Table 3 with further details below.

Table 3 Plans, projects or strategies to be assessed in-combination

Planning reference / Site code	Location	Description	Potential cumulative effect on site
DML1950	Newport	Associated British Ports (ABP) marine licence application for dredge and disposal of sediment as part of the Newport maintenance dredging operations.	No
LU140	Newport	Newport dredge disposal site (Bristol Channel).	No

DML1950 – Marine licence renewal for Newport maintenance dredging

ABP applied to renew their marine licence for undertaking maintenance dredging of the approaches to Alexandra Docks at Newport and the River Usk from the Bristol Channel. The dredge areas are approximately 1.6 km from the proposed works site. It is assumed that the maintenance dredging operations were subject to WFD assessment at the time of application and that with appropriate mitigation measures the works alone would not have the potential to impact the WFD potential of the Severn Lower water body. Given the nature of the proposed works for the effluent pipeline and the limited effects outlined in this report, it is concluded that the in-combination effects would not have any non-temporary effects on the WFD potential and would not prevent the Severn Lower transitional water body from meeting WFD objectives.

Newport dredge disposal site – Site reference LU140

The Newport dredge disposal site is approximately 3.75 km offshore from the proposed works site. The dredge disposal site receives dredged sediment from nearby dredging operations. The schedule for dredge disposals is unknown, however, given the nature of the proposed effluent pipeline replacement works and their short term duration, it is concluded that there is no potential for the works and activities at the dredge disposal site to have in-combination effects on the Severn Lower water body and would not prevent the water body from meeting WFD objectives.

6. Summary

This assessment has considered the potential effects of the proposed works on WFD receptors in the Severn Lower water body. The assessment has considered how the proposed activities may pose potential risks to the hydromorphological, biological and chemical quality elements for this water body as well as considering potential effects on WFD Protected Areas and the potential for the introduction and spread of INNS.

The Scoping stage identified that the following receptors would not be affected by the works and could be scoped out with no need for further assessment:

- Biology – Habitats (lower sensitivity)

- Water quality – phytoplankton; harmful algae; and release of chemicals in a mixing zone.
- Hydromorphology

The receptors that could not be scoped out and were taken forward to the Impact Assessment stage were:

- Biology – Habitats (higher sensitivity: Saltmarsh)
- Biology - Fish
- Water quality – Chemicals on the EQSD; Chemicals above Cefas Action Level 1; potential to affect physiochemical parameters for longer than 14 days
- WFD Protected Areas
- INNS

The assessment has taken into account the following design measures and embedded mitigation measures for the works which would be implemented in line with best practice:

- Implementation of a Construction Environmental Management Plan (CEMP) to include a range of measures to minimise the chances of accidental pollution incidents from spillage of chemicals and any subsequent effects;
- The execution of the works has been designed to avoid any interaction with the higher sensitivity saltmarsh habitat; and
- Implementation of a Biosecurity Plan.
- For all the receptors taken forward to the Impact Assessment stage it was concluded, with these identified works design and embedded mitigation measures in place, that the proposed works are not expected to result in any non-temporary effects on the biological, hydromorphological and chemical quality elements, or WFD Protected Areas, of the Severn Lower water body and are not expected to prevent the water body from meeting its WFD objectives.

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Appendix I Scoping Template

Your activity	Description, notes or more information
Applicant name	Kaymac Marine & Civil Engineering Ltd
Application reference number (where applicable)	To be confirmed
Name of activity	Newport Outfall Replacement Scheme
Brief description of activity	Installation of new effluent pipe and outfall adjacent to the existing pipe. Decommissioning and removal of section of existing pipe. Activities include excavation of trench in the intertidal zone, pipe laying, backfilling of the trench, removal of section of the existing pipe.
Location of activity (central point XY coordinates or national grid reference)	Lat. 51.536134, Lon. -2.9476176
Footprint of activity (m^2)	68,000 m^2 (installation of new pipe); 1,500 m^2 (approx. footprint of removal works)
Timings of activity (including start and finish dates)	Construction start date: Phase 2 early April 2024 to early June 2024.
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	Intertidal installation works area 0.129 km^2 (1,290 m x 100 m). Trench for new pipe in the intertidal zone will be 1,290 m in length, approx. 1.5 m deep with a cross section of 5.4 m^2. Total volume of material to be excavated approximately 7,057 m^3. Intertidal removal works area approximately 1,500 m^2.
Use or release of chemicals? State which ones	No planned use or release of chemicals, however, there is the potential for pollution events due to fuel leakages from plant. Potential mobilisation of chemicals due to excavation of sediment.

