

Mumbles Coastal Defence Scheme

Water Framework Directive (WFD) Screening Report (Final)

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Contract

This report describes work commissioned by Lee Selway, on behalf of Amey Consulting. Sarah Tyler and Jonathan Harrison of JBA Consulting carried out this work.

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Purpose

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Abbreviations

DIN	Dissolved Inorganic Nitrogen
FBC	Full Business Case
HRA	Habitats Regulations Assessment
NGR	National Grid Reference
NRW	Natural Resources Wales
NVZ	Nitrate Vulnerable Zone
OBC	Outline Business Case
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
WFD	Water Framework Directive

1 Introduction

JBA Consulting (JBA), Amey Consulting and LDA Design have been commissioned to update the Outline Business Case (OBC) and develop the Full Business Case (FBC) for the upgrade of the existing defences in Mumbles Bay, near Swansea, South Wales, on behalf of the City and County of Swansea Council. Amey is acting as Lead Consultant for the project. JBA is responsible for the detailed design of all works seaward of the primary seawall defence, up to and including this defence.

As the proposed works site is located in close proximity to water bodies listed on the Water Framework Directive (WFD) a WFD screening assessment is required to be completed.

1.1 WFD Overview

The Water Framework Directive (WFD) came into force in 2000 and is the most substantial piece of EU water legislation to date. All new activities in the water environment will need to take the Directive into account. The Directive imposes legal requirements to protect and improve the water environment.

1.1.1 Scope and Brief of the WFD Assessment

The EU Water Framework Directive was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The Directive requires that Environmental Objectives be set for all surface and ground waters in England and Wales to enable them to achieve Good Status (or Good Ecological Potential for Heavily Modified and Artificial Water Bodies) by a defined date. These Environmental Objectives are listed below:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- Aim to achieve at least good status/potential for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status/potential by 2021 or 2027;
- Meet the requirements of Water Framework Directive Protected Areas;
- Promote sustainable use of water as a natural resource;
- Conserve habitats and species that depend directly on water;
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
- Contribute to mitigating the effects of floods and droughts.

1.1.2 Preventing Deterioration in Status

Any activity which has the potential to have an impact on the ecology of a water body will need consideration in terms of whether it could cause deterioration in its Ecological Status or Potential.

For each water body, three different status objectives are identified within the River Basin Management Plan (RBMP). These are the overall status objective, the ecological status or potential objective and the chemical status objective. A default objective for all water bodies is to prevent the deterioration in the Ecological Status (or Ecological Potential for Heavily Modified and Artificial Water Bodies) of the water body.

The Ecological Status of a water body is determined through analysis of its constituent Biological Quality Elements. These elements are in turn supported by a series of Physico-Chemical and Hydromorphological Quality Elements. These Quality Elements are taken from

Annex V of the Directive and are listed below. The overall Ecological Status is determined by the lowest element status.

The Biological Quality Elements assessed in the WFD include:

- Fish;
- Invertebrates;
- Macrophytes; and
- Phytobenthos.

The WFD defines the flow, shape and physical characteristics of a watercourse as its 'hydromorphology'. Any in-channel works can impact upon the shape of a watercourse and the natural processes that occur within it, including:

- Flow patterns;
- Width and depth of a channel;
- Features such as pools, riffles, bars and bank slopes;
- Sediment availability/transport;
- Interaction between a channel and its floodplain; and
- Ecology and biology (i.e. habitats which support plants and animals).

Any activity that has the potential to have an impact upon any of the Quality Elements will need consideration in terms of whether it could cause a deterioration in the status of a water body. The activity will also need to be considered in terms of whether it will compromise the ability of the water body to reach Good Ecological Status or Good Ecological Potential by the date specified in the relevant objective.

Any adverse impacts can cause a water body's ecology to deteriorate and prevent environmental improvements from being undertaken. Nevertheless, in-channel works can also be beneficial if they can be designed to help achieve environmental improvements included in the RBMP, thus enhancing the water environment for plants and animals.

1.1.3 Artificial or Heavily Modified Water Bodies

Whilst good ecological status is defined as a slight variation from undisturbed natural conditions in natural water bodies, artificial and heavily modified water bodies are unable to achieve natural conditions. Instead, artificial and heavily modified water bodies have a target to achieve Good Ecological Potential, which recognises their important uses, whilst making sure ecology is protected as far as possible. Ecological potential is also measured on the scale high, good, moderate, poor and bad. The chemical status of these water bodies is measured in the same way as for natural water bodies.

