# C EIA Screening and Scoping Report

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# East Rhyl Coastal Defence Scheme

# Environmental Impact Assessment Screening & Scoping Report

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**Final**

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**Report prepared for:**

**Denbighshire County Council**

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| P01 | First issue | Balfour Beatty and Denbighshire County Council |
| P02 | Updates to address comments from Balfour Beatty | Denbighshire County Council and Natural Resources Wales |
| | | |

# Contract

This report describes work commissioned by Balfour Beatty, on behalf of Denbighshire County Council, by a letter dated 14th of October 2016. Balfour Beatty's representative for the contract was Graham Manners and Denbighshire CC's representative was Wayne Hope.

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# Abbreviations

| | |
|---|---|
| AADF | Annual Average Daily Flow |
| AONB | Area of Outstanding Natural Beauty |
| BAP | Biodiversity Action Plan |
| BTO | British Trust for Ornithology |
| CPAT | Clwyd-Powys Archaeological Trust |
| DCC | Denbighshire County Council |
| DMRB | Design Manual for Roads and Bridges |
| EIA | Environmental Impact Assessment |
| EcIA | Ecological Impact Assessment |
| ES | Environmental Statement |

EU ..... European Union
GES ..... Good Ecological Status
GEnS ..... Good Environmental Status
HER ..... Historic Environment Record
HRA ..... Habitats Regulations Assessment
ICZM ..... Integrated Coastal Zone Management
IEA ..... Institute of Environmental Assessment
IEMA ..... Institute of Environmental Management and Assessment
IMD ..... Index of Multiple Deprivation
JNCC ..... Joint Nature Conservation Committee
LCA ..... Landscape Character Area
LNR ..... Local Nature Reserve
LVIA ..... Landscape and Visual Impact Assessment
LWS ..... Local Wildlife Site
MCA ..... Marine Conservation Area
MHWS ..... Mean High Water Spring
NAO ..... North Atlantic Oscillation
NMR ..... National Monument Record
NNR ..... National Nature Reserve
NPPF ..... National Planning Policy Framework
NRW ..... Natural Resources Wales
NTS ..... Non-Technical Summary
PAR ..... Project Appraisal Report
PPGs ..... Pollution Prevention Guidelines
PRoW ..... Public Right of Way
RBMP ..... River Basin Management Plan
RCAHMW ..... Royal Commission on the Ancient and Historic Monuments of Wales
SAC ..... Special Area of Conservation
SMP ..... Shoreline Management Plan
SPA ..... Special Protection Area
SSSI ..... Site of Special Scientific Interest
TRO ..... Traffic Regulation Order
WBS ..... Wetland Bird Survey
WFD ..... Water Framework Directive

# 1 Introduction

## 1.1 Background

1.1.1.1 Rhyl is a seaside resort town on the coast of Denbighshire, North Wales (Figure 1-1). The town has historically been protected from coastal flooding by a range of defence structures, which in the east of the town are now exceeding their performance standards and design lives. In East Rhyl, the existing defences have overtopped in recent history, causing significant damage and disruption to the residential and commercial properties.

1.1.1.2 In 2013 deep flooding of 130 residential properties led to 400 people being evacuated from their homes and others had to be rescued by boat. Flood modelling has shown that this risk is set to increase with climate change and therefore the effectiveness of the existing defences will continue to reduce. Action is needed to protect East Rhyl now and in the future to sustain this community and encourage investment in Rhyl as a popular tourist destination.

1.1.1.3 The East Rhyl Coastal Defence project is a proposed flood defence scheme to be constructed to prevent coastal flood events, such as those experienced in 2013. The coastal defence scheme would be designed to protect East Rhyl primarily from flooding caused by wave overtopping of the existing seawall. The scheme will be designed to protect the Garford Road area of East Rhyl, from Splash Point to the Rhyl Golf Course (Figure 1-1).

1.1.1.4 This Environmental Impact Assessment (EIA) Screening and Scoping Report considers the likely significant environmental effects associated with the emerging coastal defence proposals, and recommends an appropriate scope of environmental assessment required to assess the significant effects in detail for a Planning Application and Marine Licence application.

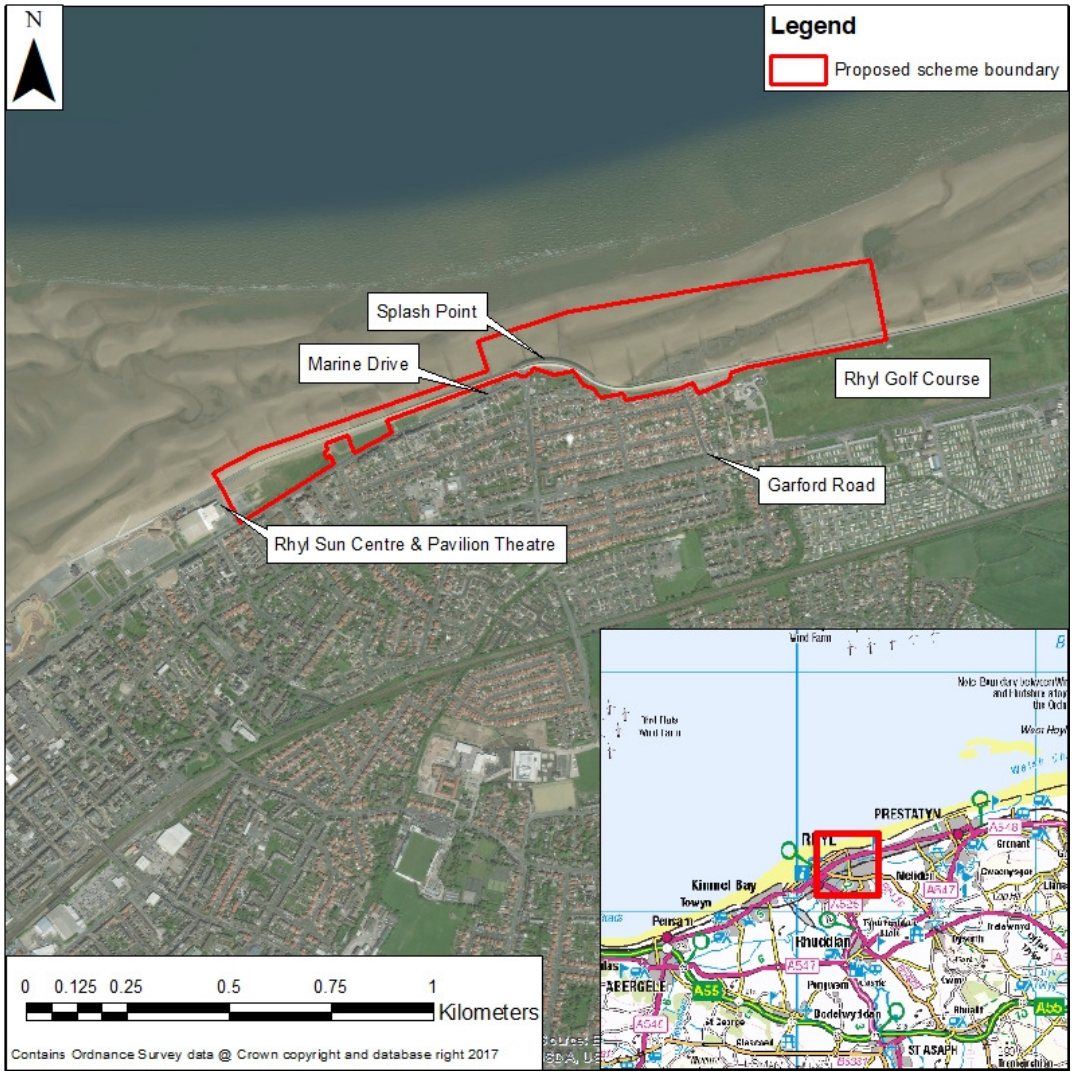


Figure 1-1: Location map of East Rhyl

## 1.2 Environmental Impact Assessment

1.2.1.1 The need to undertake EIA originates from European Directive 2011/92/EU 'on the assessment of the effects of certain public and private projects on the environment' (as amended by Directive 2014/52/EU), which is transposed into UK legislation by Statutory Instruments under the 1972 European Communities Act. In Wales the main EIA legislation is the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017. Also relevant to the proposals are the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended). Both sets of regulations are referred to collectively herein as the 'EIA Regulations'.

