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Sudbrook RA2140 – Defence Maintenance

Water Framework Directive Assessment





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Assessment Undertaken by	Julian Gregory		08/2022
Document prepared by	Julian Gregory		08/2022
Checked by	Owain Waters		08/2022
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1. INTRODUCTION

- 1.1.1 EcoVigour was instructed by Dyer & Butler – Rail Division to undertake a Water Framework Directive Assessment (WFD) for proposed maintenance works to the Sudbrook Pump Station Sea Defences.
- 1.1.2 The purpose of this assessment is to assess the potential impacts of the works associated with the Proposed Scheme and whether these could prevent the Severn Lower, Bristol Channel Inner North, Bristol Channel Inner South and associated surface and groundwater bodies, achieving their WFD Targets. This assessment includes a summary of the current local conditions and, where appropriate, identifies mitigation measures for any likely significant effects (LSE) that may arise as part of the construction and operation of the Proposed Scheme.
- 1.1.3 The works include the removal of vegetation growing from defence assets, repointing of masonry, reseating of loose stone material and the reinstatement or replacement of toe failures which have resulted in scour voids below the wall.
- 1.1.4 This WFD Assessment is required to demonstrate that the proposed works will not result in deterioration in the water body status of the Severn Estuary and adjoining water bodies or prevent them from meeting their Water Framework Directive objectives.
- 1.1.5 The Severn Estuary (Lower) discharges into Bristol Channel North and South, including associated Bathing Waters.

1.2 PROJECT BACKGROUND

- 1.2.1 The project is part of the larger RA2140 Coastal Estuarine and River Defences (CERD's) package of works, which comprise of multiple defence asset repairs along the British coastline. Sudbrook is comprised of two works packages, which will be undertaken within the same Marine License as it concerns the same defence in essence. These are RA2140 - 2026 & RA2140 – 2027.
- 1.2.2 Network Rail have commissioned the principal contractor Dyer & Butler Ltd, to undertake the remedial works.



Figure 1: Sudbrook pier facing south at the defences downstream protecting the pumping station.



2. INTRODUCTION TO THE WATER FRAMEWORK DIRECTIVE

2.1 THE WATER FRAMEWORK DIRECTIVE

- 2.1.1 The Water Framework Directive (WFD) (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000) is a European Union Directive which committed member states to achieve good qualitative and quantitative status of all water bodies by 2015. Under the Directive water bodies are defined as all ground and surface waters, including rivers, lakes, transitional waters and coastal waters (up to one nautical mile from shore).
- 2.1.2 It was not possible to achieve good status of all water bodies by 2015; therefore, outstanding water bodies had objectives set for 2021 or 2027. Interim assessments were undertaken in 2018.
- 2.1.3 The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations). These revoke and replace The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (subject to transitional provisions in article 38 of the 2017 Regulations).

2.2 SCOPE OF THIS ASSESSMENT

- 2.2.1 All new activities in the water environment need to take account of the requirements of the WFD. For a project or activity to be compliant with the WFD, it should demonstrate that:
- ◆ There is no risk of it causing a deterioration of the status of any element, in addition, for groundwater, it will limit or prevent the input of pollutants;
 - ◆ There is no risk of it preventing WFD protected areas from achieving their objectives;
 - ◆ It will not jeopardise any waterbody from achieving good status/potential; and
 - ◆ It will contribute to the protection, enhancement and restoration of waterbodies.
- 2.2.2 This WFD Assessment considers all activities that will take place as part of the proposed scheme, during both construction and operation, and identifies the potential risks associated with these activities and the WFD receptors that are at risk.
- 2.2.3 The NRW guidance includes detailed screening criteria that can be used to determine whether a proposed activity is not likely to cause a deterioration in the status of a waterbody. This includes a list of activities that in general will not cause a deterioration, such as 'temporary' works that do not normally last more than six months and are not likely to have a residual impact on a waterbody.
- 2.2.4 The guidance also lists other physical works and defines screening thresholds for each; these thresholds help to determine whether any activity presents a risk to a waterbody and any requirements for further assessment. However, these thresholds are for guidance only and expert judgement is required to determine if a proposed activity may have an impact on a waterbody.



2.2.5 Published guidance also states that the assessment must consider the potential for impacts on the following:

- ◆ Protected Areas – these are defined under Article 6 of the Directive.
- ◆ Priority Habitats – these are ‘habitats of principal importance for conservation and biodiversity’, which are defined under Section 41 of a Natural Environmental and Rural Communities (NERC) Act 2006 in England and Section 7 of the Environment (Wales) Act 2016 in Wales.
- ◆ Invasive non-native species (INNS) – assessment of INNS is required if a development could cause the introduction or spread of INNS to a waterbody.

2.2.6 A detailed Compliance Assessment would be required if it cannot be concluded that the scheme would not cause deterioration or inhibit the objective status of a waterbody. Further to this and in line with WFD requirements, there would be a need to apply the Article 4.7 test to seek approval for progression of the scheme if after the full WFD

2.3 DETERMINATION OF GOOD STATUS

2.3.1 Good status is determined from the ecological and chemical status of surface waters. These statuses are assessed according to the following criteria:

- ◆ Biological quality (fish, benthic invertebrates, aquatic flora);
- ◆ Hydromorphological quality (e.g. riverbank structure, river continuity and substrate of the riverbed); and
- ◆ Physical-chemical quality (e.g. temperature, oxygenation and nutrient conditions).

2.3.2 The chemical quality refers to environmental quality standards for river basin specific pollutants. These standards specify maximum concentrations for specific water pollutants. The WFD works on a ‘one out, all out’ basis, so if one such concentration is exceeded, then the water body will not be classed as having a good status. The chemical status of surface waters is therefore classified as good or fail.

2.3.3 The ecological status of surface waters is classified as being high, good, moderate, poor or bad, whilst water bodies that have been modified (e.g. canals or contain significant flood defences) are classed as ‘Heavily Modified Water bodies’ (HMWB) and have to reach at least good potential by their objective year.



3. ASSESSMENT METHODOLOGY

3.1 METHODOLOGY

3.1.1 This WFD Assessment was completed using the following methodology:

- ◆ The collection of baseline data to identify the current status, as well as future baseline and ability of the water bodies within and in close proximity to the proposed works to meet the WFD objectives;
- ◆ A consultation with relevant authorities;
- ◆ The review of the proposed works and the potential impacts to the identified surface and groundwater bodies; this involves identifying the impacts that could reduce the WFD status and affect the ability of the water bodies to meet the objectives of the WFD;
- ◆ The consideration of mitigation that can be included in the design, and
- ◆ The provision of an assessment of residual risks.



4. SITE CONTEXT AND DESCRIPTION OF THE PROPOSED ACTIVITIES

- 4.1.1 The work site focuses on the areas of wall masonry, concrete embankment and scour failures. Access to the defences is provided by existing steps through the pumping station to the rear of the wall and along a path the passes behind the wall to the north of the tidal flap. This route will be used to allow for a tracked machine to also access the shore (see access route figure in the sections below).



Figure 2: Sudbrook Sea Defence.



5. DESCRIPTION OF THE PROPOSED ACTIVITIES

Please note, Section 5 within the WFD mirrors Section 4 of the HRA.

5.1 SITE CONTEXT



Figure 3: Location of project in relation to wider area.

- 5.1.1 The attached Appendix highlights the scope of works required at the site. The works remit from that scope will be limited to the agreements in this Marine License. More complex works such as rock armour replenishment will require an amended marine license.
- 5.1.2 The maintenance works will consist of the summarised tasks described in the section below.
- 5.1.3 The maintenance works will consist of the summarised tasks described in the section below.