Water body	Description, notes or more information
WFD water body name	Severn Lower Transitional Water Body
Water body ID	GB530905415401
River basin district name	Severn
Water body type (estuarine or coastal)	Estuarine
Water body total area (ha)	46,597 ha
Overall water body status (2021)	Moderate
Ecological status / potential (2021)	Moderate
Chemical status (2021)	Moderate
Target water body status and deadline	Good, 2021
Hydromorphology status of water body	Not assessed
Heavily modified water body and for what use	Yes – for flood protection
Higher sensitivity habitats present	Yes – saltmarsh, intertidal seagrass, mussel beds, polychaete reef

Lower sensitivity habitats present	Yes – cobbles gravel and shingle, intertidal soft sediment, rocky shore, subtidal rocky reef, subtidal soft sediments
Phytoplankton status (2019)	Good
History of harmful algae	Not monitored
WFD protected areas within 2km	Yes – Severn Estuary SAC, Severn Estuary SPA

Section 1: Hydromorphology

Consider if your activity could:	Yes	No	Hydromorphology risk issue(s)
Severn Lower Water Body			
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at High status		✓	Does not apply as the Severn Lower water body status is 'Moderate'. The hydromorphological status of the water body has not been assessed, however, the works are small-scale, will be primarily undertaken in the intertidal zone at low tide and do not have the potential to impact on the hydromorphology of the water body.
Could significantly impact the hydromorphology of any water body		✓	The works are small-scale and will be undertaken primarily in the intertidal zone at low tide so do not have the potential to impact on the hydromorphology of the water body.
Is in a water body that is heavily modified for the same use as your activity		✓	The Severn Lower water body is classified as heavily modified for flood protection which is a different use to the proposed works.

Section 2: Biology

Habitats

Severn Lower - Higher sensitivity habitats [2]	Lower sensitivity habitats [3]
Saltmarsh (680 ha) Intertidal seagrass (264 ha) Mussel beds (46 ha) Polychaete reef (538 ha)	Intertidal soft sediments (e.g. sand and mud) (16,385 ha) Cobbles, gravels and shingle (31 ha) Rocky shore (2,293 ha) Subtidal rocky reef (8,926 ha) Subtidal soft sediments (15,205 ha)

[2] Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.
[3] Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Severn Lower - Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)

0.5 km^2 or larger		✓	Footprint is 0.129 km^2 for installation works and approx. 0.0015 km^2 for removal works.
1% or more of the water body's area		✓	Footprint of the construction works is 0.129 km^2 and approx. 0.0015 km^2 for removal works so less than 1% of water body area.
Within 500 m of any higher sensitivity habitat	✓		Approximately 30 m from saltmarsh habitat
1% or more of any lower sensitivity habitat		✓	Footprint is less than 1% of lower sensitivity habitats in the surrounding area (0.04% of intertidal soft sediment habitat)

Fish

Severn Lower - Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	✓		Works are small scale and will be undertaken primarily in the intertidal zone during low tide. There will be no physical obstruction to fish passage. The potential release of high concentrations of contaminants during the excavation of the trench or through accidental spills such as fuel could have an ecotoxicological effect on fish.
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)		✓	No pathway to impact on normal fish behaviour as the works are small scale and temporary. The project activities are anticipated to produce low levels of noise and vessel noise will be within the range routinely experienced in the water body.
Could cause entrainment or impingement of fish		✓	Not applicable

Section 3: Water quality

Severn Lower - Consider if your activity:	Yes	No	Water quality risk issue(s)

Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	✓		Works are small scale and will be undertaken primarily at low tide. Any works undertaken sub-tidally will be of short duration (approx. 4 days). There is potential for excavated sediment in the intertidal zone to be mobilised during tidal movements, which may affect water clarity. This may occur for each excavated section of the trench for a limited number of days (approx. 3 days). The trench works are scheduled to last for approx. 38 days. Therefore, there is potential for water clarity to be affected during this period. Although this is unlikely to be continuously during this period, this has been scoped in taking a precautionary approach.
Is in a water body with a phytoplankton status of moderate, poor or bad		✓	Phytoplankton status is Good
Is in a water body with a history of harmful algae		✓	This has not been monitored
Severn Lower - If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	**Yes**	**No**	**Water quality risk issue(s)**
The chemicals are on the Environmental Quality Directive (EQSD) list	✓		There is no planned use or release of chemicals during the works. Chemicals could potentially be released accidently for example through accidental fuel spillages. Any chemicals in the sediment may be mobilised during the trench excavation works.
It disturbs sediment with chemicals above Cefas Action Level 1	✓		Works could potentially disturb sediment with chemicals above Cefas Action Level 1 during the trench excavation.
Severn Lower - If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	**Yes**	**No**	**Water quality risk issue(s)**
The chemicals released are on the Environmental Quality Directive (EQSD) list		✓	The project includes a mixing zone (outfall discharge), however, there will be no change to the nature or volume of the current licensed discharge. The only change will be that the current effluent will be discharged from the new pipe and outfall. As such, this has been scoped out of further assessment.

Section 4: WFD protected areas

Severn Lower - Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2 km of any WFD protected area	✓		The works are within the Severn Estuary / Môr Hafren SAC and Severn Estuary / Môr Hafren SPA.

Section 5: Invasive non-native species (INNS)

Severn Lower - Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	✓		Potential that construction vessels used could introduce or spread INNS.

Section 6: Summary

Receptor	**Potential risk to receptor?**	**Note the risk issue(s) for impact assessment**
Hydromorphology	No	Due to the small-scale nature of the works there will be no impact on the hydromorphology of the water body. The works are not related to activities for which the water body is classed as heavily modified.
Biology: habitats	Yes	Footprint is within approximately 30m of a higher sensitivity habitat (saltmarsh habitat)
Biology: fish	Yes	The works will be undertaken primarily in the intertidal zone at low tides, they will not inhibit passage of fish and there will not be any physical obstruction in the main channel. However, the potential release of high concentrations of contaminants during the excavation of the trench or through accidental spills such as fuel could have an ecotoxicological effect on fish.
Water quality	Yes	Works could potentially release chemical substances such as fuels into the water column due to accidental releases / spillages. CEFAS Action Level 1 chemicals may be mobilised during sediment excavation works.
Protected areas	Yes	The works are within the Severn Estuary / Môr Hafren Special Area of Conservation and Special Protection Area.
Invasive non-native species	Yes	The construction vessels could lead to introduction / spread of INNS.

Appendix II Biosecurity Plan

This has been provided as a separate document.

Appendix III Cefas Action Levels and Sediment Contaminant Data

Cefas Guideline Action Levels for the Disposal of Dredged Material

	Action Level 1	Action Level 2
Contaminant / Compound	**mg/kg dry weight (ppm)**	**mg/kg dry weight (ppm)**
Arsenic	20	100
Mercury	0.3	3
Cadmium	0.4	5
Chromium	40	400
Copper	40	400
Nickel	20	200
Lead	50	500
Zinc	130	800
Organotins (TBT, DBT, MBT)	0.1	1
PCBs (sum of ICES 7)	0.01	None
PCBs (sum of 25 congeners)	0.02	0.2
DDT	0.001	None
Dieldrin	0.005	None

Total Organic Carbon and Particle Size Analysis

- * See report notes at the end of this appendix.