1.2.1.2 The development falls within thresholds for EIA development set out in Schedule 2 Section 10(m)/ Schedule A2 section 69 of the EIA Regulations *'Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles, jetties and other sea defence works, excluding the maintenance and reconstruction of such works'*. By agreement with the Local Planning Authority (Denbighshire County Council) and the Appropriate Authority (Natural Resources Wales), the requirement for statutory EIA has been formally acknowledged.

1.2.1.3 This EIA Scoping Report sets out the proposed scope of EIA that will be undertaken and reported in a statutory Environmental Statement (ES) in accordance with the EIA Regulations.

## 1.3 Outline scheme proposals

### 1.3.1 Project Appraisal

1.3.1.1 A Project Appraisal Report (PAR) was produced by JBA Consulting on behalf of Denbighshire County Council (DCC) to investigate potential options for the required form of coastal defence and justify further investment in the project. The PAR identified six options:

- Option 1 – No active intervention
- Option 2 – Do minimum – regular maintenance through beach recharge
- Option 3 – Do something – Beach Recharge scheme with a terminal groyne
- Option 4 – Do something – Offshore breakwater with a beach recharge
- Option 5 – Do something – Stepped/rock revetment with beach recharge
- Option 6 – Do something – Beach recharge scheme with a sand engine

1.3.1.2 Within the PAR Option 4 – Do Something – Offshore Breakwater with a beach recharge was selected as the preferred option. This option provides a 1 in 200-year standard of Protection (including climate change impacts to the year 2116) for the Garford Road area of East Rhyl. This option is described as an offshore breakwater; however, it is acknowledged that this is not truly an offshore breakwater but one that is in intertidal zone that will dry out around low tide.

### 1.3.2 PAR Addendum

1.3.2.1 At the time of the production of the PAR, there were concerns over the accuracy of the cost estimates for each option, due to the lack of sediment modelling, that would determine retention rates of sand. An addendum to the PAR was produced by JBA in August 2017 for Balfour Beatty and Denbighshire County Council. This assessed the same six options as previously, including numerical modelling to assess the relative impact of each option on sediment transport erosion and accretion patterns.

1.3.2.2 The modelling also influenced how the two preferred options from the PAR (Options 4 and 5) were appraised in the addendum. The findings meant it was necessary to subdivide Option 5. The revised options were:

- Option 1 – No active intervention
- Option 2 – Do Minimum – regular maintenance through beach recharge
- Option 3 – Do something - Offshore breakwater
- Option 4 – Do something - Rock revetment with minimal recharge for 'status quo' beach
- Option 5 – Do something - Rock revetment with rock groynes for enhanced amenity beach

1.3.2.3 Coastal assessment and modelling identified key attributes of the Rhyl coastline, including onshore ridge-runnel dynamics and net eastward sediment transport along the beach face. An existing onshore delivery of approximately 20,000 $m^3$/yr occurs through the migration of sand ridges, which is balanced by alongshore loss.

1.3.2.4 Modelling identified that the previous preferred offshore breakwater option (Option 3) needed to be located further offshore and westward than its original position to operate effectively. A recharge volume of approximately 156,000 $m^3$ would be required to infill the sheltered area behind the breakwater.

1.3.2.5 Coastal modelling and assessment also identified that the existing rate of onshore sediment supply is capable of supporting only a low beach, with a higher beach, such as placed by recharge, likely to experience rapid erosion. Secondary structures such as groynes would also therefore be required to retain a beach for a time scale in the order of 8–10 years. Beach recharge allowances of 5,000 $m^3$/yr and 7,000 $m^3$/yr were recommended for the offshore breakwater and groynes respectively.

1.3.2.6 Given that all of the do something options would require recharge, this would increase sediment supply to the downdrift coast to the east. However this would be largely dispersed given the overall length of this stretch of coastline (approximately 10km to Point of Aye) and the effect of coastal defences at Prestatyn. Although an environmentally sensitive area is located down drift at Gronant Dunes and Talacre Warren, it was found that the sediment supply reaching this location would be minor compared with existing year-to-year variation in beach volumes at this location.

1.3.2.7 A summary comparison of the options as reported in the PAR Addendum is provided in Table 1-1.

Table 1-1: Summary comparison of the options as reported in the PAR Addendum

| Options | Engineering | Economics | Environment |
|---|---|---|---|
| 2 - Do-minimum | Regular beach recharge still required to protect the existing revetment toe. However, this will not be an amenity beach as levels will remain at existing with minimal recharge to maintain the status quo.<br>The existing upstanding wall is expected to fail within 50 years, leaving east Rhyl at greater risk. | PV costs £4.6m<br>BC 1.7<br>NPV £3.2m<br>Cost beneficial but low SoP | Potential loss of intertidal mud/sand-flats and impact on marine benthic species and foraging habitat.<br>Some positive impact on amenity and protection of heritage assets.<br>Longer term loss of amenity from failure of wall. |
| 3 - Offshore Breakwater | The breakwater will need to be in an intertidal area, reducing the working window and increasing technical risks.<br>Recharge will be required to protect the existing wall toe. This means there will be an enhance sandy beach compared to the status quo. The upstanding wall will still be exposed to some wave action and not protected by a new revetment, so it will need to be replaced within the design life. | PV costs £40m<br>BCR 0.96<br>NPV minus £1.4m<br>Not cost beneficial | Potential changes in eastwards longshore sediment transport affecting designated foreshore, dune and shingle habitats.<br>Potential loss of intertidal mud/sand-flats and impact on marine benthic species and foraging habitat.<br>Impact on seascape and visual amenity.<br>Disturbance and disruption during construction, including, species, archaeology and amenity<br>Scope for intertidal habitat creation through engineered features. |
| 4 - Revetment minimal recharge | The new revetment will be resistant to scour so beach recharge will not be required for protection. Beach levels will remain at existing levels with minimal recharge to maintain the status quo.<br>The existing upstanding wall will need to be replaced at some stage in the 100 year design life. | PV costs £19m<br>BCR 2.0<br>NPV £19.3<br>Cost beneficial | Some potential changes in eastwards longshore sediment transport, relative to current trends, affecting designated foreshore, dune and shingle habitats.<br>Limited potential loss of intertidal mud/sand-flats and impact on marine benthic species and foraging habitat.<br>Limited impact on seascape and visual amenity.<br>Some limited disturbance and disruption during construction, including, species, archaeology and amenity<br>Scope for intertidal habitat creation through engineered features |

| Options | Engineering | Economics | Environment |
|---|---|---|---|
| 5 - Revetment with groynes | Works will be required on the existing wall (rock revetment) and in an intertidal area for the rock groynes. Beach recharge will be for amenity purposes not toe protection.<br>The existing upstanding wall will need to be replaced at some stage in the 100 year design life. | PV costs £31m<br>BCR 1.2<br>NPV £6.9<br>Cost beneficial | Potential changes in eastwards longshore sediment transport, relative to current trends, affecting designated foreshore, dune and shingle habitats.<br>Limited loss of foraging habitat and impacts on marine benthic species.<br>Impact on seascape and visual amenity.<br>Disturbance and disruption during construction, including, species, archaeology and amenity<br>Scope for intertidal habitat creation through engineered features.<br>Potential net improvement of beach amenity within the defined area |

### 1.3.3 Preferred option

1.3.3.1 The PAR Addendum found that the previous preferred Option 3 was considered no longer cost beneficial, based on new beach recharge requirements and the costs of placing the breakwater further offshore. Option 4 – Do Something – Rock revetment with minimal recharge for 'status quo' beach (provided in Appendix A), was found to provide the most cost beneficial option and was therefore selected as the preferred option. This option would involve placement of rock armour over the existing concrete stepped structure, to dissipate wave energy arriving at the structure, with beach recharge of 20,000 cubic metres to maintain the beach at existing levels*.