5.2 METHOD OVERVIEW – MASONARY WALL REPAIRS AND EMBANKMENT MAINTENANCE

- 5.2.1 Works are scheduled to commence October 2022 for approximately 12 months in duration. Works will occur over several weeks and will not be undertaken constantly during the requested license period. The longer license period is requested to account for poor weather conditions and limited available light during low tide conditions towards the winter months, as the determination of the license will likely take until autumn.
- 5.2.2 Works periods will be scheduled around daytime shifts primarily as to ensure safer working conditions and reduced disturbance to local residential area and wider environment.
- 5.2.3 Maintenance to the sea walls during night shifts is not envisaged, however some works or demobilisation on a given day may occur close to dusk to take advantage of tidal windows for longer sections of works.
- 5.2.4 The project works will be monitored by an Environmental Clerk of Works (ECoW) to ensure abidance to the HRA conditions, undertaking supervision duties when required and undertaking audits. The ECoW has the authority to cease site operations in the event works are causing disturbance to bird species. E.g., during sensitive early morning foraging periods.
- 5.2.5 Rope access system will be setup in accordance with Specialist Subcontractor RAMS and operatives will access the wall from the top down to the required location of the repair along the sea wall / embankments where required (dependent on slope angle and height).
- 5.2.6 Mixing equipment will consist of a 110v paddle mixer, 3.5kVa generator and mixing buckets. The pieces of equipment can be moved by hand when required.
- 5.2.7 Localised clearance of vegetation growing from some areas sea wall will be removed where necessary to access the wall or prevent root systems from causing further internal damage to the walls structure.
- 5.2.8 Pointing materials will be mixed in accordance with manufacturer's instructions. Where possible, mixing of material will occur within the rail corridor or on stably sections of the defence assets. However, some mixing may need to occur at ground level.
- 5.2.9 PIC (Person in Charge) indicates rope access operatives or engineers may begin work when the tidal conditions allow access to the base of the defences (non-high tide times).
- 5.2.10 Operatives will place polythene protection to base of sea wall/embankments at the areas of works, in order to capture any arisings from the maintenance.
- 5.2.11 Existing loose mortar will be removed using hand tools and collected.
- 5.2.12 Operatives will document each section of works, on completion of pointing, rope access operatives collect dropped pointing materials and remove from the working area.
- 5.2.13 The use of the 9t plant machine will be limited to the scour failure of the toe beams and scour below walls, seen in the Scope Report (Appendix B). This will require the machine to assist in clearing out these defects, to allow for a casting of new concrete to shore up the failures. The machine will carry heavy material such as block stone to fit into the voids caused by the failure. The repair will be like for like and will not increase the footprint of the defence asset. A new toe will be a replacement of completely failed toes that cannot be reinstated.



- 5.2.14 For the larger voids, a mixing wagon will be situated within the Sudbrook compound area and will pump material to the failures via a pumping line. Any excess material will be collected by the plant machine based on the foreshore to avoid overspill areas.
- 5.2.15 Regarding the embankment, vegetation growth will require removal to better ascertain the condition of these areas. Loose material will be moved by hand and set into position using target use of mortar or securing pins. As with the masonry works, any minor repairs will be like for like.
- 5.2.16 Vegetation clearance will only occur on the sea defences and 30cm from the toe of the defence as to not impact the adjacent designate habitat features. There will be no removal of Annex I habitat from the designated sites.
- 5.2.17 All clearance will be undertaken with hand tools, with no mechanical clearance.

5.3 SUPPORTING WORKS

Site Welfare - Delivery/Setup

- 5.3.1 No formal compound is required to support the works. Welfare will be provided using mobile welfare vans. These will be moved to suitable locations as the project requires. Space allowing, these vans will be predominately situated within the Sudbrook pumping station compound. This will also be the location for material delivery and setting up of the concrete wagon and pumping apparatus.

Vehicle Access

- 5.3.2 The single 9 tonne excavator will be the only heavy machine permitted for use during this project.
- 5.3.3 In terms of agreed routes, the plant machine will be delivered to by road and offloaded within the new housing development. The machine will utilise the existing pathway that connects the housing estate to the rear of the sea wall. Rock barriers will temporarily be relocated to allow for the machine to access the lower beach area. These barriers do not serve a defence purpose.
- 5.3.4 The machine will only be permitted to travel on the foreshore, mud, sand and shingle habitat. At no point will the machine be permitted to travel over vegetated intertidal habitat such as Saltmarsh.



Figure 4: 9 tonne plant machine.

Emergency Plans

- 5.3.5 The contractor will ensure that emergency pollution control plans above standardised spill control plans are prepared prior to the commencement of the project. The contractor will ensure a plan on vehicle extraction from the in-channel environment is available with plant machines or equipment on site capable of retrieving a stranded machine.



Emergency Plan Fundamentals:

- ◆ Any disabled machine within the channel environment will be immediately checked for any potential release of hydrocarbons, and if discovered, spill kits and trays will be used immediately.
- ◆ The on-call emergency plant engineer provider will be requested to attend site in the event that the fault cannot be resolved by the operator.
- ◆ Should the on-call engineer be unable to repair the machine, then it should be attempted to extract the machine using a similar powered machine, using task specific chains or tethers to tow the vehicle to a safe position.
- ◆ Should this fail, then the contractor must drain the machine of all fuel and hydraulic fluid before the tidal waters encroach on the machine. NRW and the on-call Environmental Clerk of Works will be contacted immediately and made aware of the emergency and risk of a pollution event.



5.4 SITE IMAGES AND FIGURES

- 5.4.1 The figures below illustrate the sites current condition and the indicative habitat present during summer 2022 in proximity to the Sudbrook defences.



Figure 5: Proposed Access Routes and location of equipment delivery.



Figure 6: Rock armour along the southern portion of the defence line, below a small public park.



Figure 7: Tiered masonry and concrete cast wall defence, with masonry embankment above.



Figure 8: Significant scour failure below masonry toe of the structure further north.



Figure 9: Headwall and wingwalls of Sudbrook tidal flap.



Figure 10: Dwarf wall directing the flow of water from the tidal flap.



6. BASELINE CONDITIONS

6.1 WDF STATUS OF WATERBODIES

- 6.1.1 Data on the location and status of WFD waterbodies and WFD Protected Areas has been obtained from the Water Watch Wales website (Waterwatchwales.naturalresourceswales.gov.uk) and the Multi-Agency Geographic Information for the Countryside (MAGIC) website (magic.defra.gov.uk/MagicMap.aspx)
- 6.1.2 The following WFD surface waterbodies are in proximity of the proposed scheme:
- ◆ Severn Lower (GB530905415401)
 - ◆ Bristol Channel Inner North (GB641008660000)
 - ◆ Bristol Channel Inner South (GB640807670000)
- 6.1.3 Only one groundwater waterbody, the Usk Devonian Old Red Sandstone (GB40902G201700) is located within the project area. It has a Quantitative Status of Good. Potential for the proposed scheme to impact groundwater is considered in Section 15.



6.1.4 The tables below provide a summary of the WFD status of the water bodies with potential to be influenced by the proposed works. Data has been acquired via the Natural Resources Wales (NRW) and Natural England (NE) data portals. Each of the quality elements will be assessed to determine whether the proposed scheme has the potential to adversely affect their status.

