

Aberaeron Coastal Defence Scheme

Water Framework Directive Assessment for
GI Sampling Works

Ceredigion County Council

04 December 2018

Notice

This document and its contents have been prepared and are intended solely as information for Ceredigion County Council and use in relation to Ground Investigations for the Aberaeron Coastal Defence Scheme.

Atkins Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 12 pages including the cover.

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	Client Issue	RM	AC	CM	RAM	04/12/2018

Client signoff

Client	Ceredigion County Council
Project	Aberaeron Coastal Defence Scheme
Job number	5182114
Client signature / date	

Contents

Chapter	Page
1. Introduction	4
2. Water Framework Directive legislative background	4
3. Scheme Background	6
4. Proposed Sampling Methodology	6
5. Baseline Water Quality	8
6. Assessment of Impacts on Water Quality Elements	9
7. Conclusion	11
References	11

Tables

Table 5-1 Summary of WFD Classification for Cardigan Bay Central Waterbody (NRW, 2018a; NRW 2018b)	8
Table 5-2 WFD Status – Cardigan Bay Central, RBMP (NRW, 2017; NRW, 2018b)	8
Table 6-1 Assessment of impacts on waterbody quality elements of Cardigan Bay Central	10

Figures

Figure 2-1 Background to WFD Assessment	5
Figure 4-1 Location of proposed GI locations along South Beach	7

1. Introduction

This document presents a preliminary Water Framework Directive (WFD) assessment for the proposed Ground Investigation (GI) works to inform the design of the Aberaeron Harbour coastal defence scheme.

The aims of the document are to:

- Provide background information on the WFD legislation and the proposed GI works;
- Provide a high-level baseline understanding of the affected water bodies within the context of the WFD;
- Provide an assessment of the potential for the proposed GI works to cause deterioration in the WFD status of any waterbody directly or indirectly affected by the Scheme; and
- Provide an assessment of the potential impacts on waterbody improvement measures and the ability to meet WFD objectives, as well as to suggest mitigation measures where necessary.

This preliminary WFD assessment will act to inform the Marine License application for the GI works.

2. Water Framework Directive legislative background

The WFD 2000/60/EC requires all natural water bodies to achieve both Good Chemical Status (GCS) and Good Ecological Status (GES). The River Basin Management Plans (RBMP) outline the actions required to enable natural water bodies to achieve GES. Artificial and Heavily Modified Water Bodies (A/HMWB) may be prevented from reaching GES due to the modifications necessary to maintain their function. They are, however, required to achieve Good Ecological Potential (GEP), through the implementation of a series of mitigation measures outlined in the RBMP.

New activities and schemes that affect the water environment may adversely impact biological, hydromorphological, physicochemical and/or chemical quality elements (WFD quality elements), leading to a deterioration in waterbody status. They may also render proposed improvement measures ineffective, leading to the waterbody failing to meet its WFD objectives for GES/GEP. Under the WFD, activities and schemes must not cause deterioration in waterbody status or prevent a waterbody from meeting GES/GEP by invalidating improvement measures.

The overall ecological status of a waterbody is primarily based on consideration of its biological quality elements and determined by the lowest scoring of these elements. These biological elements are, however, supported by the physicochemical and hydromorphological quality elements. Assessment of hydromorphological quality is not explicitly required for a waterbody to achieve GES or lower. However, to achieve the overall WFD aim of higher than GES, hydromorphological quality must be considered within the classification assessment.

In addition, to achieve the overall WFD aim of GES, a waterbody must pass a separate chemical status assessment, relating to pass/fail checks on the concentrations of various identified priority/dangerous substances.

A summary of key WFD concepts is presented below in **Figure 2-1**.

WFD Objectives

The WFD is a European Directive which sets out a strategic planning process for the purposes of managing, protecting and improving the water environment. The main objectives of the WFD are to:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- Aim to achieve at least 'Good Status' for all waters by 2015 (2021 or 2027) where fully justified within an extended deadline under Article 4.4;
- Promote sustainable use of water;
- 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
- Help reduce the effects of floods and droughts.