	Units	% M/M	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
	Method No	WSLM59*	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
	Accreditation	UKAS/MMO	MMO	MMO	MMO	MMO	MMO
		Total Organic Carbon	**45mm**	**31.5mm**	**22.4mm**	**16mm**	**11.2mm**
Sample Reference	**Matrix**	**–**	**-5.5**	**-5.0**	**-4.5**	**-4.0**	**-3.5**
WS01 SURFACE	Sediment	2.28	0.00	0.00	0.00	0.00	0.00
WS02 SURFACE	Sediment	2.29	0.00	0.00	0.00	0.00	0.00
WS03 SURFACE	Sediment	2.44	0.00	0.00	0.00	0.00	0.00
WS04 SURFACE	Sediment	2.36	0.00	0.00	0.00	0.00	0.00
TP01 SURFACE	Sediment	2.58	0.00	0.00	0.00	0.00	0.00
TP02 SURFACE	Sediment	2.43	0.00	0.00	0.00	0.00	0.00

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	Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
	Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
	Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
		8mm	**5.6mm**	**4mm**	**2.8mm**	**2mm**	**1.4mm**
Sample Reference	**Matrix**	**-3.0**	**-2.5**	**-2.0**	**-1.5**	**-1.0**	**-0.5**
WS01 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
WS02 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
WS03 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
WS04 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
TP01 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
TP02 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00

	Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
	Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
	Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
		1mm	**707µm**	**500µm**	**353.6µm**	**250µm**	**176.8µm**
Sample Reference	**Matrix**	**0.0**	**0.5**	**1.0**	**1.5**	**2.0**	**2.5**
WS01 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
WS02 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
WS03 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
WS04 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.43
TP01 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
TP02 SURFACE	Sediment	0.00	0.00	0.00	0.00	0.00	0.00

	Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
	Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
	Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
		125µm	**88.39µm**	**63µm**	**44.2µm**	**31.3µm**	**22.1µm**
Sample Reference	**Matrix**	**3.0**	**3.5**	**4.0**	**4.5**	**5.0**	**5.5**
WS01 SURFACE	Sediment	0.00	0.00	0.07	3.27	6.51	7.59
WS02 SURFACE	Sediment	0.00	0.00	0.01	1.71	5.91	6.33
WS03 SURFACE	Sediment	0.00	0.00	0.01	1.56	6.40	6.90
WS04 SURFACE	Sediment	4.53	1.69	0.89	6.03	7.53	8.08
TP01 SURFACE	Sediment	0.00	0.00	0.10	3.33	5.50	6.25
TP02 SURFACE	Sediment	0.00	0.00	0.01	1.60	6.03	5.92

	Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
	Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
	Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
		15.6µm	**11µm**	**7.8µm**	**5.5µm**	**3.9µm**	**2.75µm**
Sample Reference	**Matrix**	**6.0**	**6.5**	**7.0**	**7.5**	**8.0**	**8.5**
WS01 SURFACE	Sediment	8.94	8.24	10.31	11.65	10.45	7.63
WS02 SURFACE	Sediment	8.41	9.35	11.45	12.94	11.60	8.22
WS03 SURFACE	Sediment	7.89	8.59	10.94	12.84	11.86	8.58
WS04 SURFACE	Sediment	8.66	9.59	11.25	11.67	9.64	6.34
TP01 SURFACE	Sediment	8.21	9.21	11.63	13.09	11.63	8.20
TP02 SURFACE	Sediment	7.94	8.48	10.83	13.46	12.70	8.96

	Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
	Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
	Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
		1.95µm	**1.38µm**	**0.98µm**	**0.69µm**	**0.49µm**	**0.34µm**
Sample Reference	**Matrix**	**9.0**	**9.5**	**10.0**	**10.5**	**11.0**	**11.5**
WS01 SURFACE	Sediment	5.03	3.73	3.18	2.86	2.62	2.36
WS02 SURFACE	Sediment	5.02	3.43	2.86	2.63	2.49	2.29
WS03 SURFACE	Sediment	5.21	3.45	2.86	2.68	2.56	2.33
WS04 SURFACE	Sediment	3.38	1.85	1.39	1.35	1.34	1.25
TP01 SURFACE	Sediment	4.91	3.22	2.65	2.47	2.36	2.16
TP02 SURFACE	Sediment	5.12	3.22	2.68	2.60	2.56	2.39

	Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
	Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
	Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
		0.24µm	**0.17µm**	**0.12µm**	**0.09µm**	**0.06µm**	**0.04µm**
Sample Reference	**Matrix**	**12.0**	**12.5**	**13.0**	**13.5**	**14.0**	**14.5**
WS01 SURFACE	Sediment	2.00	1.51	1.09	0.67	0.26	0.03
WS02 SURFACE	Sediment	1.96	1.46	1.04	0.62	0.24	0.03
WS03 SURFACE	Sediment	1.96	1.45	1.03	0.61	0.24	0.03
WS04 SURFACE	Sediment	1.08	0.84	0.63	0.40	0.16	0.02
TP01 SURFACE	Sediment	1.83	1.38	1.00	0.61	0.24	0.03
TP02 SURFACE	Sediment	2.03	1.51	1.06	0.63	0.24	0.03

	Units	% (at 0.5phi intervals)
	Method No	*SUB_01
	Accreditation	MMO
		<0.04µm
Sample Reference	**Matrix**	**>14.5**
WS01 SURFACE	Sediment	0.00
WS02 SURFACE	Sediment	0.00
WS03 SURFACE	Sediment	0.00
WS04 SURFACE	Sediment	0.00
TP01 SURFACE	Sediment	0.00
TP02 SURFACE	Sediment	0.00

Metals

	Units	mg/Kg (Dry Weight)							
	Method No	ICPMSS*							
	Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**Arsenic (As)**	**Cadmium (Cd)**	**Chromium (Cr)**	**Copper (Cu)**	**Mercury (Hg)**	**Nickel (Ni)**	**Lead (Pb)**	**Zinc (Zn)**
WS01 SURFACE	Sediment	17.4	0.27	34.2	31.4	0.22	30.7	60.7	170
WS02 SURFACE	Sediment	14.6	0.29	41.0	27.4	0.23	33.8	59.4	204
WS03 SURFACE	Sediment	14.3	0.34	38.9	25.8	0.22	32.2	57.0	194
WS04 SURFACE	Sediment	14.1	0.28	39.0	25.2	0.21	31.6	54.1	184
TP01 SURFACE	Sediment	15.9	0.30	37.7	31.2	0.23	31.9	61.3	188
TP02 SURFACE	Sediment	14.2	0.28	38.2	25.8	0.21	32.1	57.8	198
Certified Reference Material SETOC 774 (% Recovery)		105	102	103	100	100	100	98	100
QC Blank		<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

Organotins

	Units	mg/Kg (Dry Weight)	
	Method No	ASC/SOP/301	
	Limit of Detection	0.001	0.001
	Accreditation	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
WS01 SURFACE	Sediment	<0.005	<0.005
WS02 SURFACE	Sediment	<0.005	<0.005
WS03 SURFACE	Sediment	<0.005	<0.005
WS04 SURFACE	Sediment	<0.005	<0.005
TP01 SURFACE	Sediment	<0.005	<0.005
TP02 SURFACE	Sediment	<0.005	<0.005
Certified Reference Material SETOC 774 (% Recovery)		105	63
QC Blank		<0.5	<0.001

PAHs

	Units	µg/Kg (Dry Weight)					
	Method No	ASC/SOP/303/304					
	Limit of Detection	1	1	1	1	1	1
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
WS01 SURFACE	Sediment	63.2	25.6	90.2	183	188	228
WS02 SURFACE	Sediment	52.1	37.0	101	254	296	354
WS03 SURFACE	Sediment	40.9	34.6	78.3	189	217	300
WS04 SURFACE	Sediment	37.5	38.7	85.7	234	282	323
TP01 SURFACE	Sediment	49.0	30.4	93.5	222	254	316
TP02 SURFACE	Sediment	43.9	34.9	78.2	201	236	291
Certified Reference Material SETOC 774 (% Recovery)		115	109	84	76	77	71
QC Blank		<1	<1	<1	<1	<1	<1

	Units	µg/Kg (Dry Weight)					
	Method No	ASC/SOP/303/304					
	Limit of Detection	1	1	1	1	1	1
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N**
WS01 SURFACE	Sediment	176	210	133	257	309	276
WS02 SURFACE	Sediment	266	304	194	283	302	278
WS03 SURFACE	Sediment	232	259	145	254	263	228
WS04 SURFACE	Sediment	246	285	156	258	272	243
TP01 SURFACE	Sediment	239	276	176	286	340	286
TP02 SURFACE	Sediment	229	254	147	259	260	251
Certified Reference Material SETOC 774 (% Recovery)		83	80	90	110	64	61
QC Blank		<1	<1	<1	<1	<1	<1