1.3.3.2 The existing sea wall is considered to be in fair condition but cannot be guaranteed to offer the required 100 year design life. Any further deterioration in the existing stepped revetment can be accommodated by the new rock revetment due to its adaptability (i.e. ability to re-settle following movement). The new upstand recurve wall is necessary to offer protection from wave overtopping.

1.3.3.3 In summary the proposals would comprise the demolition of approximately 600m of the existing upstand part of the recurved sea wall on the Promenade, with the construction of a replacement recurved upstand sea wall, raising of the level of the Promenade with resurfacing works, the placing of additional rock armour revetment along the beach in front of the sea wall works, and extension of the rock armour revetment at around Splash Point by up to 350 metres to the west†. Additional tie-in works to the adjacent sea defences, and entry points through the upstand sea wall with steps down to the beach, would also be provided. Construction of the proposals would temporarily occupy 18 ha of beach for access, excavation works and bulk materials storage. For the duration of the construction works, public access would be restricted to this area of beach, to a 1.6 km section of the East Rhyl Promenade, to the public gardens east of Rhyl Pavilion and to an area at the end of Garford Road which will be used as a construction compound.

*It is likely that dredged recharge material would be sourced from the Liverpool Bay dredging area located approximately 10km to the north of Rhyl. The material is likely to be transported to the beach by barge and deposited on the beach using 'rainbowing' (i.e. pumped with seawater onto the beach). Consideration would be given to this and also to the particle size of the beach replenishment material, which would be specified on the basis of optimal beach stability with respect to coastal processes and impact on marine ecology.

†The proposed extent of the rock armour revetment around Splash Point is dependent on the outcome of detailed coastal modelling work currently underway at the time of writing (January 2018). The worst case scenario of a maximum total extent of 950m of rock armour revetment has been assumed for the purpose of EIA Screening and Scoping, but will be assessed and reported definitively in the Environmental Statement.

## 1.4 Planning policy context

### 1.4.1 Welsh National Marine Plan

1.4.1.1 An initial draft of the Welsh National Marine Plan has been produced by Welsh Government[1]; a pre-consultation of the Welsh National Plan. This is directly informed by High Level Marine Objectives set out in the Marine Policy Statement (2011)[2]. These directly align with Welsh Government's well-being goals and principles for sustainable development and also the direction provided in the EU Directive on Marine Spatial Planning 89/2014.

1.4.1.2 The plan objectives, related to supporting policy objectives (i.e. in the Marine Policy Statement), of particular relevance to this scheme include:

- Plan Objective 8: Encourage and promote action on climate change adaptation and mitigation.

1.4.1.3 Objectives relevance to the environmental considerations include:

- Plan Objective 6: Ensure our coast and seas, and their resources, are safe to use and protect and promote is equitable access for those who want to use and enjoy them thereby improving the long-term well-being of the people in Wales.
- Plan Objective 7: Promote stewardship and enjoyment of marine related heritage assets, nationally protected landscapes and support that decisions take account of the seascape character of the local area.
- Plan Objective 9: Support the achievement and maintenance of Good Environmental Status (GEnS) and Good Ecological Status (GES).
- Plan Objective 10: Marine biodiversity is protected, conserved, restored and enhanced to halt and reverse its decline.

### 1.4.2 Shoreline Management Plan

1.4.2.1 The North West England and North Wales Shoreline Management Plan (SMP) 2 covers the north Wales Coast in Sub-Cell 11a, between Great Orme's Head and Formby Point. The policy for the section of coast covering East Rhyl, between Clwyd Estuary to Rhyl Gold Links (11a.4:1) is Hold the Line over the next three epochs (0 – 20 years, 20 – 50 years, 50 – 100 years). The policy states that maintaining and improving/raising the existing defences is required. This is justified in the SMP due to the commercial, residential and amenity assets, infrastructure, cycle routes and footpaths that are vulnerable to flooding.

### 1.4.3 Planning Policy Wales Chapter 5: Conserving and Improving the Natural Heritage Coast

1.4.3.1 Planning Policy Wales sets out land use planning policies of the Welsh Government. It translates the Welsh Government's commitment to sustainable development into the planning system so that it can play an appropriate role in moving towards sustainability[3].

1.4.3.2 Section 5.6 is concerned with Managing the coast. The European Union is promoting a coordinated policy for coastal regions and is calling for the implementation of strategies for Integrated Coastal Zone Management (ICZM). ICZM is intended to integrate the policies influencing coastal regions, to ensure management of these areas is environmentally and economically sustainable, socially equitable and cohesive, including recognising the threat to coastal zones posed by climate change.

1.4.3.3 The main principles of ICZM embedded into relevant plans and projects, recognising the importance of the coast for:

- The conservation of the natural and historic environment;
- Urban and rural development, including housing, local industry and agriculture; and
- Tourism, leisure and recreation[4].

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[1] Welsh Government. 2015. The Welsh National Marine Plan Initial Draft. [Online] Available at: http://gov.wales/docs/drah/publications/151130-welsh-national-marine-plan-initial-draft-november-2015-en.pdf [Accessed 17th November 2017]

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf

[3] Planning policy Wales (Edition 9, November 2016) [Online] Available at: http://gov.wales/topics/planning/policy/ppw/?lang=en

[4] Communication for the Commission to the Council and the European Parliament, 'Integrated Coastal Zone

### 1.4.4 Local Planning Policy

1.4.4.1 The Denbighshire Local Development Plan is a collection of plans, policies and programmes, that aim to achieve objectives, also set out in the Development Plan. It is active until 2021. The local development plan vision sets out how Denbighshire will have developed by the year 2021, and states '*That Denbighshire, through sustainable development, will have a vibrant urban coast, with thriving market towns and rural areas. The housing and employment needs of the County will be met, the high quality of life maintained for all communities with full recognition that we have a strong Welsh language and culture that should be maintained and protected throughout the county*"

1.4.4.2 The Local Development Plan identifies the following issues affecting the county, which are relevant to the project in question;

- There is a high quality built and natural environment in Denbighshire which should be protected and enhanced. The opportunities to enhance and develop environmental goods and services should also be explored;
- Areas of flood risk exist across the County; the coastal areas are particularly affected;
- Climate change – responses are required to address its potential impacts both in Denbighshire and on a wider scale.

1.4.4.3 The issues have led to a list of objectives, that plans and policies set out to achieve by 2021. Those relevant to this scheme are outlined in Table 1-2.

Table 1-2: Objectives from the Local Development Plan, relevant to the proposed project

| Theme | Objective | Relationship to proposed development |
|---|---|---|
| Infrastructure | The Local Development Plan will ensure that an adequate level of physical and community infrastructure will be provided alongside new developments, e.g. water supply, primary care facilities, schools, roads, community facilities. | The proposed scheme at East Rhyl will provide a level of infrastructure, that will protect development in Rhyl, and improve the viability of developing in the area. |
| Design | The Local Development Plan will ensure that new developments are sustainable and of good quality design whilst taking into account the requirements of flood risk. | The proposed scheme at East Rhyl will reduce the susceptibility many developments to coastal flood risk. |
| Areas of protection | The Local Development Plan will seek to protect and enhance the natural and built heritage of the County including aspects such as landscape, biodiversity, geo-diversity, designated sites and buildings and protected species. Environmental services and goods will additionally be enhanced and developed. | Coastal defences at East Rhyl will protect the built heritage of the town centre, including listed buildings and the Rhyl Central Conservation Area. |

Management: A Strategy for Europe' (COM/547/2000) [Online] Available at: www.ec.europa.eu/environment/iczm/comm2000.htm

# 2 EIA Screening and Scoping methodology

## 2.1 EIA Process

2.1.1.1 Environmental Impact Assessment (EIA) is defined as '*a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects'* (Sadler & Fuller, 2002[5]). Online Government guidance[6] defines the aim of Environmental Impact Assessment '*to protect the environment by ensuring that a local planning authority when deciding whether to grant planning permission for a project, which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision-making process'*.