Specific mitigation measures have been identified for each Artificial and Heavily Modified Water body and are listed in the RBMP. These mitigation measures are necessary to reduce the existing hydromorphological impacts on the water body and all measures need to be in place in order for the water body to achieve Good Ecological Status or Potential.

1.2 Purpose of this WFD Assessment

No detailed design for the Mumbles coastal defence works is available at this time and therefore this WFD screening report is based on the current understanding of the proposals. This is therefore, a preliminary assessment intended to inform the design process and to demonstrate whether the works have the potential to be WFD compliant. A further WFD assessment of the scheme may be required once the detailed designs have been finalised.

This WFD assessment aims to determine the effects of the proposed development on ecological, hydromorphological and chemical quality and identify any potential impacts that

could cause deterioration in the current status of the water body or could hinder the water body from meeting its WFD objectives in the future.

The site of works is located within the Carmarthen Bay and the Gower WFD management catchment in Western Wales. The proposed works lie immediately adjacent to the Swansea Bay Coastal water body (Water body ID: GB641008260000) and in proximity to the Bristol Channel Outer North coastal water body (ID: GB611008590001).

2 Assessment Methodology

2.1 Overview

The flow chart shown in Figure 2-1 summarises the WFD Assessment process.

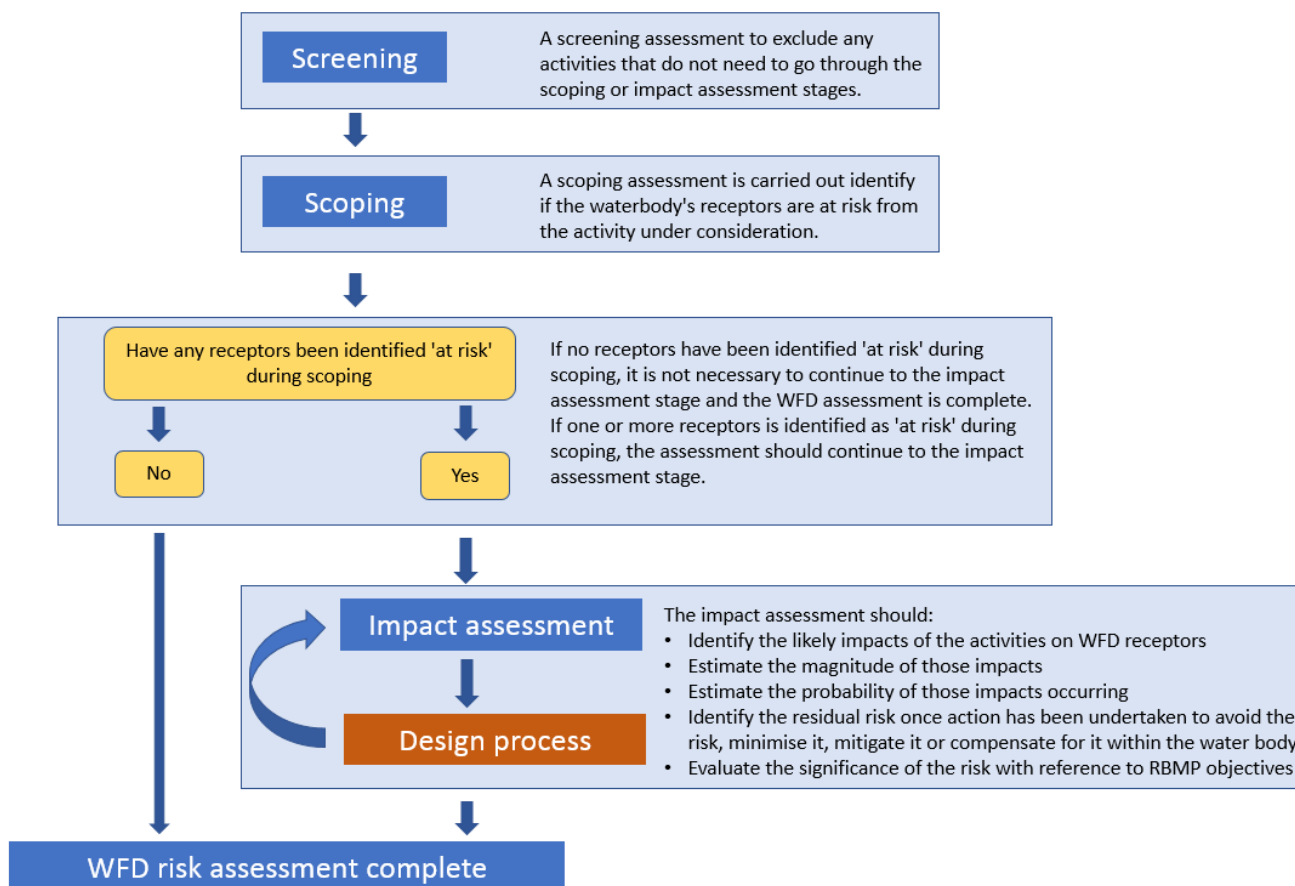


Figure 2-1 WFD Assessment Process Overview

2.2 Screening Assessment

The Screening Assessment aims to exclude any activities that do not need to go through the scoping or impact assessment stages.

The initial stage of the assessment screens the proposed works against the Ecological and Chemical Status objectives for the water bodies potentially affected by the works, together with their Quality Elements. The aim of this process is to determine whether the works could have an impact upon any of these criteria. Those criteria for which no potential adverse effects are identified are not considered further in the assessment. Any potential adverse effects are screened into the assessment and are carried forward to a detailed assessment.

2.3 Scoping Assessment

A detailed assessment is then undertaken to determine the effects that the proposed works could have upon those Quality Elements screened into the assessment. Any impacts identified are then considered in relation to the Ecological and Chemical Status of the water body and the status objectives.

The following assessment objectives are then used to determine whether the proposed works comply with the overarching objectives of the WFD. These objectives were derived from the Environmental Objectives of the Directive.

