# Central Prestatyn Coastal Defence

## Water Framework Directive Assessment

**July 2021**

**www.jbaconsulting.com**

**Balfour Beatty and Denbighshire County Council**

## JBA Project Manager

Sam Wingfield
JBA Consulting
Mersey Bank House
Barbauld Street
Warrington
WA1 1WA

## Revision History

| Revision Ref/Date | Amendments | Issued to |
|---|---|---|
| Final Report / July 2021 | - | Balfour Beatty and Denbighshire County Council |

## Contract

This report describes work commissioned by Balfour Beatty and Denbighshire Council. Susannah Reid and Anissia Halwyn of JBA Consulting carried out this work.

Prepared by ..... Susannah Reid BSc

Assistant Ecologist

..... Anissia Halwyn BSc PhD

Eco-geomorphologist

Reviewed by ..... Kieran Sheehan BSc MSc PGCE CEnv MCIEEM MIfL

Technical Director

## Purpose

This document has been prepared as a Final Report for Balfour Beatty and Denbighshire Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to Balfour Beatty and Denbighshire Council.

## Copyright

© Jeremy Benn Associates Limited 2021.

## Carbon Footprint

JBA is aiming to reduce its per capita carbon emissions.

## Contents


| | | |
|---|---|---|
| 1 | Introduction | 1 |
| 1.1 | WFD Overview | 1 |
| 1.1.1 | Scope of the WFD Assessment | 1 |
| 1.1.2 | Preventing Deterioration in Status | 1 |
| 1.1.3 | Artificial or Heavily Modified Water Bodies | 2 |
| 1.2 | Purpose of this WFD Assessment | 3 |
| 2 | Assessment Methodology | 4 |
| 2.1 | Overview | 4 |
| 2.2 | Screening Assessment | 4 |
| 2.3 | Scoping Assessment | 5 |
| 2.4 | Impact Assessment | 5 |
| 3 | Project Description | 7 |
| 3.1 | Project Overview | 7 |
| 3.2 | Proposed Works | 7 |
| 4 | WFD Screening Assessment | 9 |
| 4.1 | Overview | 9 |
| 4.2 | WFD water bodies | 9 |
| 4.2.1 | Current status | 9 |
| 4.3 | Screening Outcome: water bodies | 9 |
| 4.4 | Baseline Status of screened-in water bodies | 10 |
| 4.4.1 | WFD status of water body GB641011650000 - North Wales | 10 |
| 4.5 | Protected Areas | 10 |
| 4.5.1 | Nitrate Vulnerable Zones (NVZ) | 10 |
| 4.5.2 | Drinking Water Groundwater Safeguard Zones (SgZ) | 10 |
| 4.5.3 | Other Protected Areas | 11 |
| 4.6 | Summary | 11 |
| 5 | WFD Scoping Assessment | 12 |
| 5.1 | Overview | 12 |
| 5.2 | Scoping Assessment | 12 |
| 5.2.1 | Biological Quality Assessment | 12 |
| 5.2.2 | Hydromorphological Quality Elements | 13 |
| 5.2.3 | Physico-Chemical Quality Assessment | 15 |
| 5.3 | Impacts of works on protected sites | 18 |
| 6 | WFD Impact Assessment | 20 |
| 6.1 | Overview | 20 |
| 6.2 | Impact Assessment | 20 |
| 6.3 | Water body Mitigation Measures | 23 |
| 6.4 | WFD Assessment Objectives | 25 |
| 7 | Discussion and Conclusions | 26 |
| 7.1 | Assessment Summary | 26 |
| 7.1.1 | Biological Assessment | 26 |
| 7.1.2 | Hydromorphological Assessment | 26 |
| 7.1.3 | Physico-Chemical Assessment | 26 |
| 7.2 | Scheme Recommendations/Key Considerations | 26 |
| 7.3 | Conclusions | 27 |
| A | Supporting Evidence | 28 |
| References | | I |

## List of Figures

Figure 2-1: WFD assessment process flow chart 4
Figure 3-1: Site Location 7

## List of Tables

Table 4-1: Current WFD status 9
Table 5-1: Assessment of works against the biological elements 12
Table 5-2: Assessment of works against the hydromorphological quality elements 13
Table 5-3: Assessment of works against the physico-chemical quality elements 15
Table 5-4: Assessment of works on protected sites 18
Table 6-1: Impacts and mitigation measures 20
Table 6-2: Assessment of proposed works against the water body's mitigation measures 23
Table 6-3: Assessment of proposed works against WFD objectives 25

## Abbreviations

| | |
|---|---|
| NVZ | Nitrate Vulnerable Zones |
| PEA | Preliminary Ecological Appraisal |
| RBD | River Basin District |
| RBMP | River Basin Management Plan |
| SAC | Special Area of Conservation |
| SPA | Special Protection Area |
| WFD | Water Framework Directive |

# 1 Introduction

## 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. The Directive imposes legal requirements to protect and improve the water environment. All activities in the water environment need to take the Directive into account. 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 2003 regulations were consolidated and replaced with the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 ensure that floods and water legislation continues to be operable in the United Kingdom following withdrawal from the EU in January 2021. The instrument addresses deficiencies in retained EU law arising from the UK's withdrawal from the EU. The purpose of the instrument is to preserve and protect the existing policy regime rather than to introduce new policy. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, as amended by the Floods and Water (Amendment etc.) (EU exit) Regulations 2019, are hereafter referred to as the WFD Regulations in this report.

### 1.1.1 Scope of the WFD Assessment

The WFD Regulations require 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 2021. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status/potential by 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.
- 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[1].

For each water body, three different status objectives are identified within the 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

1 Environment Agency (2010) Assessing new modifications for compliance with WFD: detailed supplementary guidance: 488_10_SD01

Artificial Water Bodies) of the water body. Note, the Ecological Status applies only to surface water bodies, and not ground water bodies. A separate assessment may be required to assess the impacts on the chemical and quantitative status of a ground water body, if the proposed activity is likely to cause impact.

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 WFD Regulations and are listed below. The overall Ecological Status is determined by the lowest element status.

The Biological Quality Elements assessed in the WFD include:

- Composition, abundance and biomass of phytoplankton
- Composition and abundance of other aquatic flora
- Composition and abundance of benthic invertebrate fauna

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

- Depth variation
- Structure and substrate of the coastal bed
- Structure of the intertidal zone
- Direction of dominant currents
- Wave exposure

The WFD considers the chemistry of a water body through general water quality (physico-chemical measurements) and chemical pollutants. All three environmental components; morphology, hydrology and chemistry, support the Biology of a water body.

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 Catchment Data Explorer.

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

JBA Consulting was commissioned by Balfour Beatty and Denbighshire County Council to undertake a WFD assessment in relation to proposed works to create a new coastal flood embankment at Rhyl Golf Course in Rhyl/Prestatyn, Denbighshire.

This WFD assessment aims to determine the effects of the proposed flood embankment 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 adjacent to the North Wales coastal water body and falls within the Western Wales River Basin District (RBD). The Environmental Objectives, together with any specific actions (mitigation measures) necessary to enable the water body to meet these objectives, are set out in the Western Wales river basin district river basin management plan (RBMP) and the Natural Resources Wales' Water Watch Wales website.

# 2 Assessment Methodology

## 2.1 Overview

The following flow chart summarises the WFD Assessment process.