2.1.1.2 Regulation 4 of the EIA Regulations sets out:

*(1) The environmental impact assessment is a process consisting of—*

*(a) the preparation of an environmental statement by the person seeking or initiating planning permission;…*

*(2) The environmental impact assessment must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of proposed development on the following—*

*(a) population and human health;*

*(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC(1) and Directive 2009/147/EC(2);*

*(c) land, soil, water, air and climate;*

*(d) material assets, cultural heritage and the landscape; and*

*(e) the interaction between the factors listed in sub-paragraphs (a) to (d).*

*(3) The effects referred to in paragraph (2) on the factors set out in that paragraph must include—*

*(a) the operational effects of the proposed development, where the proposed development will have operational effects; and*

*(b) the expected effects deriving from the vulnerability of the proposed development to risks of major accidents and disasters that are relevant to that development.*

2.1.1.3 It is widely recognised that the EIA process is closely aligned with the design process (Figure 2-1). This effectively begins with EIA Screening, whereby the developer makes the decision whether EIA is required for the project in question. Suitable environmental alternatives (primary mitigation) should be considered at this early stage, but if it is decided that likely significant effects on the environment cannot be avoided, then an EIA Screening Opinion must be requested from the appropriate authority by the developer. As well as outline design some environmental information is required to undertake EIA Screening, and so baseline surveys may be required to inform the EIA Screening Request.

2.1.1.4 It is often appropriate where EIA Screening is likely to return a positive outcome, that EIA Scoping is undertaken at the same time. This combined approach makes use of the environmental baseline information collated for the EIA Screening Opinion request, to consider the scope of further detailed environmental impact assessment work required. Through the submission of an EIA Scoping Report, the developer requests that the relevant Authority provide an EIA Screening Opinion in order to seek agreement with the Statutory Environmental Consultees on the level of scope of EIA required.

5 Sadler B. & Fuller K. (2002). UNEP Environmental Impact Assessment Training Resource Manual. 2nd Edition.
6 https://www.gov.uk/guidance/environmental-impact-assessment

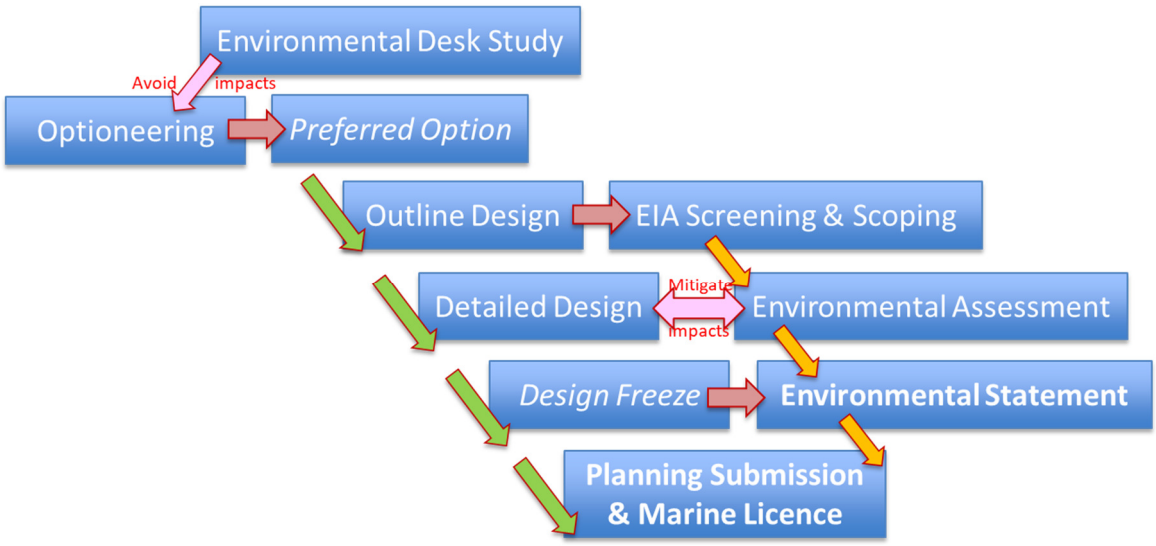


Figure 2-1: The interaction of design and EIA processes

2.1.1.5 On the basis of an EIA Scoping Opinion response from the relevant Authority, further detailed baseline information is collected to inform the detailed impact assessment work. The detailed impact assessment involves first characterising the environmental impacts and then the assessment of likely significant effects. At this stage mitigation measures can be recommended to reduce or eliminate significant effects. This is an iterative process, whereby the impact assessment process and the process of design development interact with one another to produce a mutually acceptable solution. This can also involve stakeholder engagement of the emerging design, to further minimise environmental effects. The results of the EIA process are documented in the Environmental Statement (ES), which is submitted as part of the planning application and/or marine licence. The ES should be well structured, proportionate and concise document. The ES is also supplemented with a Non-Technical Summary in printed and digital format, which is intended to make the findings of EIA publicly accessible.

2.1.1.6 Under the premise of the 'Rochdale Envelope' (with reference to the High Court judgement made in 2000 on R. v Rochdale MBC ex parte Milne), design detail must be sufficient for a proposal to set out 'clearly defined parameters within which the framework of development must take place… taken with those defined parameters of the project, the level of detail of the proposals must be such as to enable a proper assessment of the likely environmental effects, and necessary mitigation'. It is recognised that the more detailed the proposal, the easier it will be to ensure compliance with the Regulations, and so where such detail is unavailable at the design stage, commitments to mitigation will be made to avoid significant environmental effects.

2.1.1.7 Secondary Mitigation involving design amendments (secondary mitigation) and or industry standard practices or consents (tertiary mitigation) that are recommended or committed to in the ES often require separate management plans in order to achieve the desired outcome. These are usually prepared during discharge of planning conditions or during construction of the approved development.

### 2.1.2 Proportionate EIA

2.1.2.1 EIA is widely recognised as delivering valuable and accessible information that positively influences development design and consenting to the benefit of developers, communities and the environment. However as noted in the IEMA Proportionate EIA Strategy[7] it is also becoming increasingly recognised that EIA needs to be more effective and more proportionate to deliver these benefits. The assessment of the scope of likely significant effects has been considered carefully to ensure that disproportionate or irrelevant environmental information are not scoped into EIA.

### 2.1.3 Sufficient Expertise

2.1.3.1 The 2017 EIA requires that the Environmental Statement is prepared by persons who in the

[7] IEMA 2017. Delivering Proportionate EIA A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice

opinion of the relevant planning authority, have sufficient expertise to ensure the completeness and quality of the statement, and that it is accompanied by a statement from the applicant outlining the relevant expertise or qualifications of such experts.

2.1.3.2 Where an EIA deliverable contributes towards statutory EIA, it must be technically reviewed and approved a relevant person with sufficient expertise, defined here as a chartered member equivalent of a relevant professional institution and who is up to date with relevant continuing professional development.

## 2.2 EIA Screening

2.2.1.1 EIA Screening has been informed by a desk based review of environmental constraints on the basis of a review of readily available environmental information, within a 2km search area, as summarised in Table 2-1. The key environmental constraints are illustrated in the Environmental Constraints Plan in Appendix A.