Table 1: NRW Data - Severn Lower - Cycle 3 - 2021

Waterbody name, ID, Type, Management Catchment, River Basin District.	Hydro-morphological designation	Current overall status & objectives	Biological elements	Physico-chemical elements	Water body Protected Area Links
Severn Lower (GB530905415401) Type: Transitional (Estuary) Man Catchment: Wye MC TraC Area Name: South East Wales;Marine	Designated as Heavily Modified Mit Assessment = Moderate	Current overall status = Moderate	Driving_Element = Mercury;Inverts;Mit_Assmnt Fish = Good Invertebrates = Moderate Infaunal Quality Index (IQI) = Moderate Imposex = High Phytoplankton = Good Angiosperm = Moderate Salt Marsh = Moderate Sea Grass = Good	Dissolved Inorganic Nitrogen (DIN) = Good Dissolved oxygen = High Arsenic = High Chrom_VI = High Copper = High Iron = High Zinc = High Chem_PHZ = Moderate Cadmium = High Mercury = Moderate Nonylphenol = High Lead = High Nickel = High Octylphen = High Tri_chl_mh = High	Protected Area = No Bathing Waters = No Special Protection Area = Yes Special Area of Conservation = Yes Drinking Water Protected Area = No Nitrate Vulnerable Zone = No Shellfish Water = No



Table 2: NRW Data - Bristol Channel Inner North - Cycle 3- 2021

Waterbody name, ID, Type, Management Catchment, River Basin District.	Hydro-morphological designation	Current overall status & objectives	Biological elements	Physico-chemical elements	Water body Protected Area Links
Name: Bristol Channel Inner North ID: GB641008660000 Type: Coastal Man Catchment: Carmarthen Bay and the Gower TraC RBD: Western Wales Area Name: Marine;South Wales Central	Designated as Natural	Current overall status = Moderate;	Driving_Element = DIN Invertebrates = High Imposex = High Phytoplankton = Good Angiosperm = Moderate	Dissolved Inorganic Nitrogen (DIN) = Moderate Dissolved oxygen = High Arsenic = High Copper = High Toluene = High Zinc = High Chem_PHZ = High Cadmium = High Dichlo_1_2 = High Lead = High Nickel = High	Protected Area = No Bathing Waters = Yes Special Protection Area = Yes Special Area of Conservation = Yes Drinking Water Protected Area = No Nitrate Vulnerable Zone = No Shellfish Water = No



Table 3: NE Data - Bristol Channel Inner South - Cycle 2 -2019

Waterbody name, ID, Type, Management Catchment, River Basin District.	Hydro-morphological designation	Current overall status & objectives	Biological elements	Physico-chemical elements	Water body Protected Area Links
Name: Bristol Channel Inner South ID: GB640807670000 Type: Coastal Water RBD: South West	Not designated artificial or heavily modified	Current overall status = Moderate;	Driving_Element = Chemical and Macroalgae Invertebrates = Good Phytoplankton = Moderate Macroalgae = Good Morph = Supports Good	Dissolved Inorganic Nitrogen (DIN) = Good Dissolved oxygen = High Arsenic = High Copper = High Iron = High Zinc = High 1-1-1-trichloroethane = High Chem = Fail Benzo(a)pyrene = Good Cadmium = Good Dioxins = Good Hexabromocyclododecane (HBCDD) = Good Hexachlorobenzene = Good Hexachlorobutadiene = Good Mercury and Its Compounds = Fail Nonylphenol = Good Perfluorooctane sulphonate (PFOS) = Good Polybrominated diphenyl ethers (PBDE) = Fail Tributyltin Compounds = Good Fluoranthene = Good Lead and Its Compounds = Good Nickel and Its Compounds = Good Octylphenol = Good Trichloromethane = Good	Protected Area = Yes Bathing Waters = Yes Special Protection Area = Yes Drinking Water Protected Area = No Special Area of Conservation = Yes Nitrate Vulnerable Zone = No Shellfish Water = No



Table 4: NRW Data - Usk Devonian Old Red Sandstone – Cycle 3 - 2021

Waterbody name, ID, Type, Management Catchment, River Basin District.	Hydro-morphological designation	Current overall status & objectives	Biological elements	Physico-chemical elements	Water body Protected Area Links
Name: Usk Devonian Old Red Sandstone ID: GB40902G201700 Type: Groundwater RBD: Severn Area Name: Mid Wales	Natural	Current overall status = Good	Driving_Element: DrWPA;GCT;GWDTE_chem;GWSW_chem;SI_c	GWQn = Good GWDTE_abs = Good GWSW_abs = Good SI_abs = Good WB_abs = Good GWCh = Good DrWPA = Good GCT = Good GWDTE_chem = Good GWSW_chem = Good SI_chem = Good Trend_GW = High	Protected Area = Yes Special Protection Area = No Drinking Water Protected Area = Yes Special Area of Conservation = No Nitrate Vulnerable Zone = Yes



7. WATER FRAMEWORK DIRECTIVE ASSESSMENT: SCOPING FOR ACTIVITIES IN ESTUARINE AND COASTAL WATERS

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

7.1 SECTION 1: HYDROMORPHOLOGY

7.1.1 The first stage is to consider if there is hydromorphology at risk from your activity.

Table 5: Summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	The Severn Lower has a Heavily Modified status. There will be no fundamental changes to the below MHWS sections of the defence structures. The assets will only be brought back up to specification on a like for like basis. Following the same profile lines as the original structure. This impact has been assessed as negligible / slight beneficial.
Could significantly impact the hydromorphology of any water body	Please see above - No impacts on any other water bodies.



7.2 SECTION 2: BIOLOGY, HABITAT & FISH

7.2.1 The second stage is to consider if habitats, Biology and Fish Species are at risk from your activity. The figures and tables below illustrate and discuss the features present within the relevant units.