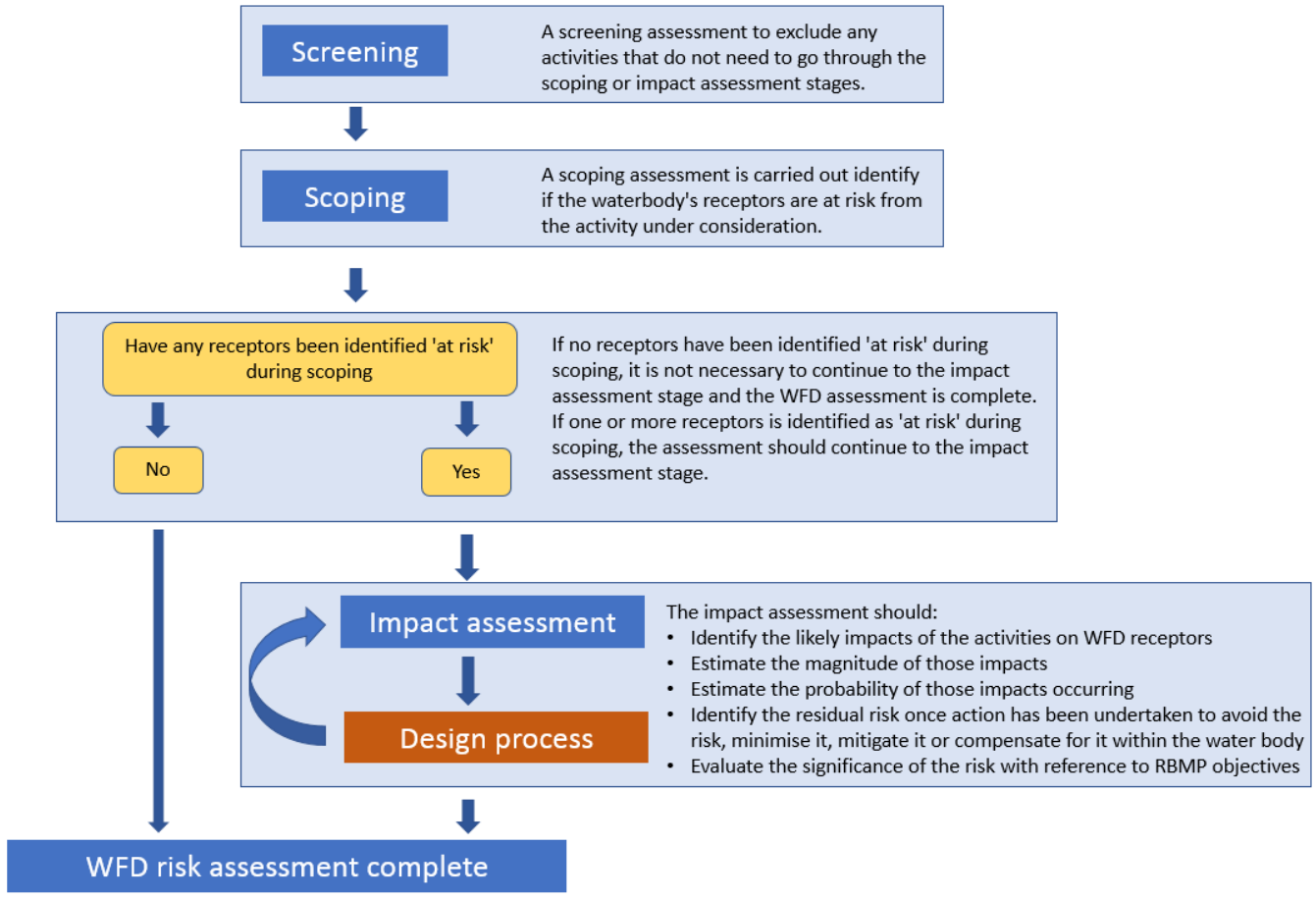



**Figure 2-1: WFD assessment process flow chart**

## 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 Western Wales RBMP and the Natural Resources Wales' Water Watch Wales website were used to determine which water bodies could be potentially affected by the proposed works. The names, ID numbers, designation, status classification and objectives for all relevant water bodies were obtained and downloaded from the Natural Resources Wales' Water Watch Wales website.

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 Status of the water body, which comprises biology, hydrology, hydromorphology and water chemistry, and the water body 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 therefore derived from the Environmental Objectives of the Directive (as listed in section 1.2).

- Objective 1: The proposed scheme does not cause deterioration in the Status of the Ecological 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 compromise 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. The assessment shows how any impact on WFD receptor caused by the proposed activity fits with the objectives of any affected WFD water bodies. 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?

When these questions are answered, the following should be borne in mind:

- A water body deteriorates in status when one WFD receptor (an "element") is affected such that it drops from one WFD status class to another.

- A significant localised impact on an element is one that is either long-lasting; causes severe harm; or affects a wide area within a water body. These are likely to contribute to a water body dropping from one status to another and highly likely to prevent action to get water bodies to good status.
- Elements at high status are very sensitive. The assessment will need to demonstrate that there will be a negligible impact on those aspects of the water environment
- Elements at bad status must not be made worse.

If it cannot be demonstrated with a high level of confidence that the activity supports RBMP objectives, then in order for the Environment Agency 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 struct environmental and sustainability criteria.

# 3 Project Description

## 3.1 Project Overview

The site is located at Rhyl Golf Course in Prestatyn, North Wales. Rhyl Golf Course is surrounded by residential housing to the west (Rhyl), a holiday park to the south and a sand dune system and residential area (Prestatyn) to the east. The site is separated from Ffrith beach by an existing sea wall. Beyond the holiday park, across a railway line, the wider landscape is predominantly agricultural. (see Figure 3-1).

An asset condition assessment found that the existing defence adjacent to Rhyl Golf Course is nearing the end of its life and there have been a number of severe floods in the area following storm events which have resulted in the evacuation of local properties. Therefore, a new flood defence is required to ensure the continued protection of properties in the area against coastal flooding.

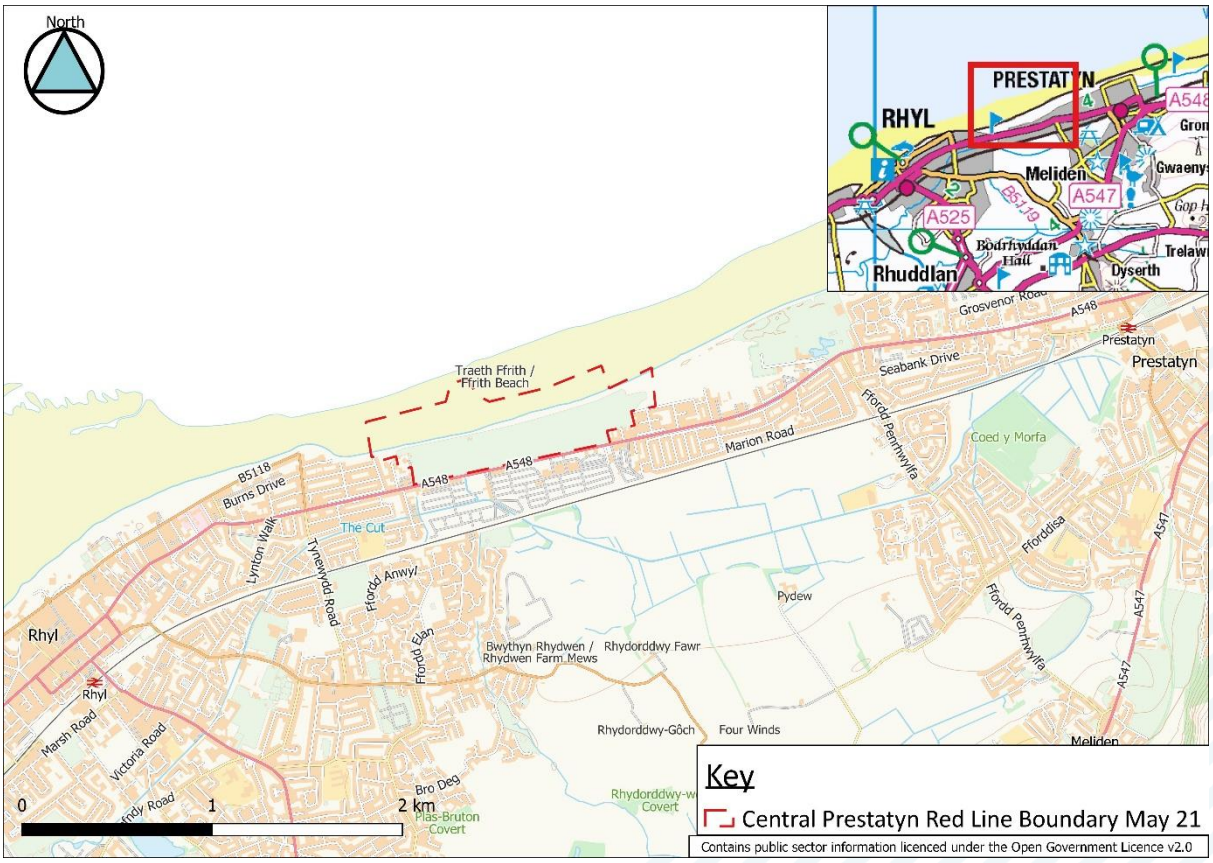



**Figure 3-1: Site Location**

## 3.2 Proposed Works

The Central Prestatyn coastal defence scheme involves the creation of a new flood embankment set back from the existing defence. No detailed designs are currently available; however, it will surround the western, southern and eastern boundaries of Rhyl Golf Course, LL18 3RE, situated along the Rhyl Coast Road and will tie-in with existing defences to the east and west.