Table 2-1: Environmental screening desktop search results.

| Topic | Environmental constraints | Description | Proximity to sites |
|---|---|---|---|
| Biodiversity and nature conservation | Special Protection Area (SPA) | Liverpool Bay SPA – designated for red-throated diver (*Gavia stellata*) and common scoter (*Melanitta nigra*) as well as other overwintering bird species. Extended in October 2017 to provide protection to foraging common tern (*Sterna hirundo*) and little tern (*Sterna albifrons*) (2.8km east). | 250m north |
| | | Dee Estuary SPA - supports internationally important populations of regularly occurring Annex I species including sandwich tern (*Sterna sandicensis*), little tern (*Sterna albifrons*), common tern (*Sterna hirundo*), and bar-tailed godwit (*Limosa lapponica*). It also supports an internationally important assemblage of waterbirds, providing feeding and roosting sites for ducks and waders in winter. | 4.1km east |
| | Special Area of Conservation (SAC) | Dee Estuary SAC - designated for estuaries, mudflats and sandflat, Salicornia and other annuals colonising mud and sand, Atlantic Salt Meadows, and annual vegetation of drift lines. Also designated for river lamprey (*Lampetra fluviatilis*) and sea lamprey (Petromyzon marinus). Other habitats include fixed dunes with herbaceous vegetation ('grey dunes'); shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes'), embryonic shifting dunes, humid dune slacks, vegetated sea cliffs of the Atlantic and Baltic coasts. | 4.1km east |
| | Ramsar site | Dee Estuary Ramsar site - regularly supports 20,000 or more waterbirds and 1% or more of the individuals in a population of one species or sub-species of waterbirds including redshank (*Tringa tetanus),* shelduck (*Tadorna tadorna*), teal *(Anas crecca*), pintail (*Anas acuta*), oystercatcher (*Haematopus ostralegus),* grey plover (*Pluvialis squatarola).* | 4.1km east |
| | Sites of Special Scientific Interest (SSSI) | Prestatyn Hillside SSSI – designated for botanical interest. Site supports a range of semi-natural plant communities including calcareous and acidic grassland, calcareous heath and scrub and broadleaved woodland. | 4.0km east |
| | | Dee Estuary SSSI - designated for special interest for its total populations of internationally important wintering waterfowl; its populations of individual waterfowl and tern species whose numbers reach national and in some cases, internationally important levels; its intertidal mud and sandflats, saltmarsh and transitional habitats; the hard rocky sandstone cliffs of Hilbre Island and Middle Eye with their cliff vegetation and maritime heathland and grassland; its assemblage of nationally scarce plants; and its populations of sandhill rustic moth (*Luperina nickerlii gueneei*), Red Data Book species. | 4.7km east |
| | Local Nature Reserves (LNR) | Gronant Dunes LNR | 4.1km east |

| Topic | Environmental constraints | Description | Proximity to sites |
|---|---|---|---|
| | Wildlife Sites | Y Ffrith Wildlife Site (Denbighshire D011) - sand dune and herb-rich grassland | 1.5km east |
| | Habitats | Range of sand dune habitats | 1.2km east |
| | | Intertidal rocky shore – rip-rap situated adjacent next to sea wall | Adjacent |
| | | Intertidal sandflats - contains marine benthic invertebrates, such as mussels, which birds may feed on | Within |
| | | Scrub and vegetation | Adjacent |
| | Species | Overwintering birds such as red-throated diver and common scoter likely to forage in the intertidal mud and sand flats adjacent to the site | Potentially adjacent |
| | | Breeding birds, particularly in scrub vegetation adjacent to promenade | Potentially adjacent |
| | | Ground nesting birds potentially in the adjacent golf course | Potentially adjacent |
| | | Potential fish spawning and nursey grounds | Potentially adjacent |
| Cultural heritage | Conservation Area | Rhyl Central Conservation Area - 19th century town planning based on rectilinear grid | 480m south west |
| | Listed building | Royal Alexandra Hospital – Grade II listed building | Adjacent |
| | | Multiple listed buildings within Rhyl Central Conservation Area and surroundings | 200m-1.1km south west |
| | Historic Environment Records (HER) | Rhyl foreshore submerged landscape - prehistoric submerged forest preserved in peat dating to 4000-3000 BC (late Mesolithic/early Neolithic) – 17103 | Within |
| | | Rhyl foreshore causeway (post-medieval trackway) - 106402 | Adjacent |
| | | Rhyl foreshore (Splash point) structures (post-medieval coastal defence/fish trap/prehistoric occupation site) – 123322 | Within |
| | | Rhyl, Volunteers' rifle range - 37700 | Within |
| | | Rhyl, Mantelet Targets - 128935 | 280m east |
| | | St Olaf, Wreck Site - 271558 | 270m north |
| | HER find spots | Rhyl foreshore (Splash Point) antler mattock (Mesolithic find) – 33099 | Adjacent |
| | | Rhyl foreshore Neolithic axes (Neolithic find) – 101936 | Adjacent |
| | | Rhyl foreshore post medieval finds (bronze objects) – 58795 | Within |
| | | Rhyl foreshore macehead – 58796 | Within |
| | | Rhyl foreshore bronze chisel (Bronze Age find) - 101937 | Within |
| Landscape and visual | Area of Outstanding Natural Beauty (AONB) | Clwydian Range and Dee Valley AONB | 3.5km southeast |
| | Marine Character Area (MCA) | Colwyn Bay & Rhyl Flats MCA | Within |
| Water environment | Water Framework Directive (WFD) water body | North Wales coastal water body GB641011650000 (heavily modified water body) - moderate status (moderate ecological potential, fail chemical status) | Within |
| | WFD higher sensitivity habitat | Mussels beds (*Mytilus edulis*) – note that the ecological surveys have been unable to locate this feature on the foreshore (may be ephemeral) | Adjacent |
| | WFD lower sensitivity habitat | Intertidal and soft sediments (sand, mud and mixed) | Within |
| | | Rocky shore (intertidal rock) | Adjacent |
| Population and socio-economics | Local residents | Nearby residential properties along Eaton Avenue, Carlisle Avenue, Garford Road and Hilton Drive | Adjacent |
| | Local businesses | Rhyl Golf Club | Adjacent |
| | Traffic | Residential roads | Adjacent |
| | Recreation and amenity | Wales Coast Path | Within/adjacent |
| | | North Wales Coastal Route 5 (traffic free cycle route) | Within/adjacent |
| | | Public Rights of Way (PRoW) & local cycle routes and footpaths | Adjacent |
| | | Ffrith Beach – recreational and water sports use | Within |

2.2.1.2 The scheme falls within Schedule 2 of the Town & Country Planning Environmental Impact Assessment Regulations (Wales) 2017 section 10(m) Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles, jetties and other sea defence works, excluding the maintenance and reconstruction of such works – All development. Under Regulation 5(8) of the EIA Regulations the proposals must therefore be screened for EIA development by the Local Planning Authority. Given that the proposals would affect an area below Mean High Water Spring (MHWS), the proposals also fall within Regulation 8(1) of the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).

2.2.1.3 Options appraisal has been undertaken for the emerging proposals, and selection of the preferred option has been endorsed by the Welsh Government as rock armour revetment with a new upstand sea wall. Particular consideration was given during the option selection process to potential impacts to the adjacent Liverpool Bay/Bae Lerpwl Special Protection Area, and the potential for indirect impacts on the Dee Estuary/Aber Dyfrydwy SPA, SAC, Ramsar and the Gronant Dunes and Talacre Warren SSSI located approximately 4.1 km to the east of the proposals (including recent extension to the Liverpool Bay SPA). Given that the detailed design proposals are still being developed, detailed assessment of potential for significant effects on these designations has not yet been undertaken with regards to Habitats Regulations Assessment (HRA). HRA Screening will be undertaken at a later stage, but with a coordinated approach with respect to determination of EIA and HRA in accordance with Regulation 26(1)/15A of the aforementioned EIA Regulations.

2.2.1.4 With reference to Regulation 6(2)(b) of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 the proposals would comprise '*the demolition of approximately 600m of the existing upstand part of the recurved sea wall on the Promenade, with the construction of a replacement recurved upstand sea wall, raising of the level of the Promenade with resurfacing works, the placing of additional rock armour revetment at Splash point, and extending the rock armour revetment at Splash Point by approximately 350 metres to the east along the beach in front of the sea wall works. Additional tie-in works to the adjacent sea defences, and entry points through the upstand sea wall with steps down to the beach, would also be provided. Construction of the proposals would temporarily occupy 18 ha of beach for access, excavation works and bulk materials storage. For the duration of the construction works, public access would be restricted to this area of beach, a 1.6 km section of the East Rhyl Promenade, together with the public gardens to the east of Rhyl Pavilion and an area at the end of Garford Road which will be used as construction compounds'*.