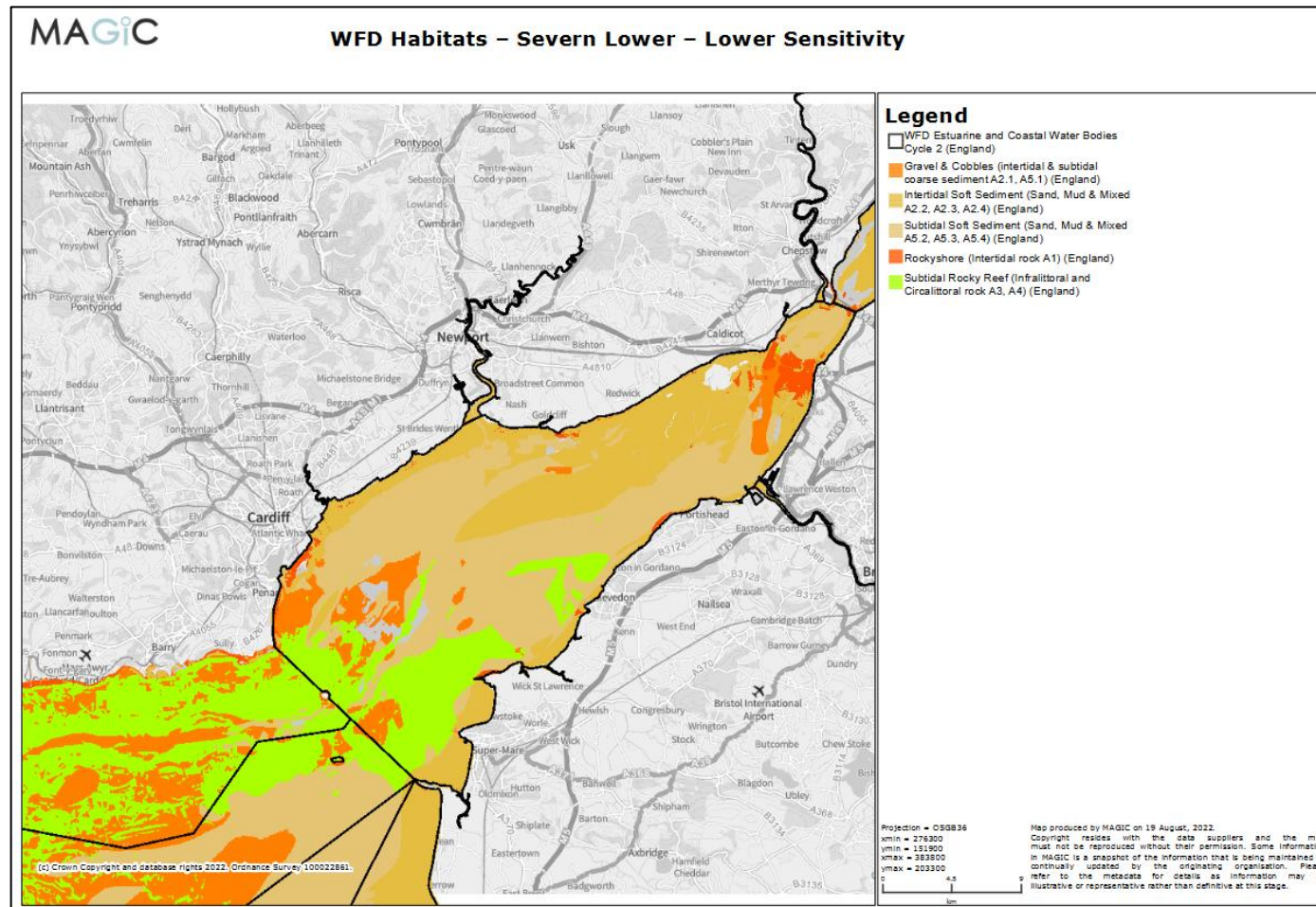


Figure 11: Severn Lower WFD Habitat Lower Sensitivity (www.magic.gov.uk)

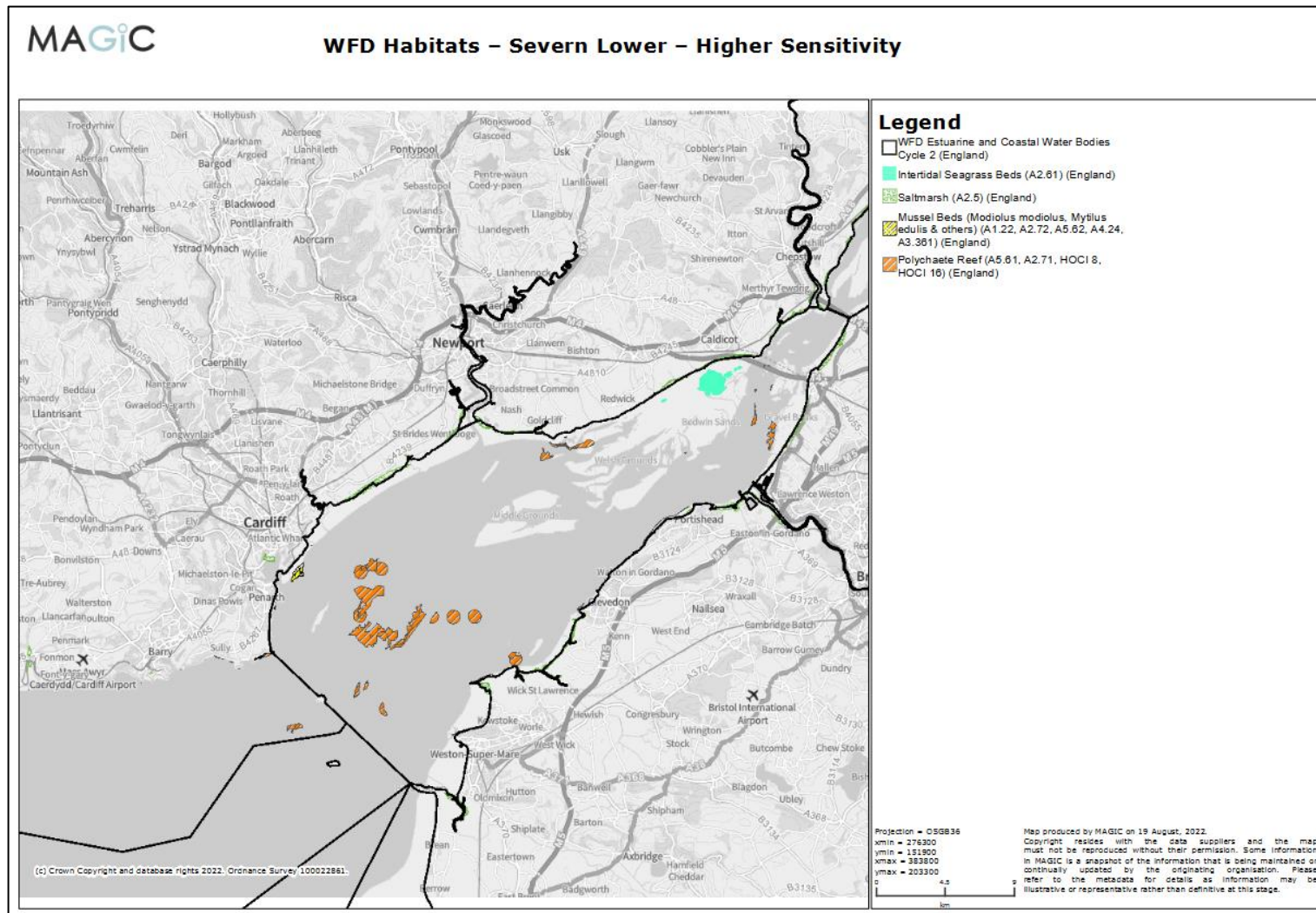


Figure 12: Severn Lower WFD Habitat Higher Sensitivity (www.magic.gov.uk)



7.2.2 The following tables below outlined the features and potential impact vectors. Note: Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures. Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Table 6: Severn Lower (GB530905415401) Water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Area Name & ID		Severn Lower (GB530905415401)	
Higher sensitivity habitats		Lower sensitivity habitats	
Potential Impacts	Habitat Type	Potential Impacts	Potential Impacts
Intertidal Seagrass Beds (A2.61)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place. Potential impact from vehicle and personnel movements if not controlled adequately.	Gravel & Cobbles (intertidal & subtidal coarse sediment A2.1, A5.1)	Direct impact in the form of vehicle movement over this harder substrate to access the structure Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.
Saltmarsh (A2.5)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.	Intertidal Soft Sediment (Sand, Mud & Mixed A2.2, A2.3, A2.4)	Direct impact in the form of vehicle movement over this harder substrate to access the structure Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.
Mussel Beds (Modiolus modiolus, Mytilus edulis & others) (A1.22, A2.72, A5.62, A4.24, A3.361)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.	Subtidal Soft Sediment (Sand, Mud & Mixed A5.2, A5.3, A5.4)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.
Polychaete Reef (A5.61, A2.71, HOCl 8, HOCl 16) (England)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.	Rockyshore (Intertidal rock A1)	Direct impact in the form of vehicle movement over this harder substrate to access the structure Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.
		Subtidal Rocky Reef (Infralittoral and Circalittoral rock A3, A4) (England)	