The proposed embankment is approximately 1.66km long with a typical sloped gradient of 1 in 3 and a crest width of 3m. The final build level of the embankment crest will be approximately 8.30mAOD and the width of the embankment footprint will be approximately 26m. Works that will occur below the Mean High Water Springs (MHWS) include tie-in rock revetments, patch repairs to the steps of the promenade, and two rock armour scour protection areas along the toe of the existing stepped revetment to provide protection to

the existing defence against the risk of undermining from discharged flood water through the new culverts.

The western tie-in will be formed of several key structural elements including:

- A new rock armour revetment along the seaward slope of the embankment at the west frontline tie-in location. This will protect against the risk of wave action and reduce overtopping rates to an acceptable overtopping threshold limit. The new rock armour will be emplaced in the main to protect the existing defence against scour and undermining. This will ensure the existing defence does not fail in this area and compromise the integrity and wave overtopping performance of the new embankment behind.
- A new extension to a concrete slipway, with a 1 in 10 slope, through the rock amour scour protection is also required to maintain access to the sandy beach.

A General Arrangement and Typical Sections Plan is available in Appendix A.2. The proposed works will be carried out between spring 2022 and winter 2024.

# 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 water bodies are within and near to the proposed works.

The results of the screening assessment are presented below. The baseline status of the Quality Elements within the water bodies screened into the assessment are discussed in this chapter. As discussed in the Introduction and Methodology, if this section finds there is potential for the proposed works to cause deterioration in the status of a water body, or prevent it from achieving its status objectives, the relevant water body and its Quality Elements should be taken forward and consider further in the Scoping Assessment chapter.

## 4.2 WFD water bodies

- Coastal waterbody GB641011650000 - North Wales. Works are taking place in and adjacent to this waterbody.
- Groundwater GB41001G202100 - Clwyd Permo-Triassic Sandstone. The works are located within this ground waterbody.

### 4.2.1 Current status

Details of the classification, status and objectives, as described by NRW's Water Watch Wales, are summarised in Table 4-1 below.

**Table 4-1: Current WFD status**

| Water body ID | Name of water body | Hydromorphological designation | Current Overall Status/ Potential | Current Ecological Status/ Potential | Overall Status Objective |
|---|---|---|---|---|---|
| GB641011650000 | North Wales | Heavily Modified | Moderate | Moderate | Good by 2021 |
| GB41001G202100 | Clwyd Permo-Triassic Sandstone | Groundwater | Good | N/A | Good by 2021 |

## 4.3 Screening Outcome: water bodies

The following table indicates which water bodies have been screened in or out of the assessment and the reasons for this decision.

| Water bodies | Reason | Screening outcome |
|---|---|---|
| GB641011650000 - North Wales | Works will be taking place in and adjacent to this waterbody and therefore have the potential to impact the WFD status and objectives. | Screened IN |
| GB41001G202100 - Clwyd Permo-Triassic Sandstone | The works are superficial and do not involve abstraction. There are not considered any pathways by which the | Screened OUT |

| | | |
|---|---|---|
| | proposed works might impact upon groundwater. | |

## 4.4 Baseline Status of screened-in water bodies

For each water body screened into the assessment, details on the status of each element, as described by NRW's Water Watch Wales (2018), are given below.

### 4.4.1 WFD status of water body GB641011650000 - North Wales

The three tables below describe the current status of the Ecological Elements according to the most recent WFD cycle.

| Biological Quality Element | Current Status (2018) | Objective |
|---|---|---|
| Invertebrates | Good | Not set |
| Imposex | Good | Not set |
| Phytoplankton | Moderate | Not set |

| Hydromorphological Quality Element | Current Status | Objective |
|---|---|---|
| Hydrological Regime | Not assessed | Not set |
| Morphology | Not assessed | Not set |

| Physico-Chemical Quality Element | Current Status | Objective |
|---|---|---|
| Dissolved Oxygen | High | Not set |
| Dissolved Inorganic Nitrogen | Good | Not set |
| Annex 8 Chemical | High | Not set |

## 4.5 Protected Areas

The WFD specifies that areas requiring special protection under other retained 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 by 22nd December 2015, unless otherwise specified in the legislation under which the protected area was established.

The water body is linked to Liverpool Bay Special Protection Area (SPA), The Dee Estuary (Wales) SPA, Bathing water 40700 and shellfish waters.

### 4.5.1 Nitrate Vulnerable Zones (NVZ)

The retained European Commission Nitrates Directive requires areas of land that drain into waters polluted by nitrates to be designated as Nitrate Vulnerable Zones (NVZs).

Waterbody GB641011650000 is located adjacent to groundwater NVZ 135.

### 4.5.2 Drinking Water Groundwater Safeguard Zones (SgZ)

Drinking Water Protected Areas (DrWPA) are designated under the retained Water Framework Directive, with the aim of avoiding deterioration in their quality in order to reduce the level of purification treatment required in the production of drinking water. SgZs are areas where actions will be targeted to address the causes of DrWPA objective failure/risk of failure.

Waterbody GB641011650000 is not linked to any Drinking Water Protected Areas.

### 4.5.3 Other Protected Areas

The coastal waterbody North Wales (GB641011650000) is linked to Liverpool Bay Special Protection Area (SPA), The Dee Estuary (Wales) SPA, Bathing water 40700 and shellfish waters.

## 4.6 Summary

To conclude the Screening Assessment, the following quality elements need to be considered further within the Scoping Assessment:

- Water body North Wales (GB641011650000)
  - Biological Elements
  - Hydromorphological Elements
  - Physico-chemical Elements
  - Protected Areas

# 5 WFD Scoping Assessment

## 5.1 Overview

This scoping assessment identifies whether the water body's receptors, identified during the screening assessment, are at risk from the proposed works discussed in Chapter 3. This assessment is supported by the evidence in the Appendix. The proposed development works are being appraised in terms of their impact on WFD status and objectives. If any Quality Elements are found to be at risk of detrimental impact, further assessment and/ or mitigation may be required in the next chapter (as demonstrated by the final column).

Some WFD Quality Elements have not been formally assessed as part of the classification for this water body. However, due to the scale and nature of the proposed works, all WFD Quality Elements have been included in the previous screening and any identified impacts have been considered in relation to the ecological status of the water body and the status objectives.

Article 4.7 of the Directive defends deterioration in status or failure to meet WFD objectives resulting from new modifications or sustainable human development activities (if all conditions set out under this Article are met). If the assessment procedure predicts that an activity will cause deterioration in water body status or prevent a water body from meeting its ecological objectives, then an assessment is also required against the conditions listed in Article 4.7 of the WFD. If all the assessment conditions are met, there will not be a breach of the WFD and compliance will be attained.

## 5.2 Scoping Assessment

### 5.2.1 Biological Quality Assessment

Table 5-1 presents an assessment of the proposed works against the biological quality elements of the North Wales coastal water body GB641011650000.