	Units	µg/Kg (Dry Weight)					
	Method No	ASC/SOP/303/304					
	Limit of Detection	1	1	1	1	1	1
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**C3N**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
WS01 SURFACE	Sediment	192	190	37.0	384	101	168
WS02 SURFACE	Sediment	178	307	53.3	481	89.0	275
WS03 SURFACE	Sediment	157	247	46.4	413	72.3	235
WS04 SURFACE	Sediment	157	257	52.7	408	77.6	261
TP01 SURFACE	Sediment	198	274	53.0	437	88.9	247
TP02 SURFACE	Sediment	174	242	49.4	373	75.3	232
Certified Reference Material SETOC 774 (% Recovery)		125	79	74	82	83	75
QC Blank		<1	<1	<1	<1	<1	<1

	Units	µg/Kg (Dry Weight)				mg/Kg (Dry Weight)
	Method No	ASC/SOP/303/304				ASC/SOP305
	Limit of Detection	1	1	1	1	1
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO
Sample Reference	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
WS01 SURFACE	Sediment	144	265	339	301	39.7
WS02 SURFACE	Sediment	172	137	331	381	22.6
WS03 SURFACE	Sediment	147	110	318	326	31.5
WS04 SURFACE	Sediment	153	127	289	334	108
TP01 SURFACE	Sediment	156	122	323	363	23.6
TP02 SURFACE	Sediment	154	103	271	300	84.9
Certified Reference Material SETOC 774 (% Recovery)		82	74	81	86	106
QC Blank		<1	<1	<1	<1	<1

PCBs

	Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
	Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
	Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
	Accreditation	MMO*	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**
WS01 SURFACE	Sediment	0.00057	0.00040	0.00093	0.00069	0.00028	0.00125	0.00022
WS02 SURFACE	Sediment	0.00135	0.00086	0.00258	0.00197	0.00071	0.00431	0.00072
WS03 SURFACE	Sediment	0.00178	0.00114	0.00300	0.00228	0.00093	0.00518	0.00088
WS04 SURFACE	Sediment	0.00140	0.00081	0.00236	0.00177	0.00080	0.00290	0.00066
TP01 SURFACE	Sediment	0.00124	0.00080	0.00239	0.00162	0.00054	0.00260	0.00057
TP02 SURFACE	Sediment	0.00169	0.00097	0.00283	0.00209	0.00081	0.00309	0.00069
Certified Reference Material SETOC 774 (% Recovery)		79	75	93	83	107	114	107
QC Blank		<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

	Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
	Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
	Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**PCB 149**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**
WS01 SURFACE	Sediment	0.00088	0.00021	0.00107	0.00010	0.00020	0.00050	0.00059
WS02 SURFACE	Sediment	0.00214	0.00054	0.00367	0.00039	0.00050	0.00128	0.00171
WS03 SURFACE	Sediment	0.00261	0.00059	0.00418	0.00038	0.00054	0.00131	0.00234
WS04 SURFACE	Sediment	0.00201	0.00052	0.00335	0.00037	0.00042	0.00113	0.00153
TP01 SURFACE	Sediment	0.00194	0.00059	0.00345	0.00032	0.00038	0.00135	0.00172
TP02 SURFACE	Sediment	0.00230	0.00059	0.00380	0.00040	0.00047	0.00129	0.00185
Certified Reference Material SETOC 774 (% Recovery)		72	76	99	85	112	76	73
QC Blank		<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

	Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
	Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
	Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**PCB 180**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**
WS01 SURFACE	Sediment	0.00104	0.00025	0.00063	0.00026	0.00148	0.00132	0.00094
WS02 SURFACE	Sediment	0.00311	0.00073	0.00204	0.00071	0.00396	0.00331	0.00210
WS03 SURFACE	Sediment	0.00299	0.00075	0.00186	0.00075	0.00442	0.00407	0.00284
WS04 SURFACE	Sediment	0.00274	0.00069	0.00147	0.00066	0.00360	0.00301	0.00186
TP01 SURFACE	Sediment	0.00325	0.00066	0.00156	0.00074	0.00334	0.00300	0.00207
TP02 SURFACE	Sediment	0.00294	0.00078	0.00166	0.00067	0.00412	0.00353	0.00245
Certified Reference Material SETOC 774 (% Recovery)		83	83	98	67	105	89	107
QC Blank		<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

	Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
	Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
	Limit of Detection	0.00008	0.00008	0.00008	0.00008
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**PCB 47**	**PCB 49**	**PCB 52**	**PCB 66**
WS01 SURFACE	Sediment	0.00031	0.00072	0.00084	0.00162
WS02 SURFACE	Sediment	0.00077	0.00176	0.00209	0.00393
WS03 SURFACE	Sediment	0.00108	0.00250	0.00304	0.00481
WS04 SURFACE	Sediment	0.00073	0.00169	0.00197	0.00366
TP01 SURFACE	Sediment	0.00070	0.00181	0.00219	0.00363
TP02 SURFACE	Sediment	0.00086	0.00204	0.00247	0.00428
Certified Reference Material SETOC 774 (% Recovery)		94	102	103	99
QC Blank		<0.00008	<0.00008	<0.00008	<0.00008

Organochlorine pesticides

	Units	mg/Kg (Dry Weight)							
	Method No	ASC/SOP/302							
	Limit of Detection	0.0001							
	Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Sample Reference	**Matrix**	**AHCH**	**BHCH**	**GHCH**	**DIELDRIN**	**HCB**	**PPTDE**	**PPDDE**	**PPDDT**
WS01 SURFACE	Sediment	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	0.0003	0.0003	0.0005
WS02 SURFACE	Sediment	<0.0001	<0.0001	<0.0001	0.0003	0.0004	0.0007	0.0005	0.0003
WS03 SURFACE	Sediment	<0.0001	<0.0001	<0.0001	0.0002	0.0004	0.0006	0.0005	<0.0001
WS04 SURFACE	Sediment	<0.0001	<0.0001	<0.0001	0.0002	0.0003	0.0006	0.0004	<0.0001
TP01 SURFACE	Sediment	<0.0001	<0.0001	<0.0001	0.0003	0.0004	0.0005	0.0004	0.0003
TP02 SURFACE	Sediment	<0.0001	<0.0001	<0.0001	0.0002	0.0005	0.0006	0.0005	<0.0001
Certified Reference Material SETOC 774 (% Recovery)		52	64	87	107	95	90	101	69
QC Blank		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
*SUB_01	MAR01451.001-006	Analysis was conducted by an approved subcontracted laboratory.
WSLM59*	MAR01451.001-006	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ICPMSS*	MAR01451.001-006	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ASC/SOP/301	MAR01451.001-006	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/302	MAR01451.001-006	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (PCB101) . These circumstances should be taken into consideration when utilising the data.
ASC/SOP/303/ 304	MAR01451.001-006	Chrysene is known to coelute with Triphenylene and these peaks cannot be resolved in the PAHSED UKAS accredited method. Chrysene and Triphenylene are resolved for MMO but this is currently not UKAS accredited therefore Chrysene is reported without this accreditation.

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Sample Contaminated through Damaged Packaging	N/A	N/A
D3	Sample Contaminated through Sampling	N/A	N/A
D4	Inappropriate Container/Packaging	N/A	N/A
D5	Damaged in Transit	N/A	N/A
D6	Insufficient Quantity of Sample	N/A	N/A
D7	Inappropriate Headspace	N/A	N/A
D8	Retained at Incorrect Temperature	N/A	N/A
D9	Lack of Date & Time of Sampling	N/A	N/A
D10	Insufficient Sample Details	N/A	N/A
D11	Sample integrity compromised or not suitable for analysis	N/A	N/A

Method	Sample and Fraction Size	Method Summary
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Air dried	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Metals	Air dried	Aqua-regia extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Ultra-violet fluorescence spectroscopy
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.
Organochlorine Pesticides (OCPs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions					
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorocyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorocyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Dibenzo[ah]anthracene	GHCH	gamma-Hexachlorocyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	PPDDE	p,p'-Dichlorodiphenyldichloroethylene
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	PPDDT	p,p'-Dichlorodiphenyltrichloroethane
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	PPTDE	p,p'-Dichlorodiphenyldichloroethane
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		