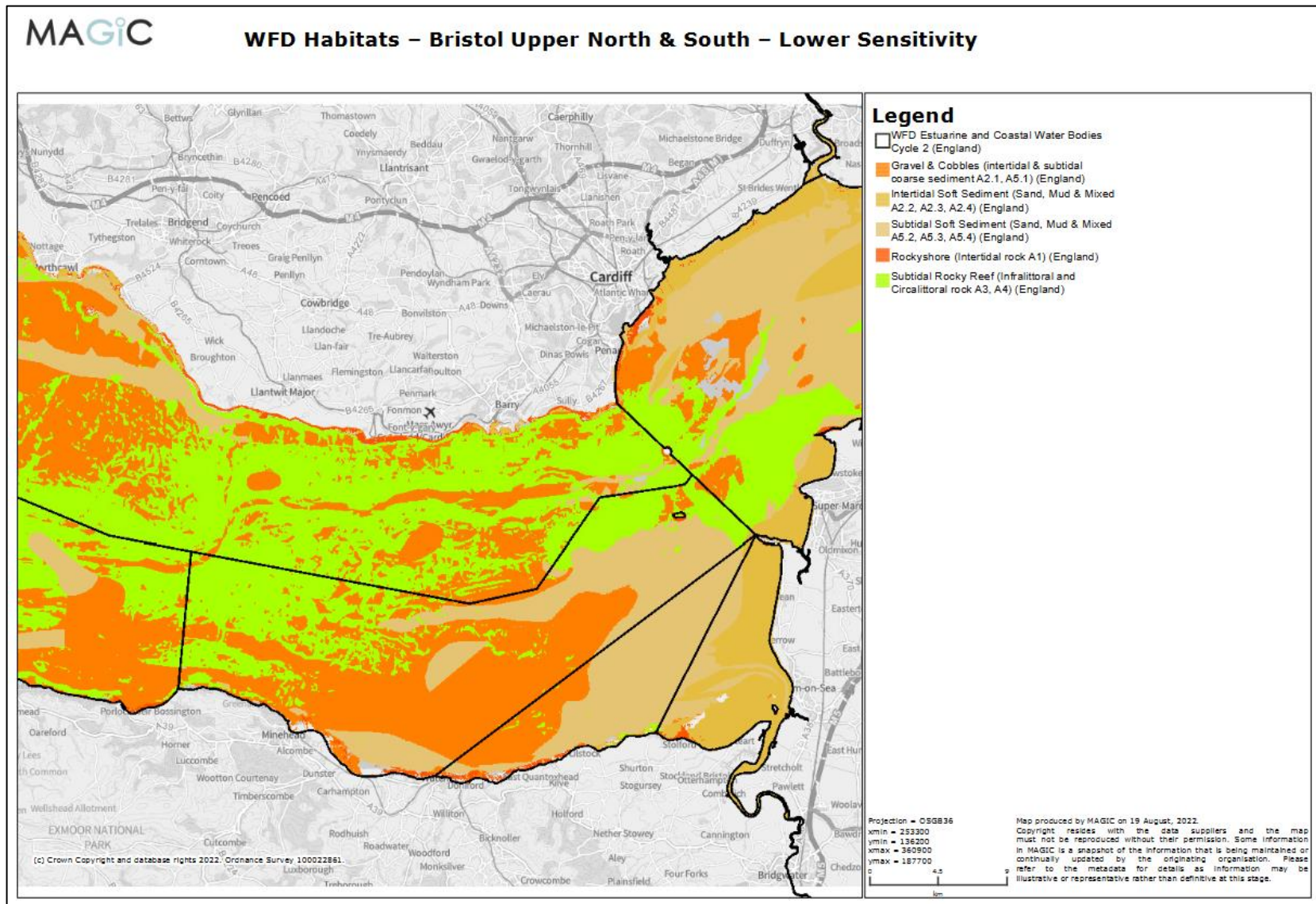


Figure 13: Bristol Upper North & South - WFD Habitat Lower Sensitivity (www.magic.gov.uk)

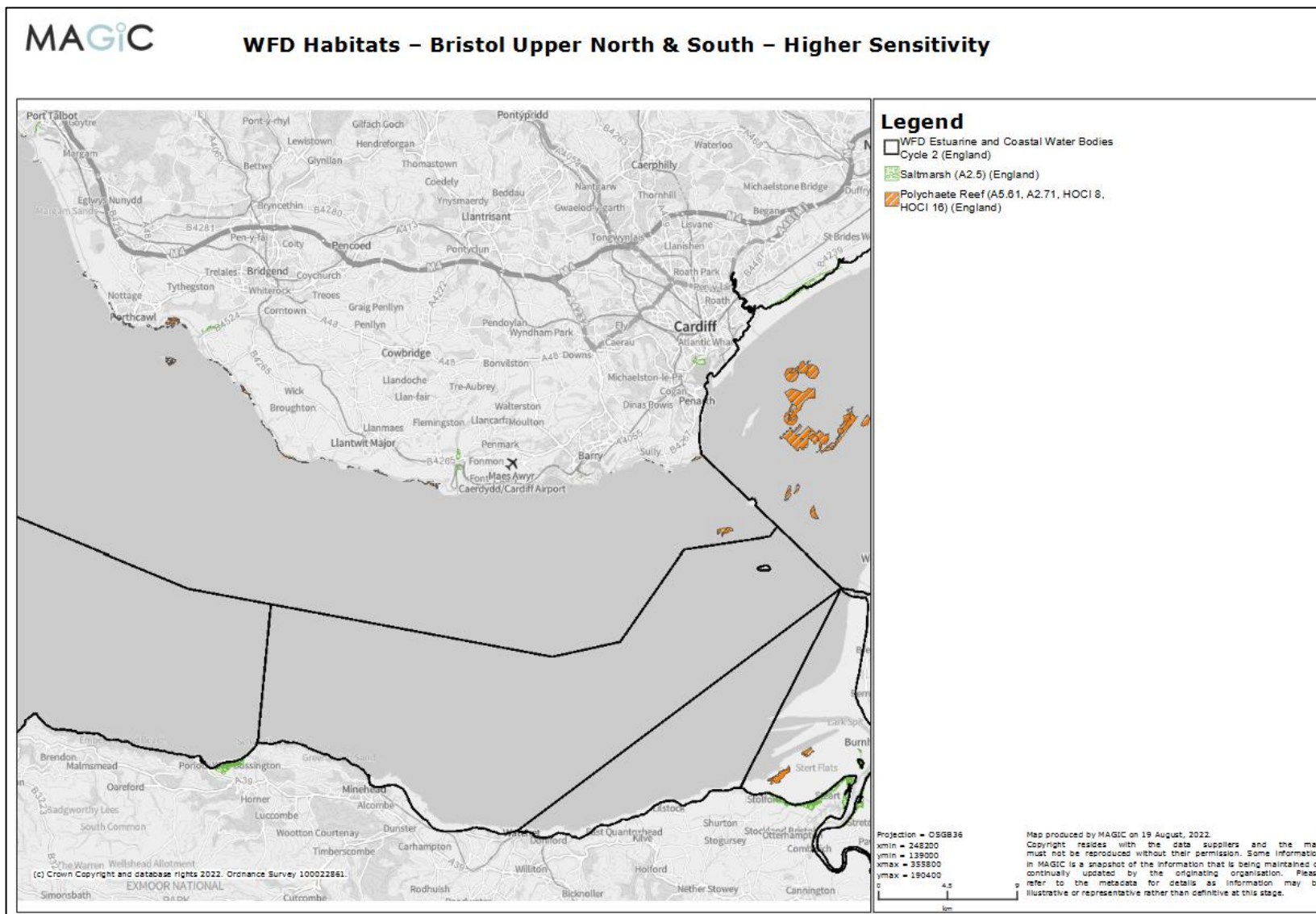


Figure 14: Upper Bristol North and South - WFD Habitat Higher Sensitivity (www.magic.gov.uk)