**Table 5-1: Assessment of works against the biological elements**

| WFD Quality Element | Current Status | Potential Impact | Further assessment and/or mitigation required? |
|---|---|---|---|
| Invertebrates | Good | No impacts on this WFD receptor are anticipated as a result of the works.<br>The majority of the works will be set back from the sea wall with only temporary impacts on invertebrates expected due to disturbance during the works on the beach. All works on the beach will occur at low tide. Any impacts through disturbance, pollution and increased levels of suspended sediment lowering oxygen levels will be minimal as appropriate pollution prevention guidance* will be implemented throughout. | No |
| Imposex | Good | No, the works will not result in the input of TBT into the waterbody. Therefore, no impacts on this WFD | No |

| | | | |
|---|---|---|---|
| | | receptor are predicted resulting from the works. | |
| Phytoplankton | Moderate | No adverse impacts on phytoplankton communities are anticipated, due to all the works on the beach occurring at low tide. Any impacts through pollution and increased levels of suspended sediment lowering oxygen levels will be minimal as appropriate pollution prevention guidance* will be implemented throughout.<br>Construction of the rock armour has the potential to provide new habitat opportunities for a range of marine fauna and flora. | No |

### 5.2.2 Hydromorphological Quality Elements

Table 5-2 presents an assessment of the proposed works against the hydromorphological quality elements of the North Wales coastal water body GB641011650000.

**Table 5-2: Assessment of works against the hydromorphological quality elements**

| WFD Quality Element | Current Status | Potential Impact | Further assessment and/or mitigation required? |
|---|---|---|---|
| Direction of dominant currents | Not assessed | The proposed defences are predominantly set back from the foreshore and will only interact with currents during more severe storm events. The proposed works below MHWS (rock armour tie-ins, the rock armour scour protection areas along the toe of the existing defence and the new extension to the existing concrete slipway) could have impacts on water flow during construction, from the temporary storage of rock armour material on the beach. These works will be extending the footprint of the existing hard defence on the foreshore and could therefore also have a potential impact on the direction of dominant currents during operation. | Yes. Potential impacts have been identified during scoping and the proposed works also need to be further assessed due to the fact they are taking place in a waterbody that is designated as heavily modified due to coastal protection. |
| Wave exposure | Not assessed | The proposed defences are predominantly set back from the foreshore and will only interact with waves during more severe storm | Yes. Potential impacts have been |

| | | | |
|---|---|---|---|
| | | events. With future sea level rise, it is likely that the proposed defences will be inundated more frequently and at greater depth as the existing defence fails. The proposed defence will allow better accommodation of the increasing tidal prism and better dissipation of wave energy in future in comparison to raising the existing defence.<br>The proposed works below MHWS (rock armour tie-ins, the rock armour scour protection areas along the toe of the existing defence and the new extension to the existing concrete slipway) could have impacts on wave action during construction, from the temporary storage of rock armour material on the beach. These works will be extending the footprint of the existing hard defence on the foreshore and could therefore also have a potential impact on wave exposure during operation. | identified during scoping and the proposed works also need to be further assessed due to the fact they are taking place in a waterbody that is designated as heavily modified due to coastal protection. |
| Depth variation | Not assessed | Water depths will be reduced above the footprint of the proposed works below MHWS (rock armour tie-ins, the rock armour scour protection areas along the toe of the existing defence and the new extension to the existing concrete slipway). Depths will also be reduced above the footprint of the temporary stores of rock armour. | Yes. Potential impacts have been identified during scoping and the proposed works also need to be further assessed due to the fact they are taking place in a waterbody that is designated as heavily modified due to coastal protection. |
| Structure and substrate of the coastal bed | Not assessed | Alterations to the hydrological regime during construction below MHWS (see above) could have indirect impacts on the structure and substrate of the coastal bed, such as the drawdown of beach material around the temporary storage of rock armour material. | Yes. Potential impacts have been identified during scoping and |

| | | | |
|---|---|---|---|
| | | Excavation during the works below MHWS will directly could result in sediment mobilisation. During operation, hydrodynamic changes may have impacts on adjacent beach morphology, as a result of erosional and depositional processes. Cross-shore sediment transport may also be impacted by the structures, causing deposition of sediment on the side of the structure facing the prevailing wind and beach lowering on the opposite side. | the proposed works also need to be further assessed due to the fact they are taking place in a waterbody that is designated as heavily modified due to coastal protection |
| Structure of the intertidal zone | Not assessed | The proposed works will have direct physical impacts on coastal morphology, on the beach and the adjacent sand dunes (supratidal) during construction. | Yes. Potential impacts have been identified during scoping and the proposed works also need to be further assessed due to the fact they are taking place in a waterbody that is designated as heavily modified due to coastal protection |

### 5.2.3 Physico-Chemical Quality Assessment

Table 5-3 presents an assessment of the proposed works against the physico-chemical quality elements of the North Wales coastal water body GB641011650000.

**Table 5-3: Assessment of works against the physico-chemical quality elements**

| WFD Quality Element | Current Status | Potential Impact | Further assessment and/or mitigation required? |
|---|---|---|---|
| Transparency | Not assessed | During construction, transparency levels could be affected locally in the short term through | No |

| | | | |
|---|---|---|---|
| | | increased sedimentation. However, works in the marine environment are limited and therefore impact on transparency is unlikely. These risks will be effectively managed through a programme of mitigation measures implemented through a Construction Environmental Management Plan (CEMP).<br>The permanent works are not anticipated to impact this WFD receptor, as there will be minimal alterations to the flood embankment. | |
| Thermal conditions | Not assessed | No changes to thermal conditions are expected as a result of the works. Therefore, no impacts on this WFD receptor are predicted. | No |
| Salinity | Not assessed | No changes to salinity are expected as a result of the works. Therefore, no impacts on this WFD receptor are predicted. | No |
| Oxygenation conditions | Not assessed | During construction, dissolved oxygen levels could be affected locally in the short term through increased sedimentation. However, works in the marine environment are limited and therefore impact on dissolved oxygen is unlikely. These risks will be effectively managed through a programme of | No |

| | | | |
|---|---|---|---|
| | | mitigation measures implemented through a Construction Environmental Management Plan (CEMP). The proposed works will not affect other physicochemical elements.<br>The permanent works are not anticipated to impact this WFD receptor, as there will be minimal alterations to the flood embankment. | |
| Nutrient conditions | Not assessed | No inputs of nutrients are expected as a result of the works. Therefore, no impacts on this WFD receptor are predicted. | No |
| Specific pollutants | High | During temporary works there is the potential for the release of contaminated sediments, if present, into suspension.<br>These risks be managed effectively through a programme of mitigation measures implemented through a Construction Environmental Management Plan (CEMP). Pollution prevention measures* will be properly implemented throughout the process to avoid any pollution events. Having these measures in place will reduce the potential for these occurrences so no impacts on these WFD receptors are predicted resulting from the works. The permanent works are | No |
| Pollution by all priority substances identified as being discharged into the body of water | Not assessed | | No |
| Pollution of other substances identified as being discharged in significant quantities into the body of water. | Not assessed | | No |

| | | | |
|---|---|---|---|
| | | not anticipated to impact this WFD receptor. | |

*Relevant pollution prevention guidance to be followed (e.g. CIRIA Guidance: Control of water pollution from construction sites. Guidance for consultants and contractors (C532D) (Masters-Williams, 2001). Pollution prevention measures will include the use of plant nappies and storage of plant and fuels away from the waterbody. Spill kits will be available on site in case of accidental fuel spillages.

## 5.3 Impacts of works on protected sites

Table 5-4 presents an assessment of the proposed works against any protected sites identified in the North Wales coastal water body GB641011650000.

**Table 5-4: Assessment of works on protected sites**

| Name | Current status | Potential Impact | Further assessment and/or mitigation required? |
|---|---|---|---|
| Groundwater NVZ 135 | Not applicable | The works are superficial and do not involve abstraction. Therefore, no impacts on Nitrate Vulnerable Zone (NVZ) 135 are anticipated. | No |
| Liverpool Bay Special Protection Area (SPA) | Not applicable | The EcIA (see ES Chapter 3) confirms that the proposed scheme is not likely to have a significant adverse effect on the features of the Liverpool Bay SPA. An HRA Screening (Stage 1) Assessment is also being carried out. | No |
| The Dee Estuary (Wales) SPA | Not applicable | In the EcIA this designation was considered a sufficient distance away from the works so that the proposed scheme is not likely to have a significant adverse effect on the features of the site. | No |
| Bathing waters 40700 | Excellent | The construction works are not likely to present a risk to bathing water quality due to the limited | No |

| | | | |
|---|---|---|---|
| | | nature and extent of the proposed works. | |
| Shellfish waters | Not applicable | The site is considered a sufficient distance away from the works that the proposed scheme is not likely to have a significant adverse effect on any shellfish waters site. | No |

# 6 WFD Impact Assessment

## 6.1 Overview

The Scoping Assessment presented in Chapter 5 identified some receptors may potentially be at risk from the proposed works. An Impact Assessment is therefore required to describe how these identified impacts will be mitigated.