- Objective 1: The proposed scheme does not cause deterioration in the Status of the Biological Elements of the water body.
- Objective 2: The proposed scheme does not compromise the ability of the water body to achieve its WFD status objectives.
- Objective 3: The proposed scheme does not cause a permanent exclusion or compromised achievement of the WFD objectives in other bodies of water within the same RBD.
- Objective 4: The proposed scheme contributes to the delivery of the WFD objectives.

In order to establish whether the strategy complies with the WFD it is necessary to ascertain whether the preferred options have the potential to result in:

- Failure of a water body to achieve Good Ecological Status or Potential; or
- Failure to prevent a deterioration in the Ecological Status or Potential of a water body

If the answer to these questions is 'no' the strategy can be considered WFD compliant. If either of these failures is identified and if any receptors are identified as 'at risk', further assessment may be required to identify if the strategy meets all of the conditions set out by the WFD Legislation.

2.4 Impact Assessment

The third stage of the WFD Assessment, if determined as necessary from the Screening and Scoping Assessments, is to undertake an Impact Assessment to consider the impacts of the proposed scheme in more detail and recommend necessary mitigation measures. An impact assessment must be carried out for each receptor identified during scoping as being at risk from your activity.

The Impact Assessment describes how any identified impacts from the proposed scheme will be mitigated, to either avoid or minimise the impacts. After the works have been amended to try and avoid, minimise, mitigate or compensate for the risks to WFD receptors the following questions will need to be answered:

- Could the activity still cause a water body to deteriorate from one WFD status class to another or cause significant localised impacts that could contribute to this happening?
- Could the activity prevent or undermine action to get water bodies to good status?

If it cannot be demonstrated with a high level of confidence that the activity supports RBMP objectives, then in order for the statutory authority to permit the activity it must be shown that the activity meets the criteria set out in Article 4(7) of the WFD. Article 4(7) sets out stringent environmental and socio-economic tests to assess if a scheme meets strict environmental and sustainability criteria.

3 Project Description

3.1 Site Location

Mumbles Bay is located near Swansea in South Wales. The project extends from Knab Rock slipway in the south east (National Grid Reference (NGR): SS 62394 87729) to beyond the Dairy Car Park in the north west (NGR: SS 61579 88472), see Figure 3-1.