Table 7: Combined Upper Bristol Channel body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Area Name & ID		Bristol Channel Inner (Upper) South (ID: GB640807670000) and Bristol Channel Inner (Upper) North (ID: GB641008660000)	
Higher sensitivity habitats		Lower sensitivity habitats	
Potential Impacts	Habitat Type	Potential Impacts	Potential Impacts
Saltmarsh (A2.5)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.	Gravel & Cobbles (intertidal & subtidal coarse sediment A2.1, A5.1)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.
Polychaete Reef (A5.61, A2.71, HOCI 8, HOCI 16) (England)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.	Intertidal Soft Sediment (Sand, Mud & Mixed A2.2, A2.3, A2.4)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.
		Subtidal Soft Sediment (Sand, Mud & Mixed A5.2, A5.3, A5.4)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.
		Rockyshore (Intertidal rock A1)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.
		Subtidal Rocky Reef (Infralittoral and Circalittoral rock A3, A4) (England)	Potential for indirect impacts due to chemical and hydrocarbon emissions from the works, if sufficient controls are not put in place.

1.1.1 WFD Habitats – Bristol Upper North & South – Higher Sensitivity



Table 8: Biology.

Consider if the footprint ⁴ of your activity is:	Biology habitats risk issue(s)
0.5km ² or larger	The working footprint of the 1.5ha
1% or more of the water body's area	The Lower Severn alone covers an area of approximately 119979ha. The footprint of the works is therefore less than 1% of the estuaries area.
Within 500m of any higher sensitivity habitat	Works will be undertaken within 500m of the following designated sites: ♦ Severn Estuary (SAC) ♦ Severn Estuary (SPA) ♦ Severn Estuary - RAMSAR ♦ Severn Estuary (SSSI)
1% or more of any lower sensitivity habitat	The works footprint, including temporary works areas is substantially less than 1% of lower sensitivity habitats.

⁴ Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.



7.3 DESIGNATED SITES WITHIN THE INFLUENCE OF THE SEVERN ESTUARY

7.3.1 There are 5 statutory designated sites within 3km of the project boundary which are linked to the Severn Estuary:

- ◆ Severn Estuary (SAC)
- ◆ Severn Estuary (SPA)
- ◆ Severn Estuary – RAMSAR
- ◆ Severn Estuary (SSSI)
- ◆ Gwent Levels (SSSI)

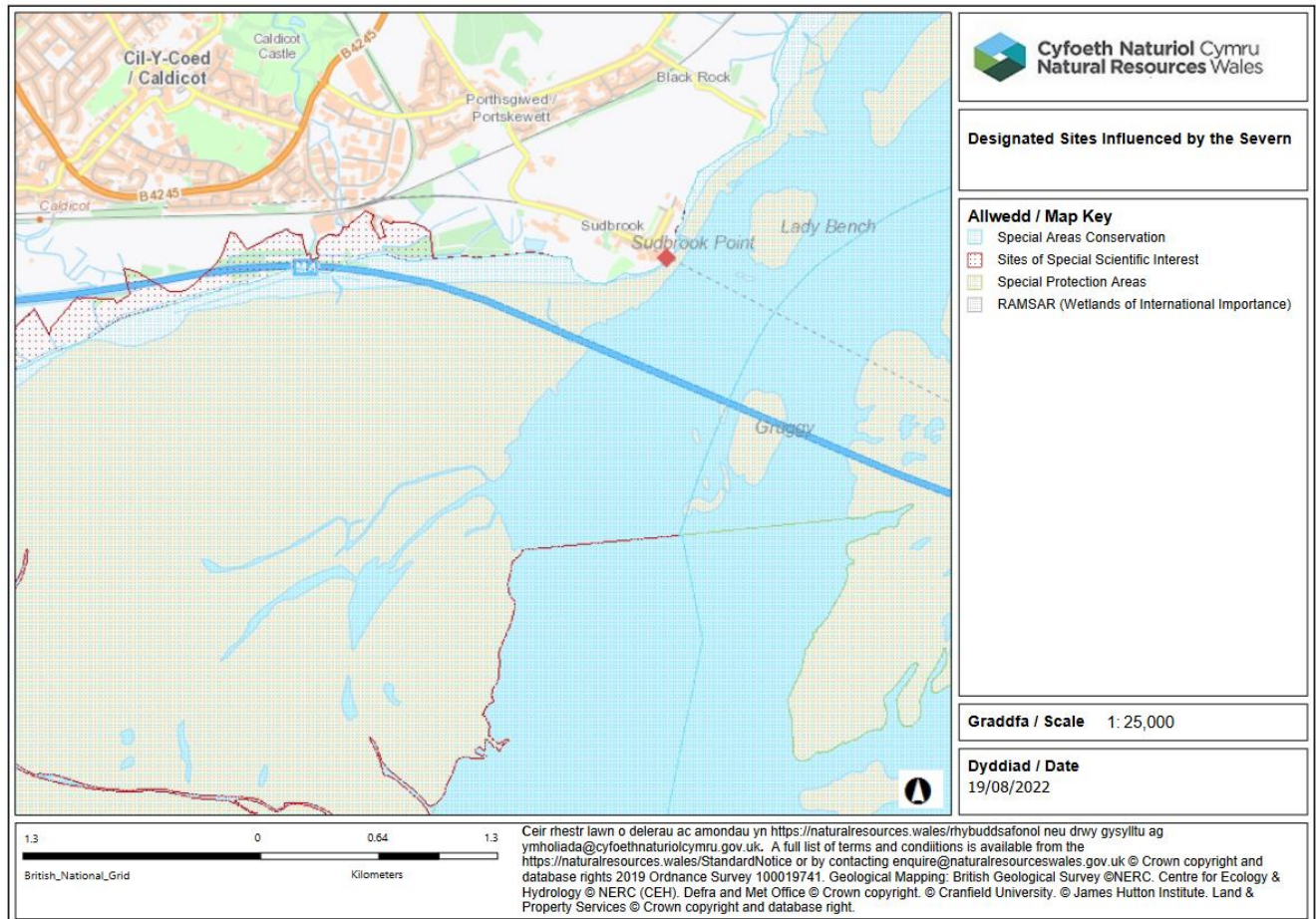


Figure 15: Designated Site Map in relation to Sudbrook defences.

7.3.2 There is additional terrestrial Statutory and Non-statutory sites within proximity to the project, however these are unlikely to be influenced by the projects small footprint and are omitted from this assessment.



Table 9: Potential fish species at risk from your activity, but only if your activity is in an estuary or could affect fish in or entering an estuary.