The Impact Assessment needs to consider if there is a pathway linking the pressure to the receptor. If there is no pathway there can be no impact on the receptor and there is no need for any further assessment of that receptor to be carried out. If there is a potential pathway the assessment should consider if the activity, and the pressure it creates, may cause deterioration of the receptor.

In order to effectively assess the potential impacts of the proposed works and decide upon suitable mitigation measures, a good understanding of the proposed scheme and design is required. Should any revisions be made to the proposed works that could impact any of the WFD Quality Elements, this section should be revised.

## 6.2 Impact Assessment

Table 6-1 discusses each of the receptors identified as being potentially at risk in the scoping assessment. Mitigation measures are recommended to mitigate the effects of the proposed works. It should be noted that these mitigation measures differ to the Mitigation Measures identified for any Heavily Modified water body.

**Table 6-1: Impacts and mitigation measures**

| WFD Quality Element | Pathway (direct / indirect/ none) | Potential Impact/ Mitigation measures |
|---|---|---|
| Direction of dominant currents<br>Structure and substrate of the coastal bed | Direct<br>Indirect | **Permanent Impact:** The local current regime may be altered by the proposed defences and slipway below MHWS and, as their footprint extends onto the foreshore, flow paths may be intercepted. This could cause changes to sedimentation patterns, with scour in some areas and accretion in others. However, the majority of the proposed defence is set back from the foreshore; therefore, these impacts should be small-scale and limited to the local area and unlikely to impact the overall status of the waterbody. |
| Direction of dominant currents<br>Structure and substrate of the coastal bed | Direct<br>Indirect | **Temporary Impact:** All rock and materials required to build the new culvert outfall structures and rock armour scour protection will be transported to the required location and locally stockpiled on the beach for a short period. The storage area is likely to be below MHWS. The storage of the material could cause small-scale changes to current flows over and around the rock piles, which could increase turbulence, resulting in increased localised sediment mobilisation. The potential rate of erosion will depend on the current velocity, and will therefore be dependent on the tidal state, wave height and the duration that the rock |

| | | |
|---|---|---|
| | | piles remain on the beach. Following removal of the rock pile, the beach profile is anticipated to return to its previous state.<br>**Mitigation:** The material should be stored on the upper shore to minimise frequency and duration of inundation and only stored for a short period (approximately two months maximum). No further mitigation is required as the beach profile is anticipated to return to its previous state following removal of the rock material. |
| Wave exposure<br>Structure and substrate of the coastal bed | Direct<br>Indirect | At the rock armour tie-ins, scour protection around the culvert and extended slipway will be inundated on every high tide, there is a risk that wave reflection may increase, which could cause erosion and drawdown of the beach sediment immediately adjacent to the proposed structures. However, the rock armour has been designed to be a similar, low gradient to the existing beach profile to reduce wave reflection. In addition, the proposed works are limited to the tie ins and culverts rather than the entirety of the existing defence; therefore, any impacts will be small-scale and limited to the immediate vicinity of the rock armour. |
| Depth variation | Direct | The proposed works below MHWS will reduce water depths in the immediate vicinity. However, the proposed works are limited to the tie ins and culverts rather than the entirety of the existing defence; therefore, any impacts will be small-scale and limited to the footprint of the rock armour, without posing a risk to overall depth variation within the water body. |
| Structure and substrate of the coastal bed | Direct | **Temporary Impact:** There is a risk that sediment mobilisation could occur during construction, particularly during excavation, for the proposed works under MHWS.<br>**Mitigation:** All work on the beach shall be undertaken during periods that allow for dry working (within the tidal windows).<br>The rock revetment will be constructed in sections that can be completed during a single tidal period. Works will not be undertaken during storm events.<br>Measures would be undertaken to reduce risks of pollution and run-off following CIRIA Guidance.<br>A geotextile membrane will also underlie the rock armour, which will reduce erosion at the |

| | | |
|---|---|---|
| | | toe and base of the revetment and prevent leaching of the underlying substrate.<br>Based on the low magnitude of the disturbance, and its localised nature, providing the mitigation measures are taken into consideration, there should be no significant impact on the morphology of the waterbody. |
| Structure and substrate of the coastal bed | Direct | **Temporary Impact:** Rock armour material will be transported by vehicle across the beach to the revetment locations ready for placing. The movement of vehicles is likely to produce tracks in the beach sands. Additional sand will be accumulated to protect the natural surface. The rate of beach material disturbance by the vehicles will be dependent on various factors, such as: vehicle type, drive type (tracked or wheeled), track/wheel type and dimensions, weight of vehicle (including loads), friction angle between wheels/tracks and the beach and the nature of the sediment (cohesion and adhesion etc).<br><br>**Mitigation:** The movement of the vehicles on the beach will be along designated routes, thereby limiting the potential impact area and allowing continual visual monitoring.<br>Based on the low magnitude of the disturbance, and its localised nature, providing the mitigation measures are taken into consideration, there should be no significant impact on the morphology of the waterbody. |
| Structure of the intertidal zone | Direct | **Permanent Impact:** Physical loss or modification of coastal morphological landforms is anticipated to occur during construction of the proposed defence. A small area of reinforced sand dune will be modified during construction of the eastern tie-in (this is in the supratidal zone). In addition, the footprint of the proposed structures below MHWS extends onto the sandy beach.<br><br>**Mitigation:** The eastern tie-in of the coastal embankment will be planted with Marram Grass *Ammophila arenaria* and Sand Sedge *Carex arenaria* to naturalise it with the surrounding dune system and prevent erosion. This small section of dune is already modified and may benefit from intervention to encourage its ability to trap and retain sediment.<br>Based on the small-scale of the physical disturbance in relation to the waterbody, providing the mitigation measures are taken |

| | | |
|---|---|---|
| | | into consideration, there should be no significant impact on the morphology of the water body. |

## 6.3 Water body Mitigation Measures

There are mitigation measures contributing to better ecological potential for the water body identified in the Natural Resources Wales' Water Watch Wales website. The ability of the proposed works to deliver these mitigation measures, or the risk that the works could prevent their implementation, is considered further in the table below.

**Table 6-2: Assessment of proposed works against the water body's mitigation measures**

| Category | Mitigation Measure | Current Status | Will the proposed works contribute towards the implementation of the mitigation measure | Will the proposed works prevent the mitigation measure from being implemented |
|---|---|---|---|---|
| Habitat creation | Indirect mitigation | Not currently applicable - not required in this water body | Yes. Construction of the rock armour has the potential to provide new habitat opportunities for a range of marine fauna and flora. | No |
| Operations and maintenance | Avoid the need to dredge | | No. The works will not alter the need to dredge. | No |
| | Dredging disposal strategy | | No. The works will not alter dredging disposal. | No |
| | Reduce impact of dredging | | No. The works will not reduce the impact of dredging. | No |
| | Reduce sediment resuspension | | No. The works will not alter the levels of sediment resuspension. | No |
| | Re-time dredging or disposal | | No. The works will not result in re-timing of dredging or disposal. | No |
| | Sediment management | | No. It is beyond the scope of works to alter sediment management. | No |
| | Dredge disposal site selection | | No. The works will not alter the selection of dredge disposal sites. | No |
| | Manage disturbance | | No. The works will not alter disturbance levels. | No |
| | Retain habitats | | No. The works will not result in the retention of existing habitats on site. | Minor change. The installation of rock armour will result in |

| | | | | |
|---|---|---|---|---|
| | | | | change from sand to rock habitats. |
| Structural modification | Fish passes | | No. The works will not affect fish passage. | No |
| | Enhance ecology | | The works will add habitat in the form of rock armour which could be beneficial to certain species. The loss of small areas of sand habitat is not anticipated to impact the ecology of this waterbody. | No |
| | Changes to locks etc | | No. The works will not affect any locks. | No |
| Working with physical form and function | Realign flood defence | | Yes. The works will create a new flood embankment set back from the existing defence. | No |
| | Remove obsolete structure | | No. The proposed works will not remove any obsolete structures. | No |
| | Remove or soften hard bank | | No. The works will not remove any existing hard banks. | No |
| | Preserve or restore habitats | | No. It is beyond the scope of the works to restore habitats. | Yes. The installation of rock armour will alter existing habitats. |
| | In-channel morph diversity | | No. | Yes. Physical loss or modification of coastal morphological landforms is anticipated to occur as a result of the works. |
| | Bank rehabilitation | | No. No existing banks will be reprofiled as result of the works. | No. |

The proposed works will not contribute towards implementation of the mitigation measures for the waterbody; however, they may result in the alteration of existing habitats. The changes are relatively small scale with the majority of the works being set back from the existing embankment, therefore, the works are not expected to significantly impact these mitigation measures in the future.