2.2.1.5 With reference to Regulation 6(2)(c) and (d) there is potential for the proposals to have likely significant effects on the aforementioned designated sites. There is potential for the proposals to have likely significant effects through impacts on visual amenity, in particular associated with some increased obstruction to views of the seascape and landscape. There would also be a loss of part of the beach as a direct result of placement of rock armour revetment on the foreshore. During construction of the proposals, there is potential for likely significant effects to be caused by disturbance to known and unknown archaeology on the foreshore (particularly submerged forest and peat deposits), and on adjacent residential and business receptors.

2.2.1.6 With reference to Regulation 6(2)(e) consideration has been given during the options selection process to the avoidance of potential likely significant effects. Given that it is not possible to avoid all potential likely significant effects, specific mitigation measures would be considered as part of detailed environmental impact assessment of the proposals

2.2.1.7 In response to the initial EIA Screening request Natural Resources Wales and Denbighshire County Council requested further information on the proposals, but have confirmed that the proposals would be EIA by agreement. An Environmental Statement would therefore be produced for the proposals and would form part of the Planning Application and Marine Licence submissions. Initial discussions between Natural Resources Wales and Denbighshire County Council have also indicated that a coordinated approach would be taken to EIA determination, with agreement to be reached on who will act as the lead point of contact.

## 2.3 EIA Scoping

2.3.1.1 The objective of EIA Scoping is to consider the scope and level of detail of the information to be provided in the ES (Regulation 14(1)). The EIA Scoping Report sets out a proposed methodology for the assessment of likely significant effects on the basis of reasonably accessible environmental baseline information, and proposes an appropriate structure for the ES. Although it is not a statutory requirement to undertaken EIA Scoping, it allows agreement on approach to be sought from the statutory environmental consultees at an early stage in the EIA process. Early engagement through EIA Scoping also encourages an iterative approach to design development, whereby any environmental concerns raised during consultation can be used to inform the emerging design proposals and mitigate any significant environmental effects.

### 2.3.2 Content of the Scoping Report

2.3.2.1 The aspects of the environment set out under regulation 4(2) and Schedule 4 of the EIA Regulations are required to be considered for the proposed scope of EIA. On the basis of review of the extent of project information available, and reasonably accessible environmental baseline information, environmental topics headings are proposed for further consideration of the EIA scope (Table 2-2).

Table 2-2: Aspects of environment considered in scoping report

| Aspect of environment quoted in EIA Regulations 2017 (Regulation 4(2) and Schedule 4) | Chapters heading considered for EIA scope |
|---|---|
| Water (for example hydromorphological changes, quantity and quality) | Chapter 3 Coastal hydrology & hydromorphology |
| Biodiversity (for example flora and fauna) | Chapter 4 Biodiversity & nature conservation |
| Landscape | Chapter 5 Landscape and visual impact |
| Cultural heritage, including architectural and archaeological aspects | Chapter 6 Cultural heritage |
| Population, human health, land (for example land take), material assets | Chapter 7 Socio-economics and human health |
| Population, material assets | Chapter 8 Traffic & Transport |
| Human health, land (for example land take), soil (for example organic matter, erosion, compaction, sealing), air | Chapter 9 Other construction effects |
| Climate (for example greenhouse gas emissions, impacts relevant to adaptation), vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned | Chapter 10 Sustainability and climate change |
| Cumulation of effects with other existing and/or approved projects | Chapter 11 Cumulative and interrelationship |

2.3.2.2 The key environmental topics described in the proceeding chapters of the Scoping Report are set out to the following structure:

1. Baseline – provides a description of environmental information relevant to the proposals that is reasonably available;
2. Environmental Impacts & Likely Significant Effects – considers the likelihood of the aspects of the environment to be significantly affected, on the basis of the extent of project information available, and reasonably accessible environmental baseline information; and
3. Proposed Methodology – proposes the methodology for assessment of likely significant effects and level of detail of the information to be provided in the ES.

2.3.2.3 For each of the environmental topics, the aspects of the environment that are 'scoped in', would require further studies undertaken to inform the ES. Where environmental aspects are 'scoped out' these would not be considered further unless there is a material change in the scheme proposals. The aspects of the environment scoped in or out are summarised in the concluding chapter of the EIA Scoping Report. However environmental aspects can be scoped in or out at any stage of EIA, and so this would be definitively reported in the ES, with refence to the EIA Scoping Report.

## 2.4 Proposed approach to EIA

2.4.1.1 The EIA would be undertaken to comply with the aforementioned EIA Regulations, but reference is also made to current EIA practice guidance, primarily:

- Online Government Guidelines[8].
- Guidelines for Environmental Impact Assessment (IEMA, 2004) & 2006 Updates[9].
- State of Environmental Impact Assessment Practice in the UK (IEMA, 2011[10]).
- Environmental Impact Assessment Guide to Shaping Quality Development (IEMA, 2015[11]).
- Environmental Impact Assessment Guide to Delivering Quality Development (IEMA, 2016[12]).

2.4.1.2 Other environmental topic-specific guidance will be detailed in the methodology section of the environmental scoping chapters.

### 2.4.2 Defining the temporal & spatial scope of EIA

2.4.2.1 The temporal scope of the ES will be considered in terms of the following principal stages of development:

- existing conditions (baseline prior to construction);
- construction period (Spring 2018 to Summer 2020); and
- operation (including maintenance) of the development post construction.

2.4.2.2 Future decommissioning of the development is considered unlikely, given the hold the line policy set out in the Shoreline Management Plan.

2.4.2.3 The spatial scope of the EIA will be considered on the basis of:

- the physical extent of the proposed works, as defined by the limits of land to be acquired or used (temporarily or permanently);
- the nature of the existing baseline environment, including the location of sensitive receptors;
- the geographical extent of impacts beyond the site, e.g. effects on traffic and waterbodies may extend some distance from the development site; and
- the geographical boundaries of the political and administrative institutions and authorities, which provide the planning and policy context for the project.

### 2.4.3 Defining impacts and effects

2.4.3.1 Schedule 4 of the EIA Regulations sets out the requirement of Regulation 17(3) that the ES provides both a description of the characteristics of the proposed development together with a description of the aspects of the environment likely to be significantly affected by the development, including, '*population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape*'. The EIA would therefore seek to identify the importance or sensitivity of these aspects of the environment where they could be affected by the development proposals, characterise the nature of any impacts on these aspects of the environment, and then assess the likely significance of the effect that would result if left unmitigated.

2.4.3.2 Distinction is drawn between environmental impact and likely significant effects, as not all environmental impacts identified necessarily result in a significant effect on the environment.

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[8] https://www.gov.uk/guidance/environmental-impact-assessment

[9] Institute of Environmental Management and Assessment (IEMA) (2004). *Guidelines for Environmental Impact Assessment*. 2006 Updates.

[10] Institute of Environmental Management and Assessment (IEMA) (2011). *State of Environmental Impact Assessment Practice in the UK*. Special Report.

[11] Institute of Environmental Management and Assessment (IEMA) (2016).*Environmental Impact Assessment Guide to Shaping Quality Development*

[12] Institute of Environmental Management and Assessment (IEMA) (2016). *Environmental Impact Assessment Guide to Delivering Quality Development*.

For the purpose of EIA these terms are defined in as follows:

- Environmental Impacts are the identified changes to the baseline environment that are likely to result from the development proposals;
- Likely Significant Effects are the consequences of the identified change in the baseline environment, on environmental resources or receptors of a particular value, importance or sensitivity.

### 2.4.4 Reporting of significant environmental effects

2.4.4.1 For each specialist EIA topic the impact assessment chapter is structured to allow a narrative based approach, whereby the assessment builds towards a reasoned conclusion. This begins with a review of the context and baseline conditions, defines an appropriate methodology of assessment, considers the environmental impacts, and likely significant effects, identifies mitigation measures and then reports on the residual effects where agreement is reached to effectively reduce the significance of an effect. Technical terms would be kept to a minimum in the main text of the ES, with a glossary of terms provided.