NRW is responsible for implementing the WFD in Wales and monitors, advises and manages many aspects of the water environment through regulating discharges, abstractions and processing environmental permits and licenses. NRW is committed to implementing environmental improvements by reducing the physical impacts of flood risk management activities (within artificial or heavily modified water bodies).

WFD Classification

The WFD classification for a defined waterbody is produced by the assessment of a wide variety of different 'elements' which includes:

- '*biological elements*' such as fish, invertebrates, phytoplankton (which includes plants, macro-algae, phytoplankton);
- '*supporting elements*' that include chemical measurements such as ammonia, dissolved oxygen, pH, phosphate, copper, zinc and temperature; and
- '*supporting conditions*' (sometimes referred to as hydromorphology) that assess the physical attributes of the waterbody such as 'quantity and dynamics of flow' and 'morphology'.

The assessment given for each element is also accompanied by a measure of certainty in the result. The status classification is published in the RBMP and provides a baseline condition against which compliance and future improvements can be measured.

WFD Compliance

There are three key objectives against which the impacts of proposed works on a waterbody need to be assessed to determine compliance with the overarching objectives of the WFD:

- Objective 1: The Scheme will not cause a deterioration in any element of waterbody classification.
- Objective 2: The Scheme will not prevent the WFD status objectives from being reached within the waterbody or other downstream water bodies.
- Objective 3: The Scheme will contribute to the delivery of the relevant WFD objectives. In this case, it will be what contribution the scheme can make towards the waterbody reaching its objective GEP through planned RBMP mitigation measures.

Objective 1 and Objective 2 must be met to avoid infringement of the WFD. The delivery of the third objective is central to the NRW's implementation of the WFD, where it can be supported through its operational activities. If it is considered that the Scheme is likely to cause deterioration in waterbody status or prevent a waterbody from meeting its ecological objectives, then an assessment would be made against the conditions listed in Article 4.7 of the WFD. Article 4.7 can be invoked if; 'new modifications' are of overriding public interest and/or the environmental and social benefits of achieving the WFD objectives are outweighed by the benefits of the new modifications to human health, safety and sustainable development; there are no significantly better environmental options that are technically feasible or not disproportionately costly; and all practicable steps for mitigation have been taken.

Figure 2-1 Background to WFD Assessment

3. Scheme Background

Atkins have been commissioned by Ceredigion County Council (CCC) to undertake an Environmental Impact Assessment (EIA) and Detailed Design of a coastal defence Scheme. The proposed Scheme is made up of three linked elements – works along the north harbour wall and in the inner harbour (Pwll Cam); works to South Pier; and works on South Beach.

4. Proposed Sampling Methodology

GI works are required to inform the design of the Aberaeron Harbour coastal defence Scheme. The investigations, which are licensable marine activities, consist of digging trial pits on South Beach to remove samples of beach material (sand and shingle) for sediment analysis.

GI works will take place at low tide (in the dry) along the Aberaeron South Beach up to and including the beach area around the South Pier. Trial pits on the upper, mid and lower shore will be taken at fifteen locations along the beach as presented in Figure 4-1.

A JCB with backhoe will be used to dig the trial pits and to obtain bulk samples of the beach shingle and sand up to 1.5m below the beach surface. This material (maximum 20kg) will be put into bags using a shovel and then sent away for tests, including petrographic tests, density and particle size analysis (PSA). The total amount of sampled material will equate to approximately 300kg or <0.2m³ of available beach material. No vessels will be used for the works.

All GI works will be undertaken during daylight hours and will be over a period of 4 weeks. A contingency of 2 months would be needed to suit tides, available light and prevailing bad weather. It is anticipated that the investigations will take place in January / February 2019.