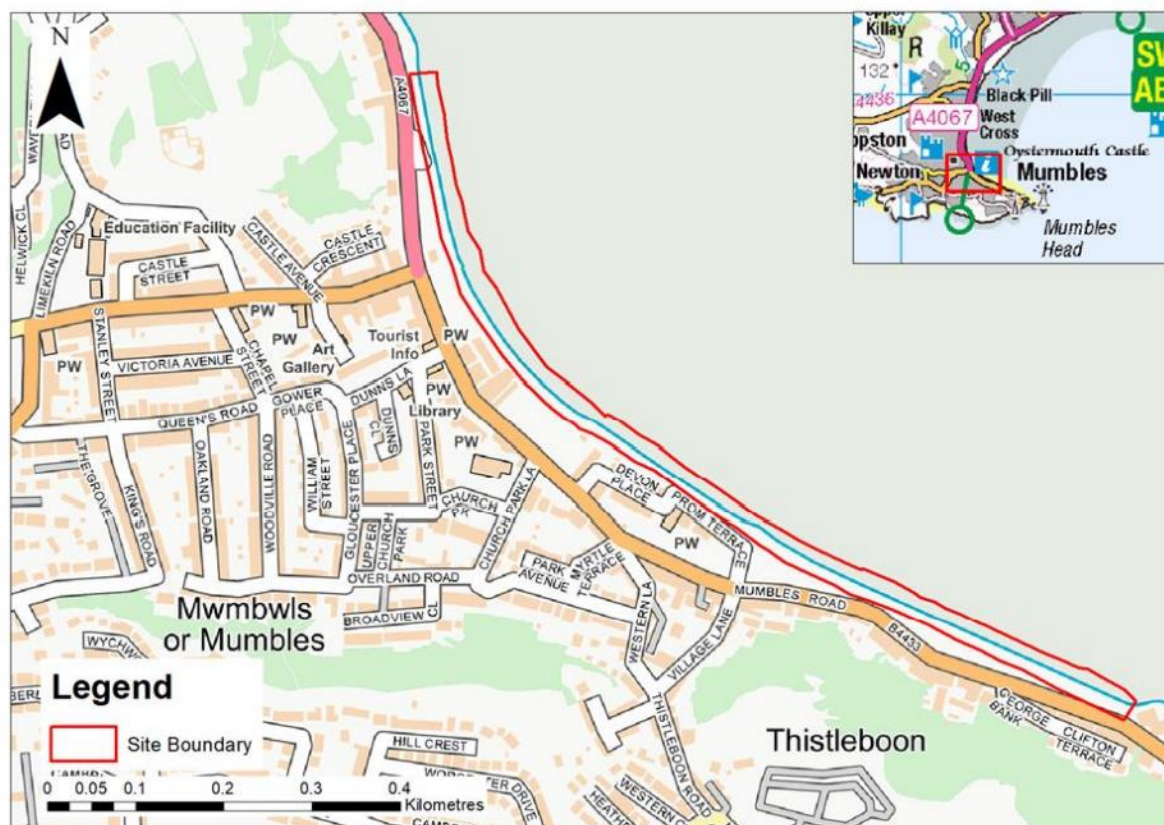


Figure 3-1 Site Location

3.2 Proposed Works

Full details of the design standards and criteria can be found in the associated Design Input Statement (JBA Consulting, 2020).

The OBC concluded that the preferred solution to manage the flood risk and achieve the scheme objectives would be to:

- Widen the promenade to approximately 6m by replacing the 80m length of existing sea wall;
- Repoint and patch repairs to the remaining 500m length of sea wall;
- Encase the existing concrete revetment with a new rock armour revetment;
- Construct a new parapet wall along the full length of both defences with a raised crest level;
- Raise land locally to maintain visibility along the length of the promenade; and
- Place rock armour at the toe of all defences to reduce the risk of erosion of the foreshore (which involves excavating material on the foreshore).

Detailed designs are still being developed as part of the FBC for the scheme, and therefore further information on the construction methodology is not available at this stage.

4 WFD Screening Assessment

4.1 Overview

This screening assessment aims to screen in any works that require WFD Assessment and to identify which WFD waterbodies are within and near to the proposed works.

The results of the assessment are presented below. A full and detailed WFD assessment will be required should it be concluded that the scheme could cause deterioration in the status of the water body or prevent it from achieving its status objectives.

4.2 WFD Water Bodies

The following water bodies have been assessed against the proposed works to identify potential conflicts with the WFD, and to identify whether they should be screened in or out of this WFD compliance assessment.

The proposed works are immediately adjacent to the Swansea Bay coastal water body and approximately 550m from the Bristol Channel Outer North coastal water body. The nearest river water body is the Clyne River- headwaters to tidal limit, located approximately 2.5km to the north of the proposed works location.