2.4.4.2 Likely significant effects will be reported in the ES on the basis of their nature and duration as follows:

- Permanent effects – result from a significant irreversible change to the baseline environment or which persist for the foreseeable future;
- Temporary effects – are significant but persist for only a limited period or which may disappear due to natural recovery of the environment or their assimilation into it;
- Direct or Primary effects – arise from the impact of activities that form an integral part of the project;
- Indirect or Secondary effects – arise from the impact of activities that do not form part of the project, but which are a consequence of it;
- Beneficial effects – have a significant positive influence on environmental receptors and resources;
- Adverse effects – have a significant negative influence on receptors or resources;
- Cumulative effects – result from multiple impacts or effects effect on a particular environmental resource or receptor, which are significant but would otherwise not occur or would be less severe.

2.4.4.3 Significance of environmental effects would be assessed on the basis of the magnitude or intensity of impacts versus the value or sensitivity of the affected environment. Where applicable Table 2-3 will be used to assist in the judgement of significance. This matrix-based approach helps to increase consistency in the assessment of significance and reduces uncertainty by utilising pre-defined relationships between the criteria. Throughout the ES the significance of environmental effect assessment scores will be described using these terms.

Table 2-3: Matrix of significance of effect scoring terms.

| | | *Magnitude, intensity or irreversibility of impact* | | | |
|---|---|---|---|---|---|
| | | **No Change** | **Minor** | **Moderate** | **Major** |
| *Value, sensitivity or importance of impacted environmental resource or receptor* | **Low** | Not Significant or Neutral | Slight | Slight/Moderate | Moderate |
| | **Medium** | | Slight/Moderate | Moderate | Moderate/Large |
| | **High** | | Moderate | Moderate/Large | Large |

### 2.4.5 Mitigation, enhancement and residual effects

2.4.5.1 Regulation 17(3) (c) requires that the ES must include: 'a *description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment*'. Ideally mitigation measures should be both reasonable and practicable, taking account of the following criteria:

- current best practice guidance;

- precedents set by similar projects;
- the effectiveness of different technical solutions;
- their feasibility in construction and operational terms; and
- their incremental costs.

2.4.5.2 When identifying the best possible design measures available to achieve the required mitigation within a scheme, the principles of the hierarchy of mitigation should be employed as follows (in order of preference):

- Avoidance (primary mitigation) – making changes to the project's design to avoid adverse effects on an environmental feature;
- Reduction (secondary mitigation) – where avoidance is not possible, adverse effects can be directly reduced through sensitive environmental treatment or design (mitigation measures);
- Remediation (tertiary mitigation) – where adverse effects are unavoidable or difficult to directly reduce, prevention measures can be introduced to limit their influence. Tertiary mitigation is of a requirement of a legislative regime, and is therefore not optional (i.e. applying for a protected species licence);
- Compensation – where avoidance, reduction or remediation measures are not possible or applicable, it may be appropriate to provide compensatory measures to seek to offset the adverse effect with a comparable positive one elsewhere.

2.4.5.3 Where positive effects can be introduced without the requirement to mitigate an effect, this is termed 'enhancement'.

2.4.5.4 Any environmental effects that remain significant after mitigation are termed 'residual effects'. Residual effects are a convenient way of reporting the overall significance of environmental effects of a proposed development scheme, and would therefore be reported in the ES conclusions and non-technical summary.

# 3 Coastal hydrology and hydromorphology

## 3.1 Baseline

### 3.1.1 Coastal hydromorphology

3.1.1.1 East Rhyl is located on the North Wales coast, which is comprised on mostly low-lying land, formed from alluvial deposits[13]. Its position determines the coastal oceanography, with tidal flows and ambient wave conditions controlled by the structure of the Irish Sea. The tidal regime is dominant, with a spring tide range of 7.5m, and almost total shelter from long-period oceanic swell waves. Ambient waves resulting from the prevailing winds and available fetch lengths occur mainly from the north-west, resulting in predominantly high wave angle conditions along the north-facing coast. The combination of tide and wave conditions has resulted in formation of wide beaches, commonly sand overlying glacial till (clay), with occasional expressions of peat or shingle deposits.

3.1.1.2 The pattern of prevailing west to east sediment transport from Great Orme's Head towards the Dee Estuary has long been identified, through both the interpretation of morphology and observations of downdrift erosion to the east side of coastal and flood defences after they were installed[13]. This transport pathway is the major attribute used to classify this section of coast as a regional sediment sub-cell, Sub-cell 11a[14], which implies a strong spatial coherence of coastal sediment transport (Figure 3-1).

3.1.1.3 Within Sub-cell 11a, the coastal morphology changes near Abergele (Figure 3-2). To the west, carboniferous limestone headlands occur at Great Orme, Little Orme, Rhos Point and the eastern end of Colwyn Bay, providing structural control to arcuate bays. These controls support clay scarp formation along the coast, fronted by sand and shingle beaches. To the east, there is a relative absence of rock formations, with coastal curvature developed near the mouth of the Clwyd River and large-scale spits at Gronant and Talacre, with associated dune fields. The continuity of the coastline is naturally disturbed at the Dee Estuary, which forms a large potential trap for sediments, including finer clays and silts.

3.1.1.4 Most of the North Wales coast has been extensively modified through the installation of coastal defence structures; with 47 artificial structures being identified between Little Orme and the Point of Ayr, along with several points of recharge[15]. Shingle beaches, which occur naturally close to headlands, have been highly modified since the 1840s, with limited apparent opportunity for material renewal.

3.1.1.5 The practice of 'holding the line' where coastal assets were deemed to be at risk, has gradually proliferated along the coast over the last 200 years, and is now central to the coastal management strategy[15]. The prevalence of defensive structures, including groynes and seawalls, has led to progressive beach lowering across much of the shore from Little Orme through to Prestatyn.

[13] Welsby J & Motyka JM. (1989) *A macro review of the coastline of England and Wales-volume 8: the North West-the Great Orme to the Solway Firth*.

[14] Cooper, N.J. and Pontee, N.I., (2006). Appraisal and evolution of the littoral 'sediment cell' concept in applied coastal management: experiences from England and Wales. Ocean & coastal management, 49(7), pp.498-510.

[15] Halcrow Group Ltd. (2011) *North West England and North Wales Shoreline Movement Plan SMP2*. North West and North Wales Coastal Group.


Figure 3-1: Sediment Sub-cells, defined in Halcrow (2010)[16]


Figure 3-2: Coastal locations from Little Orme to Dee Estuary. The study site (Splash point) is located at Rhyl

3.1.1.6 A conceptual source-pathway-sink model is partly supported by the nature of irregularities in the coastal structure. To the west, convex forms are related to geological features, and suggest partial retention of sediment on the updrift side. The less pronounced convexities at Rhyl and Gronant are hydraulic and related to the Clwyd River and tidal exchange from Prestatyn Gutter, and support natural bypassing.

3.1.1.7 Modern interpretation of simple source-pathway-sink behaviour is obscured by the

[16] Halcrow Group Ltd. (2010) *Cell 11 Regional Monitoring Strategy (CERMS). 2009 Baseline Reporting.*

substantial amount of structural modification occurring along the coast, including material extraction, flood protection works and coastal stabilisation. Beach lowering is observed along almost the entire coast between Great Orme Head and the Point of Ayr during the 20th century, along with substantial narrowing of the intertidal zone for the coast between Rhyl and Prestatyn[13,17].

3.1.1.8 Coastal behaviour near East Rhyl, identified from historic mapping, includes:

- Substantial retreat of the low water mark for 5km east of Splash Point between 1871 and 1900, of up to 600m, with subsequent relative stability;
- Progressive retreat of the high-water mark for 2km east of Splash Point from 1871 to 1945, subsequently sitting on the revetment face;
- No clear demonstration of further movement of the intertidal zone from the 1950s, although subsequent installation of structures suggests either continued erosion to downdrift, or an objective to increase the quantity of sand on the beach. Initial efforts to increase beach volume using an extensive field of timber groynes is considered to have failed[13], with greater success for a more recent field of rock T-groynes at Prestatyn[18].