## 6.4 WFD Assessment Objectives

Following consideration of the potential impacts and recommended mitigation measures, as well as the appraised Mitigation Measures for the water body, Table 6-3 assesses whether the proposed works comply with the overarching objectives of the WFD.

**Table 6-3: Assessment of proposed works against WFD objectives**

| WFD Assessment Objectives | Assessment of works |
|---|---|
| Objective 1: The proposed works do not cause deterioration in the Status of the Ecological Elements of the water body | The scheme should not deteriorate the current status of the waterbody as long as the mitigation measures identified in the previous tables are implemented.<br>With the implementation of appropriate mitigation measures, the current classification of the biological elements, with the consideration of the proposed works in the context of the waterbody, the effects are not likely to be significant at a wider level, however, they do propose a slight risk at a local level. |
| Objective 2: The proposed works do not compromise the ability of the water body to achieve its WFD status objectives | The current Ecological Status of the waterbody is Moderate, and the objective is to achieve Good Potential by 2021. The works will not prevent the waterbody from achieving Good Potential as the proposed impacts are unlikely to compromise the whole waterbody if suitable mitigation measures are implemented throughout the construction process. |
| Objective 3: The proposed works do not cause a permanent exclusion or compromised achievement of the WFD objectives in other bodies of water within the same RBD | The impact of the scheme will be direct and local to the site. If suitable mitigation measures are put in place, the project will not impact on adjacent linked waterbodies. |
| Objective 4: The proposed works contribute to the delivery of the WFD objectives | There is limited potential for the works to contribute towards achieving better ecological potential for the waterbody. |

# 7 Discussion and Conclusions

## 7.1 Assessment Summary

This assessment has identified one waterbody (North Wales - GB641011650000) that has the potential to be impacted by the works. The proposed works were assessed against the WFD receptors for this waterbody.

This assessment has been undertaken with the current site plans provided, should the works change this document should be updated.

### 7.1.1 Biological Assessment

It was determined that the proposed works are unlikely to result in the deterioration in the biological status of the water body or hinderance to the water body meeting its WFD objectives in the future, providing the measures detailed in Section 7.2 are applied.

### 7.1.2 Hydromorphological Assessment

Although there is the potential for some adverse impacts on Hydromorphological Quality Elements during the works, these are considered to be small-scale and localised, as the majority of the proposed structure is to be set back from the foreshore. The resulting impacts from proposed works below MHWS are temporary in nature and restricted to the construction period. The works will not prevent the water body from achieving Good Potential as the proposed impacts are unlikely to compromise the whole water body if suitable mitigation measures are implemented throughout the construction process. The footprint of the works will directly and indirectly impact local coastal morphology, as the extent of hard defences is to be increased. However, the works below MHWS are relatively small-scale due to the general design of the setback defence and are not anticipated to have a significant impact on the water body as a whole.

### 7.1.3 Physico-Chemical Assessment

The proposed works are not anticipated to significantly impact upon the physico-chemical elements of the waterbodies. Following appropriate pollution prevention measures and silt management will ensure that there is no adverse impact upon the physico-chemical elements of the waterbodies.

## 7.2 Scheme Recommendations/Key Considerations

The impact assessment determines whether the proposed works have the potential to significantly impact any of the quality elements screened into the assessment. Any mitigation measures that need to be considered to make the works compliant with the WFD are presented in Table 6-1; however, the critical ones are listed below:

- Inert Materials should be stored on the upper shore to minimise frequency and duration of inundation and only stored for a short period.
- All work on the beach shall be undertaken during periods that allow for dry working (within the tidal windows).
- The rock revetment will be constructed in sections that can be completed during a single tidal period. Works will not be undertaken during storm events.
- Measures would be undertaken to reduce the risk of pollution and run-off following CIRIA Guidance.
- A geotextile membrane will also underlie the rock armour, which will reduce erosion at the toe and base of the revetment and prevent the leaching of underlying substrate.
- The movement of the vehicles on the beach will be along designated routes.

- The eastern tie-in of the coastal embankment will be planted with Marram Grass and Sand Sedge to naturalise it with the surrounding dune system and prevent erosion.

No detailed design was available at the time of preparing this WFD assessment. Therefore, it is recommended that this assessment is reviewed following detailed design and revised where necessary.

## 7.3 Conclusions

The proposed works are considered to be compliant with WFD objectives if the appropriate mitigation measures described in relation to each potential impact are incorporated into the construction works. Specifically, pollution prevention measures should be adhered to, to ensure protection of the WFD quality elements.