The proposed works location lies directly above the Gower Carboniferous Limestone ground water body.

Details of the classification, status and objectives for the water bodies identified above (as described by Water Watch Wales (Natural Resources Wales, 2021)), are summarised in Table 4.1 below.

Table 4.1 Current WFD Status

Water Body ID	Name	Hydromorphological Designation	Current Overall Status/ Potential	Overall Status Objective
GB641008260000	Swansea Bay	Heavily modified water body (HMWB) (for flood defence and navigation purposes, due to the presence of extensive artificial shoreline structures and the occurrence of dredging related activities within the water body)	Moderate (2018)	Good by 2027
GB611008590001	Bristol Channel Outer North	Not designated artificial/ heavily modified	Moderate (2018)	Good by 2021
GB110059025620	Clyne River- headwaters to tidal limit	Not designated artificial/ heavily modified	Poor (2018)	Good by 2027
GB41001G204000	Gower Carboniferous Limestone	Not applicable	Good (2015)	Good by 2015- objective has not been updated

4.3 Screening Outcome

4.3.1 Swansea Bay

The coastal water body lies immediately adjacent to the proposed works site. There is the possibility that the status of the Swansea Bay coastal water body could be affected by the works or that the works could prevent it from achieving its status objectives. Therefore, the Swansea Bay coastal water body has been **screened in** to the screening assessment, and the potential impacts of the works on the quality elements of this water body are considered in Section 4.4 below.

4.3.2 Bristol Channel Outer North

This coastal water body is located approximately 550m to the south of the proposed works site but has no direct hydrological connection to the works area, as it is separated by the Swansea Bay coastal water body. Due to this fact, the proposed works are not expected to impact the status of this water body or prevent it from achieving its objectives. As such, the Bristol Channel Outer North coastal water body has been **screened out** of this assessment and will not be considered further.

4.3.3 Clyne River-Headwaters to Tidal Limit

The worksite is located approximately 2.5km to the south of this water body. There is no direct hydrological connection to the Clyne River as it is upstream from the proposed works and is geographically distant. Due to the distance from the site, the proposed works are not expected to impact the status of this water body or prevent it from achieving its objectives. As such, the Clyne River- headwaters to tidal limit water body has been **screened out** of this assessment and will not be considered further.

4.3.4 Gower Carboniferous Limestone Ground Water Body

The proposed works lie above the Gower Carboniferous Limestone ground water body. However, the coastal defence works do not involve any deep excavations or any other actions that could affect groundwater. As such, the Gower Carboniferous Limestone ground water body has been **screened out** of this assessment and will not be considered further.

4.4 Swansea Bay- Baseline Status

4.4.1 Ecological Status/ Potential- Biological Quality Elements

Only one Biological Quality Element has been identified for the Swansea Bay coastal water body, this is benthic invertebrates which have a current status of good (2018), and an objective of good by 2021.

Conclusion: The construction of the proposed coastal defence works does not involve any significant disturbance to marine sediments or working within the marine environment (beyond the immediate foreshore) where benthic invertebrates are present. Any indirect effects of the works on the benthic invertebrate status of the coastal water body are also screened out due to the small-scale nature of the works, with no potential to change the status of the water body as a whole. Furthermore, standard pollution precautions and a construction management plan will be in place. Therefore, no further assessment is required for Biological Quality Elements.

4.4.2 Hydromorphological Quality Elements

The specific Hydromorphological Quality Element for this water body is flow, however freshwater flow does not apply to coastal water bodies and therefore this has been assumed to be linked to the hydromorphological supporting conditions of coastal water bodies- including coastal processes generally.

Conclusion: The construction of the proposed coastal defence will involve repairing the existing hard defences and placing new rock armour revetment at the toe of the existing defences. These actions are very small-scale in nature and are not anticipated to cause any effect on the hydrological supporting elements and coastal processes at play in the Swansea Bay water body as a whole and they have been screened out. Therefore, no further assessment is required for Hydromorphological Quality Elements.

4.4.3 Physico-Chemical Quality Elements

One Physico-Chemical Quality Element has been identified for the Swansea Bay coastal water body, this is dissolved inorganic nitrogen (DIN), which is currently at moderate status (2018).