Figure 4-1 Location of proposed GI locations along South Beach

5. Baseline Water Quality

Aberaeron is situated in the Western Wales River Basin District and the management strategies for the District are stated within the Western Wales RBMP. River basin management is a continuous cycle of planning and delivery. The first RBMP was published in 2009 and set out the management plan for the first six years 2009-2015 (Cycle 1). The plan was updated in 2015 to cover the second period 2015-2021 (Cycle 2) and will be updated again in 2021. The purpose of this management plan is to protect and improve the water environment for the wider benefits to people and wildlife.

Aberaeron and the proposed GI programme on the South Beach will take place within the Cardigan Bay Central Waterbody (ID: GB651009030000). A summary of the waterbody classification for the Cardigan Bay Central Waterbody from Cycle 1 (2009 – 2015) and Cycle 2 (2015 – 2021) is provided in Table 5-1 below.

Based on the Cycle 2 data for Cardigan Bay Central, the waterbody has been assessed overall as 'Good', with overall ecological status assessed as 'Good' and Chemical status assessed as 'Good' (Table 5-2). Quality of supporting elements have been assessed using Cycle 1 data (Cycle 2 data for supporting elements is currently unavailable). Cardigan Bay Central has been assessed as 'Probably at Risk' of invasive non-native species (INNS) with deterioration by INNS by 2015 and 2050. INNS highlighted as a risk to the waterbody are the colonial tunicate *Didemnum spp.* with deterioration by 2015.

South Beach is not a designated bathing water and the closest designated Bathing Waters are Llanrhystud and three at New Quay all of which were classified as 'Excellent' or 'Sufficient' in 2017 (NRW, 2018c).

Table 5-1 Summary of WFD Classification for Cardigan Bay Central Waterbody (NRW, 2018a; NRW 2018b)

Name	Type	Waterbody ID	Grid Reference	Protected Area Designation	Overall Status Cycle 1	Objective	Overall Status Cycle 2
Cardigan Bay Central	Coastal	GB651009030000		Bathing Water Directive	Good	Good by 2015	Good

Table 5-2 WFD Status – Cardigan Bay Central, RBMP (NRW, 2017; NRW, 2018b)

Waterbody: – Cardigan Bay, waterbody ID GB651009030000		
Overall status: Good		
Ecological status: Good		
Chemical status: Good		
Biological quality elements	Physicochemical elements	Hydromorphological supporting elements
Fish: Not Assessed	Temperature: Not Assessed	Hydrology: High
Invertebrates: Good	pH: Not Assessed	Morphology: High
Macroalgae: Good	Dissolved oxygen: High	Highly Modified Water Body (HMWB): No
Macrophytes: Not Assessed	Phosphate: Not Assessed	
Phytoplankton: High	Dissolved Inorganic Nitrogen: High	

6. Assessment of Impacts on Water Quality Elements

Table 6-1 considers impacts on each ecological element under the WFD for the Cardigan Bay Central waterbody.

Table 6-1 Assessment of impacts on waterbody quality elements of Cardigan Bay Central