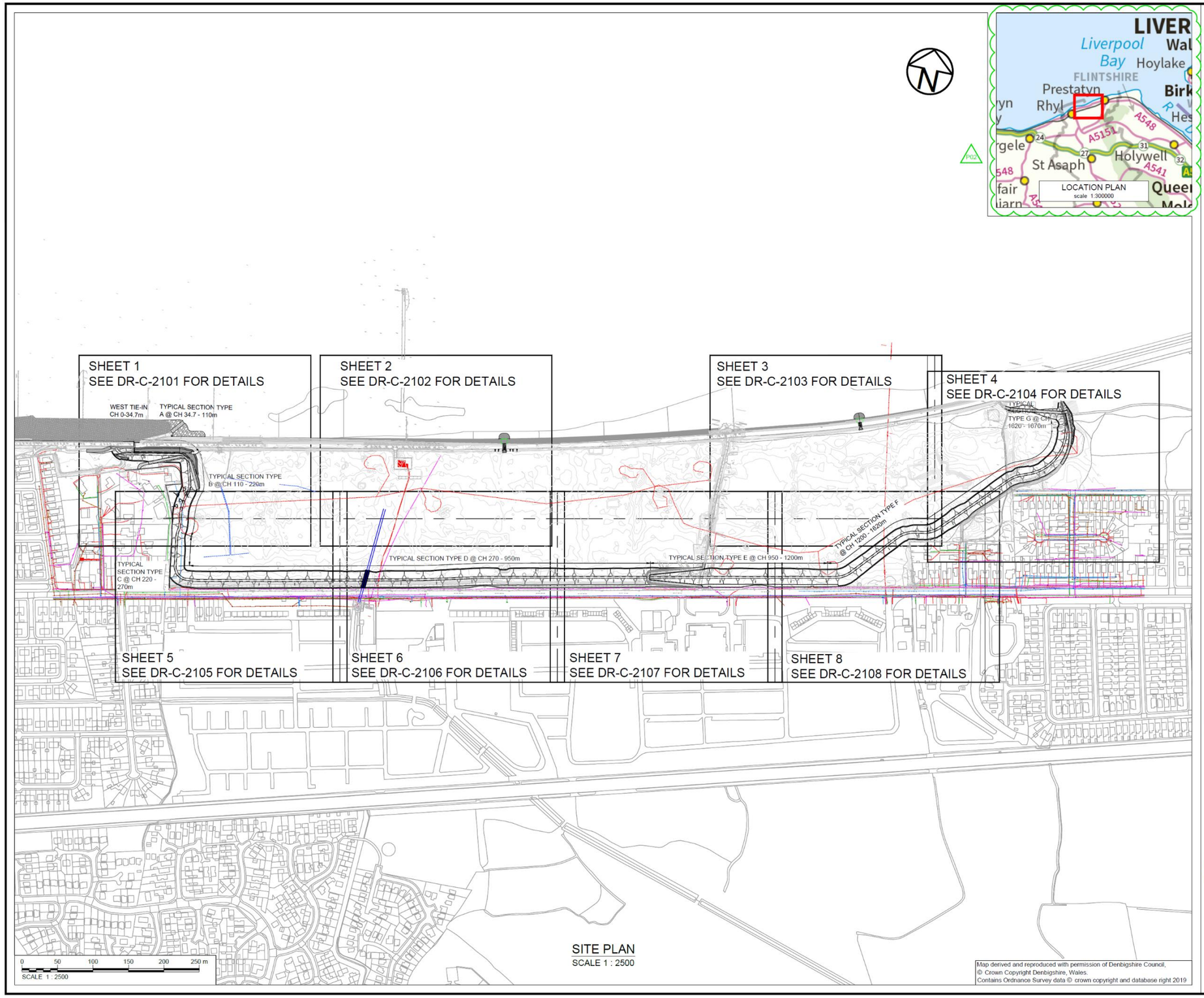
# Appendices

## A Supporting Evidence

### A.1 Ecology Survey

A Preliminary Ecological Appraisal was undertaken by JBA Consulting in September 2020. This report is available on request.

## A.2 Section and Details: Design Drawings




General Notes

1. All dimensions are shown in millimetres unless otherwise stated and levels are in Ordinance Datum. All co-ordinates are based on Ordnance Datum Newlyn with the OS active network using the geoid model OSGM15.
2. Do not scale from this drawing. All dimensions must be checked/verified at detailed design and on site.
3. All levels quoted were relevant at the time of survey (October 2020). Levels and setting out should be checked by the site engineer to ensure the quoted levels are still relevant at the time of construction.
4. All works on the coast will be carried out with care to minimise the risk of pollution adhering to Pollution Prevention Guidelines.
5. All works affecting flood defences, main watercourses and/or ordinary watercourses will be subject to Consent for Permanent and Temporary Works under the Land Drainage Act 1991.
6. All dimensions and details are intended to show design intent only, and are subject to minor alterations during detailed design.

Services Key:

- 220kV Elec HV
- Elec HV
- Elec LV
- Surface Water
- Water
- Gas
- Foul Water Sewer
- Combined Sewer
- Telecom
- Golf Course services irrigation system
- GCS Water mains to storage pond

UTILITY SERVICES INVESTIGATION GAUGE TO PAS 128

- TYPE D: DESK STUDY
- TYPE C: DESK STUDY AND SITE RECONNAISSANCE
- TYPE B: DESK STUDY WITH SITE RECON AND UTILITY DETECTION SURVEY
- TYPE A: DESK STUDY WITH SITE RECON, UTILITY DETECTION SURVEY & TRIAL HOLES

| TYPE D | TYPE C | TYPE B | TYPE A |
|---|---|---|---|
| 12/10/2020 | 01/01/2021 | | |

THE POSITION OF ANY EXISTING PUBLIC OR PRIVATE SEWERS, UTILITY SERVICES, PLANT OR APPARATUS SHOWN ON THIS DRAWING HAS BEEN OBTAINED FROM STATUTORY RECORDS. THE INFORMATION SHOWN IS BELIEVED TO BE CORRECT BUT NO WARRANTY TO THIS IS EXPRESSED OR IMPLIED. OTHER SUCH PLANT OR APPARATUS MAY ALSO BE PRESENT BUT NOT SHOWN. INVESTIGATIONS SHOULD BE UNDERTAKEN ON SITE CONFIRMING LOCATIONS BEFORE BREAKING GROUND.

| Rev.: | Comments | Date | Drawn | Designed | Checked | Approved |
|---|---|---|---|---|---|---|
| P02 | BB comments addressed for planning | 19/03/21 | RG | AF | DW | AT |

Client Approval

- A - Approved
- B - Approved with Revisions
- C - Do Not Use

| Purpose of Issue | Status |
|---|---|
| For review and comment | S3 |


JBA consulting
35 Perrymount Road
HAYWARDS HEATH
West Sussex
RH16 3BW
United Kingdom
www.jbaconsulting.com
t +44 (0)1444 473652
f +44 (0)845 8627772
e info@jbaconsulting.com
Offices at Coleshill, Doncaster, Edinburgh, Exeter, Glasgow, Haywards Heath, Isle of Man, Leeds, Limerick, Newcastle upon Tyne, Newport, Peterborough, Saltaire, Skipton, Tadcaster, Thirsk, Wallingford and Warrington


CENTRAL PRESTATYN COASTAL DEFENCES SCHEME

GENERAL ARRANGEMENT

for

Cyngor sir ddinbych denbighshire County Council

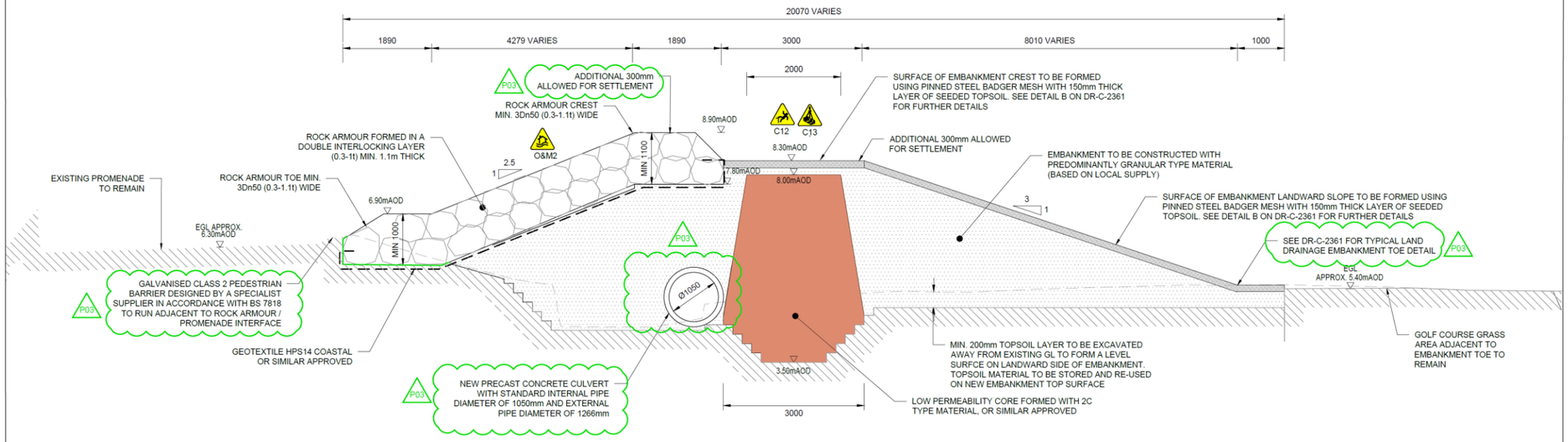
Balfour Beatty


This document is the property of Jeremy Benn Associates Ltd. It shall not be reproduced in whole or in part, nor disclosed to a third party, without the permission of Jeremy Benn Associates Ltd.


| Scale: | | | |
|---|---|---|---|
| As shown @ A1 | Drawn: | R. Groves | 02/02/21 |
| | Designed: | A. Fyffe | 02/02/21 |
| | Checked: | D. Wardill | 16/02/21 |
| | Approved: | A. Tyndel | 18/02/21 |