Conclusion: The construction and operation of the proposed coastal defence has no potential to increase DIN in the coastal waterbody, as no nitrogen sources are involved in the proposed works. Furthermore, standard pollution precautions and a construction management plan will be in place. Therefore, no further assessment is required for Physico-Chemical Quality Elements.

4.4.4 Specific Pollutants

Specific pollutants identified for the Swansea Bay coastal water body are Arsenic and Zinc, both have a current status of good (2018).

Conclusion: The proposed works to the foreshore will be timed to be completed during low tides which will reduce the amount of additional suspended sediment input into the water body. The works to excavate the foreshore for installation of the rock armour will be completed in stages. Excavated material will be placed on the foreshore temporarily during low tides and reinstated at each working area before the next section is commenced. Therefore, there will not be significant releases of sediments (or the specific pollutants that may be contained within them) as a result of the works. In addition, the existing condition of the water body at the site immediately adjacent to the foreshore is a highly turbid environment, and any pollutants contained within the sediment would be regularly disturbed as part of the natural regime.

Therefore, no further assessment is required for specific pollutants.

4.4.5 Chemical Status

The chemical status of the Swansea Bay coastal water body was assessed in 2018 and considered to fail, based on high levels of numerous chemicals present, including DDT and metals such as Lead and Nickel.

Conclusion: The proposed works to the foreshore will be timed to be completed during low tides which will reduce the amount of additional suspended sediment input into the water body. The works to excavate the foreshore for installation of the rock armour will be completed in stages. Excavated material will be placed on the foreshore temporarily during low tides and reinstated at each working area before the next section is commenced. Therefore, there will not be significant releases of sediments (or the chemicals which they may contain). Therefore, the proposed coastal defence works do not have the potential to impact on the chemical status of the coastal water body. No further assessment of chemical status is required.

4.5 Protected Areas

The WFD specifies that areas requiring special protection under other EC Directive and waters used for the abstraction of drinking water are identified as protected areas. These areas have their own objectives and standards. Article 4 of the WFD requires Member States to achieve compliance with the standards and objectives set for each protected area, unless otherwise specified in the community legislation under which the protected area was established.

The works are located in proximity to the following protected areas for nature conservation that need addressing under the WFD: Gower Ash Woods / Coedydd Ynn Gwyr Special Area of Conservation (SAC) and the Limestone Coast of South West Wales / Arfordir Calchfaen De Orllewin Cymru SAC.

A separate Habitats Regulations Assessment (HRA) screening report has been completed which concluded no likely significant effects on the two SAC designated sites as a result of the proposed coastal defence works (JBA Consulting, 2021). Therefore, these protected areas do not require any further assessment and will not be considered further in this WFD screening.

There are no Nitrate Vulnerable Zones (NVZ) or Drinking Water Protected Areas in proximity to the proposed works location.

The proposed works site lies directly adjacent to the Swansea Bay (West) Shellfish Water Protected Area, with the Swansea Bay (South) and Swansea Bay (East) Shellfish Water Protected Areas also present in close proximity, within the wider bay. Shellfish Water Protected Areas are designated for the protection of economically significant species, and water quality (specifically the concentrations of bacteria such as E Coli.) is the most important factor in maintaining these areas. The proposed works for the Mumbles coastal defence scheme are not anticipated to affect E Coli. distributions or concentrations within the wider Swansea Bay area, and the works will not result in significant releases of sediment or any other pollutants. Therefore, the works will not impact on the Shellfish Water Protected Areas of Swansea Bay.

The proposed works are also in close proximity to the designated bathing waters of Swansea Bay, Bracelet Bay and Limeslade Bay. The works are not anticipated to change or impact the hydrodynamics of Swansea Bay or the wider area, or to result in significant releases of sediment or pollutants, due to their small-scale nature and the staged timing of the excavations. Therefore, the proposed works will not impact on the bathing waters designated in the area.

5 Conclusion

The proposed coastal defence works at Mumbles Bay are considered to be compliant with the WFD objectives for the water bodies in the vicinity of the proposed works.

All of the quality elements of the Swansea Bay coastal water body have been screened out of this WFD assessment, as there is no potential for the works to impact upon them. In addition, no impacts on protected areas have been identified.

No further WFD assessment is considered necessary unless the proposed works are significantly altered at the detailed design stage.

References

JBA Consulting (2020) *Mumbles Coastal Defence Scheme: Design Input Statement*. Unpublished.

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