Biology Fish fauna: Species composition and abundance; Presence of type-specific disturbance sensitive species; Age structure of fish communities. Benthic invertebrate fauna: Composition; Abundance. Macroalgae, macrophytes and phytoplankton: Taxonomic composition; Average macrophytes and phytoplankton abundance.	Physicochemical Salinity, Nutrient concentrations, pH, Oxygen balance; Acid neutralising capacity, Temperature, Transparency Pollution by all priority substances identified as being discharged into the waterbody Pollution by other substances identified as being discharged in significant quantities into the waterbody	Hydromorphological Supporting Elements Hydrological regime: Quantity and dynamics of water flow Morphological conditions: water column depth variation; Structure and substrate of the sea bed.	Mitigation Measures that will be employed throughout the GI Works - All equipment, temporary structures, access tracks, waste and/or debris associated with the works will be removed on completion of the GI works. No equipment or waste will be left in the intertidal area on completion of each sampling day. - Bunding, storage facilities and spill kits will be employed to contain and prevent the release of fuel, oils and chemicals associated with the plant, refuelling and construction equipment into the marine environment. - Plant, vehicles and machinery will not be refuelled on the foreshore. - All equipment will be suitable for use in the marine environment and are used in accordance with best environmental practice. - All equipment, materials, machinery and PPE used will be in a clean condition prior to their arrival on site, and upon removal from site, to minimise risk of INNS into the marine environment. - In the event of removal of any sensitive species or habitat designated by NRW under Schedule 7 of the Environment (Wales) Act 2016, no further removals will occur at that location or within 20m of that location
Assessment of Impact	Assessment of Impact	Assessment of Impact	
All GI works will be undertaken in the intertidal area during low tide. All activities will take place during daylight hours and will be dispersed over 4 weeks. Therefore, there will be no damage or disturbance to fish fauna or phytoplankton. The GI works may result in loss or damage of benthic infauna or intertidal macroalgae or macrophytes. It is anticipated that fifteen samples will be taken along South Beach, equating to around 300kgs or <0.2m³ of available beach material taken. Due to relatively small sample size in comparison to the overall waterbody, sampling will not have a significant impact upon benthic infauna, intertidal macroalgae or macrophytes. As with all works in, or near water, there is a risk of spreading INNS through the use of equipment which have been in other waterbodies. However best practice guidelines will be followed and therefore spread of INNS is unlikely to occur. No vessels will be used for the works.	Disturbance of shingle from the GI works and the construction of shingle ramps along the beach could lead to increases in turbidity in the water column. However due to the localised nature of the sampling, as well as the timeframe for the works (dispersed over 4 weeks) it is unlikely that any increases in turbidity will lead to significant impacts to the waterbody. There is potential for accidental pollution releases during GI works. Best practice guidelines will be followed throughout the GI works and therefore pollution of the waterbody is unlikely to occur.	Shingle ramps, if left in situ could have the potential to alter the hydrological regime along South Beach. However, shingle ramps will not remain over a tidal cycle i.e. they will be created and returned to the shingle bank while the tide is out. Due to the localised nature of the works, as well as the relatively small sample sizes in comparison to the overall waterbody, it is considered unlikely the works will have an impact on the wider estuarine and coastal processes operating in this area.	
The potential for the proposed GI words to result in deterioration to the biological quality elements is considered NEGLIGIBLE.	The potential for the proposed GI words to result in deterioration to the physicochemical quality elements is considered NEGLIGIBLE.	The potential for the proposed GI words to result in deterioration to the hydromorphological supporting elements is considered NEGLIGIBLE.	

7. Conclusion

This Preliminary WFD Assessment has evaluated the proposed GI works against the biological, physicochemical and hydromorphological elements of the WFD. Based on the information available and taking into account the mitigation measures which will be employed throughout the works, all aspects of the GI works are expected to have a negligible impact on the biological, physicochemical and hydromorphological quality and supporting elements and are therefore WFD compliant.

Liaison with NRW will continue throughout the application process to ensure all the practicable mitigation is implemented during the GI works.

References

NRW (2017). Western Wales Surface water bodies Classification status and Objectives for WFD Cycle 1. Download available online through Water Watch Wales Map Gallery: <http://waterwatchwales.naturalresourceswales.gov.uk/en/> [December 2018]

NRW (2018a) Water Watch Wales Map Gallery. Available online <https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6> [Last Accessed [December 2018]

NRW (2018b) Wales Water Body Objectives and Measures Update 2017. Download available online through Water Watch Wales Map Gallery <https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6>. Last Accessed [December 2018]

NRW (2018c) Wales Bathing Water Report 2017. Available Online <https://cdn.naturalresources.wales/media/684898/wales-bathing-water-report-2017.pdf?mode=pad&rnd=131695484950000000> [Last Accessed December 2018]

Rob Morgan

Atkins Limited
West Glamorgan House
12 Orchard Street
Swansea
SA1 5AD

Tel: +44 (0)1792 641172
Fax: +44 (0)1792 472019

© Atkins Limited except where stated otherwise