Consider if your activity:	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	The areas in question within this assessment do not contain Shellfish Waters. Works will be restricted to the defence structures during lower tide conditions, with no physical impediment to fish passage along the estuary. The works are unlikely to impact any important seasons.
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)	Please refer to information above. Works will not cause a barrier to migrating fish species.
Could cause entrainment or impingement of fish	No identified impact



7.4 SECTION 3: WATER QUALITY

7.4.1 The third stage is to consider if water quality is at risk from your activity.

Table 10: Water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	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)	The works will include the use of a single tracked excavator during low tide, access the structure along the existing rocky/shingle edge of the estuary. Sediment Release: Excavation will be limited to what is required to rebuild the lower toe reinforcements, (e.g. clearing an area to allow for temporary shrouds to be set in place to contain pumped concrete. This would not add any materials to the marine environment but may re-mobilise deposited materials. Use of Hydrocarbons: ◆ All plant machinery movement will occur within the confines of the licensed footprint. ◆ No refuelling of plant machinery or equipment will occur within the estuary. ◆ All items of static plant will be placed within a plant nappy when not in use. ◆ Fuelled equipment will be checked for defects and leaks prior to the start of each shift. ◆ Within the Sudbrook compound, a refuelling procedure will be implemented, whereby plant nappies will be placed beneath fuelling apertures during fuelling and refuelling will only be undertaken by designated, trained individuals using equipment specifically designed for that purpose. ◆ Network Rail have a spillage plan and specialised contractor in place to respond to and clean up spills. Impact Assessment – To assess the potential impacts of these activities, the following should be considered: Construction plant will be used on the viaduct within the estuary and hence there is a heightened risk of hydrocarbon release due to leaks of fuels and oils. The contractor will refer to guidance from: ◆ GPP 2 - Above ground oil storage tanks, ◆ GPP 5 - Works and maintenance in or near water, ◆ GPP 7 - Safe storage – The safe operation of refuelling facilities, ◆ GPP 21 - Pollution incident response planning, ◆ GPP 22 - Dealing with spills,



Consider if your activity:	Water quality risk issue(s)
	♦ GPP26 - Safe storage – drums and intermediate bulk containers. This includes controls for the operation of plant using biodegradable hydraulic oil (where this is within the manufacturers permitted specification), the re-fuelling of plant and equipment, inspection and maintenance routines for plant to identify defects which could result in the release of liquids, biosecurity protocols, silt mitigation procedures, waste management procedures. The ESMP also includes details on incident response and reporting, including hydrocarbon spills, remediation and reporting to NRW. Conclusion: Provided detailed mitigation plans are developed as part of the Task Specific Method Statements, in line with the broad guidance above, risks to water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns have therefore been assessed as low.
Is in a water body with a phytoplankton status of moderate, poor or bad	Phytoplankton within the Severn Lower has been reported as Good.
Is in a water body with a history of harmful algae	No

Table 11: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Impact Assessment: Chemicals which will be taken into the estuary as part of the works will be:



If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Water quality risk issue(s)
	Hydrocarbons and coolants within plant and machinery. Conclusion: Provided the project complies with the measures set out within the ESMP, which in turn contains guidance from the relevant GPPs, the risk of release of hydrocarbons and cementitious materials is low.
It disturbs sediment with contaminants above Cefas Action Level 1	A sampling regime has not been undertaken, however given the highly limited volume of material which as naturally formed in scour void that requires removal, it is unlikely that contaminants would be in such concentrations to be above Cefas Action Level 1.

Table 12: Assessing whether project falls within mixing zone.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Water quality risk issue(s) /Assessment of Risk / Mitigation Proposals.
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	The works are maintaining an existing outfall asset.

⁵ Carry out your impact assessment using the Environment Agency's surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.

7.5 SECTION 4: WFD PROTECTED AREAS

7.5.1 The forth stage is to consider if WFD protected areas are at risk from your activity. These include:

- ◆ Special Areas of Conservation (SAC)
- ◆ Special Protection Areas (SPA)
- ◆ Site of Special Scientific Interest (SSSI)
- ◆ RAMSAR
- ◆ Bathing Waters
- ◆ Nutrient Sensitive Areas
- ◆ Shellfish Waters



Table 13: Location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is: Within 2km of any WFD protected area ⁶	Protected areas risk issue(s)
Severn Estuary (SAC)	The project is along the edge of the SAC, however due to the very small working footprint, impacts are considered unlikely, this is further quantified in the support HRA. Works are limited to lower tide conditions predominantly and daytime conditions predominantly.
Severn Estuary (SPA)	As above.
Severn Estuary - RAMSAR	As above.
Severn Estuary (SSSI)	As above.

⁶ Note that a regulator can extend the 2km boundary if your activity has an especially high environmental risk.

7.6 SECTION 5: INVASIVE NON-NATIVE SPECIES (INNS)

7.6.1 The fifth is to consider if there is a risk your activity could introduce or spread INNS.

7.6.2 Risks of introducing or spreading INNS include:

- ◆ Materials or equipment that have come from, had use in or travelled through other water bodies.
- ◆ Activities that help spread existing INNS, either within the immediate water body or other water bodies.



Table 14: Risk from INNS.

Consider if your activity could:	INNS risk issue(s)
Introduce or spread INNS	The risk of introducing INNS into the estuary environment will be controlled through Biosecurity Best Practice - Plant and equipment to be used within and adjacent to the estuary will be subject to the Check, Clean, Dry process and will be treated with an aquatic safe disinfectant such as Virkon S. A Biosecurity Management Plan has been prepared for the project, which assesses the risk from INNS and proposes mitigation for this. Please refer to Appendix A.

7.7 SUMMARY OF WFD PRE-ASSESSMENT FINDINGS

Table 15: Summary of Pre-Assessment Stage Findings.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	The Severn Lower has a Heavily Modified hydromorphological status. The section of the estuary in which the works are being undertaken is predominately unnatural, with rock armour, defence walls and a pier making up the majority of the shoreline boundary. Returning the structures to its operational capacity is assessed as a neutral impact on the hydromorphology of the estuary as it's an existing structure.	Mitigation to be out in place to minimise impacts – Please refer to section 8.
Biology: habitats	No long term identified impacts on habitats, provided adequate pollution control measures are put in place i.e. collection of material during repairs, controls on the storage and use of hydrocarbons, plant machine not permitted to traverse high sensitivity habitat (saltmarsh).	Mitigation to be out in place to minimise impacts – Please refer to section 8.
Biology: fish	No identified impact. There will be no physical blocks to fish migrating through the estuary/river.	Mitigation to be out in place to minimise impacts – Please refer to section 8.



Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
	Key impacts on fish will therefore be noise and vibration from works and the use of a plant machine near channel. As the works will occur during low tide, noise and vibration will not be transmitted directly into the water column.	
Water quality	No risk to water quality providing adherence to GPP and best practice is maintained.	Mitigation to be out in place to minimise impacts – Please refer to section 8.
Protected areas	Works at times will be within the SAC, SSSI, SPA, RAMSAR site.	Mitigation to be out in place to minimise impacts – Please refer to section 8.
Invasive non-native species	A Biosecurity Management Plan has been developed for the project, which includes INNS. Please refer to Appendix A.	Please refer to Biosecurity Plan – Appendix A
Bathing Waters	Potential impact via hydrocarbon release event without robust pollution controls in place. This risk is mitigated by adhering to the control plans and relevant GPP's. The project is a significant distance away from the closest bathing water location.	Mitigation to be out in place to minimise impacts – Please refer to section 8.

7.7.1 The WFD guidance stipulates if a pre-assessment has not identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

7.7.2 However, if the pre-assessment identifies one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Table 16: Water Framework Directive (WFD) Assessment for the Usk Devonian Old Red Sandstone groundwater waterbody

WFD elements	Assessment
Chemical status	<u>Temporary impacts during construction</u> No identified impacts <u>Permanent effects during operation</u> No predicted impacts. No features of the defence structures will be changed a river bed level. <u>Assessment outcome</u>



WFD elements	Assessment
	No adverse effects on the chemical status of the groundwater body have been identified and therefore this is scoped out of further assessment.
Quantitative status	<u>Temporary impacts during construction</u> No anticipated interaction with groundwater during maintenance works. <u>Permanent effects during operation</u> No predicted impacts from the operation of the existing defence structures. <u>Assessment outcome</u> Effects to the quantitative status of the groundwater body have been scoped out of further assessment.