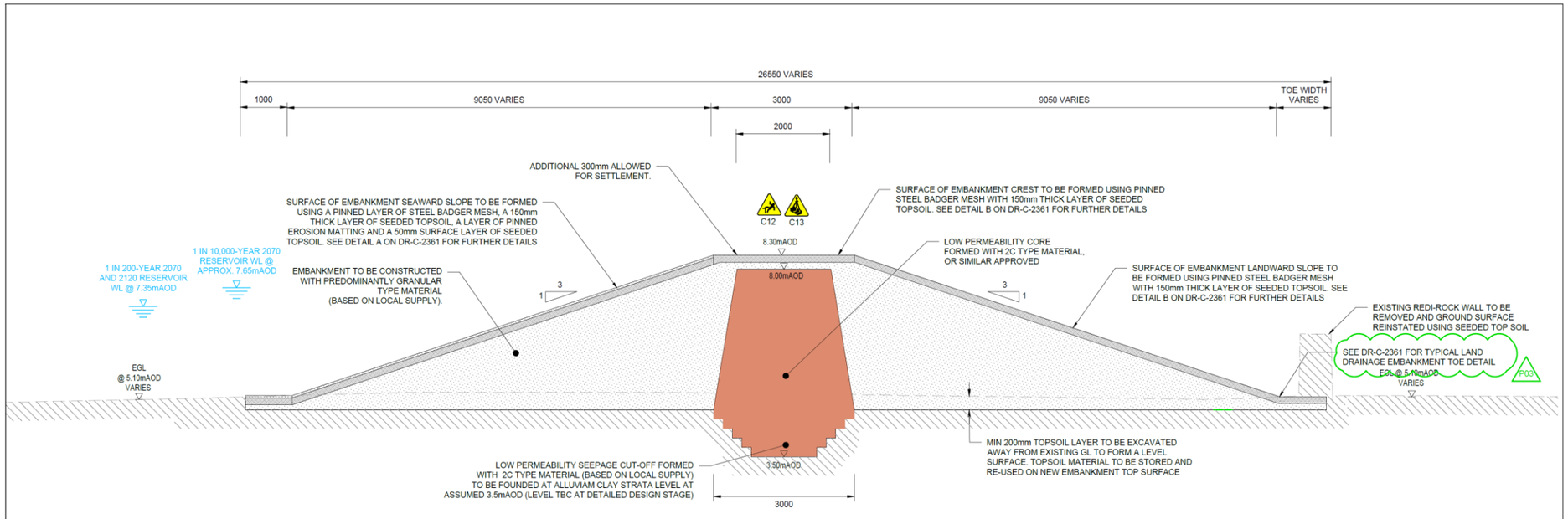
Project Reference: CP-JBA-01-00-DR-C-2001-General_Arrangement

| Drawing Number: | Revision |
|---|---|
| CP-JBA-01-00-DR-C-2001 | P02 |




TYPICAL SECTION A @ CH50

SCALE 1 : 50




TYPICAL SECTION B @ CH200

SCALE 1 : 50

0 1 2 3 4 5 m

SCALE 1 : 50

Map derived and reproduced with permission of Denbigshire Council,
© Crown Copyright Denbigshire, Wales.
Contains Ordnance Survey data © crown copyright and database right 2019

General Notes

1. All dimensions are shown in millimetres unless otherwise stated and levels are in Ordinance Datum. All co-ordinates are based on Ordnance Datum Newlyn with the OS active network using the geoid model OSGM15.
2. Do not scale from this drawing. All dimensions must be checked/verified at detailed design and on site.
3. All levels quoted were relevant at the time of survey (October 2020). Levels and setting out should be checked by the site engineer to ensure the quoted levels are still relevant at the time of construction.
4. All works on the coast will be carried out with care to minimise the risk of pollution adhering to Pollution Prevention Guidelines.
5. All works affecting flood defences, main watercourses and/or ordinary watercourses will be subject to Consent for Permanent and Temporary Works under the Land Drainage Act 1991.
6. All dimensions and details are intended to show design intent only, and are subject to minor alterations during detailed design.

| Safety, Health and Environment information | | |
|---|---|---|
| In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant risks | | |
| **Construction** | | |
| C12 | | Working at height |
| C13 | | Lifting operations |
| **Operation and Maintenance** | | |
| O&M2 | | Breach along existing frontline defence |
| **Demolition** | | |
| | | |

UTILITY SERVICES INVESTIGATION GAUGE TO PAS 128

- TYPE D: DESK STUDY
- TYPE C: DESK STUDY AND SITE RECONNAISSANCE
- TYPE B: DESK STUDY WITH SITE RECON AND UTILITY DETECTION SURVEY
- TYPE A: DESK STUDY WITH SITE RECON, UTILITY DETECTION SURVEY & TRIAL HOLES

| TYPE D | TYPE C | TYPE B | TYPE A |
|---|---|---|---|
| 12/10/2020 | 01/02/2021 | | |

THE POSITION OF ANY EXISTING PUBLIC OR PRIVATE SEWERS, UTILITY SERVICES, PLANT OR APPARATUS SHOWN ON THIS DRAWING HAS BEEN OBTAINED FROM STATUTORY RECORDS. THE INFORMATION SHOWN IS BELIEVED TO BE CORRECT BUT NO WARRANTY TO THIS IS EXPRESSED OR IMPLIED. OTHER SUCH PLANT OR APPARATUS MAY ALSO BE PRESENT BUT NOT SHOWN. INVESTIGATIONS SHOULD BE UNDERTAKEN ON SITE CONFIRMING LOCATIONS BEFORE BREAKING GROUND.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| P03 | Comments: BB comments addressed for planning | | | | | | | | | |
| Rev.: | Date | 19/03/21 | Drawn | RG | Designed | AF | Checked | IJ | Approved | AT |
| P02 | Comments: For planning | | | | | | | | | |
| Rev.: | Date | 19/02/21 | Drawn | RG | Designed | AF | Checked | DW | Approved | AT |

Client Approval

- A - Approved
- B - Approved with Revisions
- C - Do Not Use

| Purpose of Issue | Status |
|---|---|
| For review and comment | S3 |

JBA consulting
35 Perrymount Road
HAYWARDS HEATH
West Sussex
RH16 3BW
United Kingdom
www.jbaconsulting.com
t +44 (0)1444 473652
f +44 (0)845 8627772
e info@jbaconsulting.com
Offices at Coleshill, Doncaster, Edinburgh, Exeter, Glasgow, Haywards Heath, Isle of Man, Leeds, Limerick, Newcastle upon Tyne, Newport, Peterborough, Saltaire, Skipton, Tadcaster, Thirsk, Wallingford and Warrington

CENTRAL PRESTATYN COASTAL DEFENCES SCHEME

TYPICAL EMBANKMENT CROSS SECTIONS A & B

for

Cyngor sir ddinbych denbighshire County Council

Balfour Beatty

This document is the property of Jeremy Benn Associates Ltd. It shall not be reproduced in whole or in part, nor disclosed to a third party, without the permission of Jeremy Benn Associates Ltd.

| Scale: | | |
|---|---|---|
| As shown @ A1 | Drawn: R. Groves | 26/11/20 |
| | Designed: A. Fyffe | 25/11/20 |
| | Checked: A. Dane | 04/12/20 |
| | Approved: A. Tyndel | 04/12/20 |

Project Reference: CP-JBA-01-00-DR-C-2201-Typical_Sections_A_&_B

| Drawing Number: | Revision |
|---|---|
| CP-JBA-01-00-DR-C-2201 | P03 |

## References

European Communities (2000). *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy.* Official journal of the European Communities L327(43), 1–72.

JBA Consulting (2021) *CP-JBA-02-00-RP-EN-0004-S0-P01-Central_Prestatyn_Ecological_Impact_Assessment*. Warrington (unpublished).

Masters-Williams, H., Heap, A., Kitts, H., Greenshaw, L., Davis, S., Fisher, P., Hendrie, M., Ownes, D. (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors (C532D)*. London, CIRIA.

Natural Resources Wales (2015). *Western Wales River Basin Management Plan 2015-2021*. [Online] Available at: <https://naturalresources.wales/media/676165/wwrbdsummary.pdf> [accessed June 2021]

Water Watch Wales (2018). [Online] Available at <https://waterwatchwales.naturalresourceswales.gov.uk/en/] [accessed June 2021]

JBA consulting

Offices at

Brisbane
Bucharest
California
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
South Barn
Broughton Hall
SKIPTON
North Yorkshire
BD23 3AE
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn Associates Limited

Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001:2018

New Civil Engineer TechFest. Awards WINNER

New Civil Engineer 100 COMPANIES OF THE YEAR 2016 WINNER

New Civil Engineer 100 COMPANIES OF THE YEAR 2017 RANKED COMPANY

CHAS Accredited Contractor CHAS.co.uk

CIEEM REGISTERED PRACTICE 2021-2022