8. PROPOSED PROJECT MITIGATION

8.1 CONSTRUCTION PHASE MITIGATION

8.1.1 In Table 14 below, measures have been set out detailing mitigation to be implemented to minimise the potential project impacts.

Table 17: Proposed Mitigation Matrix

Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
Estuarine habitat - Loss of habitat from project activities.	During the project, all welfare, storage, parking and general works will occur within hard standing areas of Sudbrook pumping station or within existing road laybys within the residential area. No Annex I habitat removal is required. Movement of the machine over the harder and more stable rock/ rock/shingle habitat is unlikely to cause lasting impacts as this type of sediment is expected to return to equilibrium over a short period as it will drop out of suspension ahead of other materials such as loose silt.	Negligible Likelihood of significant for Impacts.
Salt marshes (also part of estuarine habitat)	Salt marsh is present along the edges of the dwarf wall and will wall of the tidal flap connected to the pumping station. No plant machine will be permitted to traverse this Annex I habitat. Any disturbance from footfall within the salt marsh habitat from access alone is expected to regenerate readily. Operatives will stick to worn paths created by the public where possible. Furthermore, tarps will be placed at the base of working locations to ensure Annex I habitat is not detrimentally impacted by proposed works. Please see HRA for further detail.	Negligible likelihood of impacts.
Mudflats and sandflats not covered by seawater at low tide – muddy gullies in the Estuary - Loss of habitat from project activities.	No works are proposed within the main bed of the estuary. The works are limited to the areas below the defences, with a large enough easement for the plant machine to move. This habitat is predominately, shingle, sand and rocky shore habitat. No loss of habitat is envisaged.	Negligible likelihood of impacts.
Release of contaminative chemicals from sediments within the estuary.	Excavation of sediment is not proposed, only clearing out of sea debris from the scour failures where toe beams are damaged or missing is proposed to allow for repairs. Any larger volumes of grout or cement will be pumped from a secure source situated from outside of the marine environment.	Negligible likelihood of impacts with mitigation in place.
Contamination of the estuary from spillage of hydrocarbons during refuelling of plant and equipment or due to equipment failure.	No refuelling of plant machinery or equipment will occur within the estuary habitat. All items of static plant will be placed within a plant nappy when in use or being stored. Plant will be checked for defects and leaks prior to the start of each shift. No bulk fuels will be stored on site, the excavator will be delivered to site fuelled and due to the short duration will not need to be re-fuelled. Within the compound, a refuelling procedure will be implemented, whereby plant nappies will be placed beneath fuelling apertures during fuelling and refuelling will only be undertaken by designated, trained individuals using equipment specifically designed for that purpose.	Negligible likelihood of impacts with mitigation in place.



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
	Network Rail have a spillage plan and specialised contractor in place to respond to and clean up spills. The Contractor will develop and implement an Emergency Awareness and Response Plan. This will describe how spills will be contained and cleaned up. The emergency plan will appoint an Incident Coordinator, define roles and responsibilities during an incident, detail response procedures and contain an inventory of response equipment to be maintained on site. Plant will also be available to remove contaminated ballast from site if required. All machinery on site will undergo regular checks. If oil leaks or damage to hydraulic hoses is noted, plant and machinery will be removed from the site and isolated within the site compound with containment measures beneath the leak, until it has been repaired and signed off by a competent fitter. The contractor will develop an emergency response plan in the event a machine becomes stranded in the estuary from mechanical failure and cannot be removed ahead of the rising tide. Equipment will be available to syphon the fuel from the disabled machine in order to reduce the potential release of hydrocarbons into the estuary.	
Contamination of the estuary from release of chemicals.	Please see above. No use of paints or related chemicals is proposed to undertake the works.	Negligible likelihood of impacts with mitigation in place.
Aggregations of bird species Noise disturbance / Visual Disturbance / Habitat Destruction.	Project activities will create a source of visual output and noise over 6-10 hours during the day. Times will vary due to the variation in the tide and season. As working hours are not continuous there will be periods when birds are not disturbed by site activities. However, it is likely that local bird populations are habituated to a level of disturbance from human activities, due to large numbers of pedestrians walking along the coastal path, vehicles crossing the Severn bridge. The site is beyond 1km to the nearest identified high tide roost.	Negligible likelihood of impacts with mitigation in place.
Individual wintering birds - Noise disturbance / Visual Disturbance / Habitat Destruction.	Works within the estuary are programmed to be undertaken between October 2022 to October 2023. Please see HRA for further information regarding consideration to the winter wading assemblage.	Impact on Wintering Birds has been assessed as low.
Otter - Noise disturbance / Visual Disturbance / Habitat Destruction.	Toolbox Talks will inform site personnel on identifying the Annex II Species. No otter holts, resting up area or evidence (e.g. spraint) have been identified within proximity to the structure to date. The project will not represent a hard boundary preventing access to the wider estuary by this species. Otter would be able to move along the river channel and along the tops of the banks at all times during the works.	Impact Not Likely to be Significant, with appropriate mitigation



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
	Habitat impact is limited, however there may be a temporary impact to prey species disturbed by ongoing works. It is not anticipated that these works will have an impact on the population. Night working will be avoided as much as practically possible.	
Fish Assemblage – Pollution and water quality impacts.	Pollution control and Biosecurity measures implemented as described in above will minimise water quality impacts on fish species.	Impact Not Likely to be Significant, with appropriate mitigation
13. Fish Assemblage - Noise disturbance / Visual Disturbance / Habitat Destruction.	There will be no physical blocks to fish migrating through the estuary. There will be no physical blocks to fish migrating through the estuary. Key impacts on fish will therefore be potential noise and vibration from works, however there will be no direct vector as works will be undertaken during low-tide conditions.	Works have potential to cause a Minor Significant impact.
14. Fish Assemblage - Contamination of the estuary from spillage	See comments under estuarine habitat	Impact Not Likely to be Significant
15. Biosecurity	A detailed Biosecurity Plan has been prepared for the project. This includes the following: - All site personnel and site visitors will be informed if any INNS are known to be present on site and that they are jointly responsible for preventing their spread/impacts. They will be made aware of what these species look like so they can avoid it where possible and take appropriate actions. - All site personnel and visitors will be inducted in good biosecurity practices. This will include adoption of the CHECK-CLEAN-DRY campaign (NNSS, 2015). - The CHECK-CLEAN-DRY poster will be displayed in the site office as a reminder of good biosecurity practices: http://www.nonnativespecies.org/checkcleandry/ - All equipment, tools, vehicles and personal protective equipment (PPE) used on site will be checked for seeds originating from any identified INNS before leaving the area. If seeds from identified invasive species are identified, the items will be cleaned and removed seeds will be destroyed. - The spread of waterborne diseases will be limited through the adoption of the CHECK-CLEAN-DRY campaign. This would entail the use of a suitable disinfectant e.g. Virkon® S Aquatic to decontaminate all machinery and PPE prior to it entering site and upon leaving site. Following application of a suitable disinfectant, machinery and PPE will be allowed to fully dry for at least 72 hours before being used on another aquatic site. The Biodiversity Management Plan can be found in Appendix A.	Impact Not Likely to be Significant



9. WFD CONCLUSION

- 9.1.1 Due to the nature and scale of the works to be undertaken during the Sudbrook Sea Defence maintenance project, providing the mitigation outlined within this document and within this document and the supporting Habitat Regulations Assessment (HRA) is implemented, this project will not prevent any of the water bodies associated with the project from meeting their Water Framework Directive objectives.



APPENDIX A - BIOSECURITY MANAGEMENT PLAN & RISK ASSESSMENT