3.1.1.9 Physical evaluation of coastal change for East Rhyl has previously been reported using analysis of coastal profiles along the Denbighshire coast[17,19]. These analyses indicate that most variation is cyclic, related to nearshore movements of sand ridges and runnels. No clear spatial pattern was demonstrated, although net losses were inferred for east Rhyl and downdrift of the Prestatyn groyne field.

3.1.1.10 An analysis of the Denbighshire coastal profiles has been conducted with the objective of assessing coastal sediment transport characteristics. Denbighshire has arranged semi-annual surveys of 26 fixed profile locations since the establishment of the coastal monitoring programme in 2002 (Figure 3-3). Surveys from November 2002 to October 2009 were obtained as part of this project. It is understood that subsequent surveys have been conducted, with CEUK[19] reporting a further 6 surveys over the years 2010, 2013 and 2014.

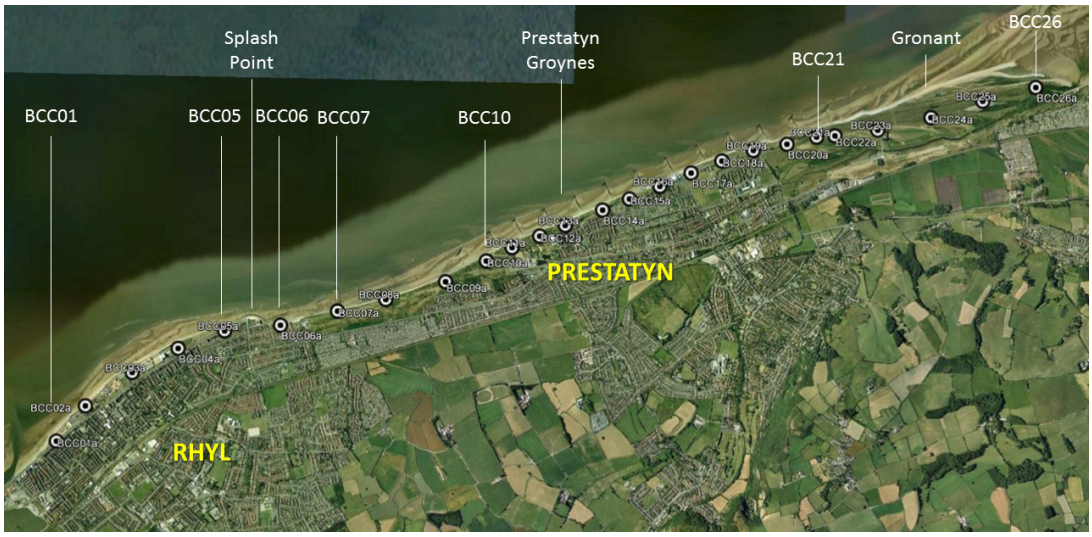



Figure 3-3: Coastal monitoring profile locations (Note: BCC label prefix is interchangeable with the prefix DCC within subsequent figures and the report text).

3.1.1.11 The evaluation of sequential profile surveys and aerial imagery has confirmed that the coastal dynamics are mostly associated with the movement of ridges and runnels along the Rhyl-Gronant coast.

3.1.1.12 At East Rhyl, between profiles BCC02 and BCC09 (Figure 3-3), undular (wavy) profiles are present, resulting from alternating ridges and runnels, occurring between mean low water spring tide and mean high water neap tide. Evaluation of the profile time sequence indicates that these features are bounded within planar envelopes with a grade of approximately 1:55-

[17] HR Wallingford (2008) *Coastal Processes Study: Rhyl to Prestatyn*. v4.0. Martin Wright Associates. EX5690.

[18] Burgess KA, Frampton APR & Bradbury AP. (2014) *Beach modelling: Lessons learnt from past scheme performance*. Environment Agency Project SC110004/R2. Halcrow Group Limited.

[19] CEUK (2015) North West Strategic Monitoring; Regional Sediment Analysis and Reporting 2015. Inter-tidal Report. Prepared for Sefton Council. CEUK Project 08/1410.

60, with material contained within the ridges moving landwards over time.

3.1.1.13 Evaluation of the cross-sectional area above the lower envelope limit (Figure 3-4) shows that although the area for individual ridges may vary substantially (up to 160m$^2$ between surveys), the total area varies more slowly (up to 70m$^2$ between surveys and a total range of only 90m$^2$). As the profiles show landward ridge movement, this suggests sequential material supply, rather than direct exchange between ridges.

3.1.1.14 Differences in ridge behaviour occur between profiles DCC05, DCC06 and DCC07. At DCC06, which is located east of Splash Point, the ridges arrive distinctly on an annual basis, with volume loss only occurring after they have reached the beach. This is consistent with the onshore migration of the ridge and alongshore transport at the beach, which follows from their relative orientation. For DCC05 and DCC07, the ridges are less discrete, with some breaking down or splitting before reaching the shore. Some explanation is provided by aerial imagery (Figure 3-5) which shows the ridges between DCC01 to DCC05 transition in structure and orientation from the trained mouth of the Clwyd River, towards Splash Point. For DCC07, the stability of individual ridges is apparently affected by interactions with the substantial outfall pipeline.

3.1.1.15 Evaluation of sequential profiles at several locations shows that onshore delivery of sediment from ridge migration varies along the Rhyl and East Rhyl shore (Figure 3-5). The timing and volume of sediment supply has been analysed at selected locations, suggesting that the onshore delivery rate varies spatially, with the most rapid and consistent delivery occurring at East Rhyl (Table 3-1).

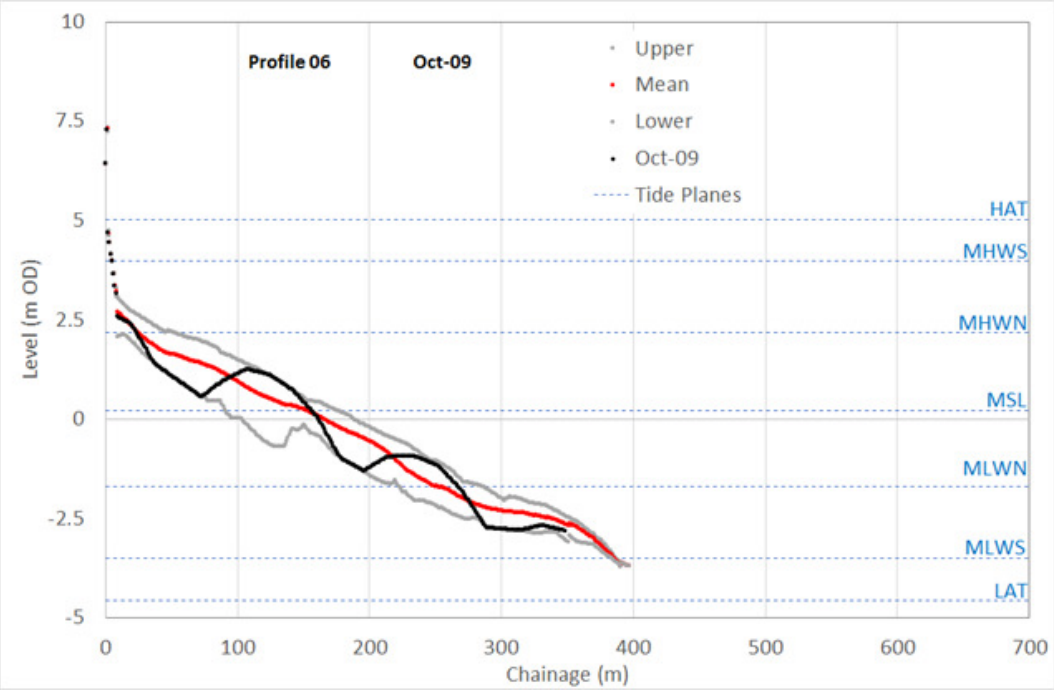



Figure 3-4: Profile DCC06 envelope of surveys 2002-2009 (East Rhyl)

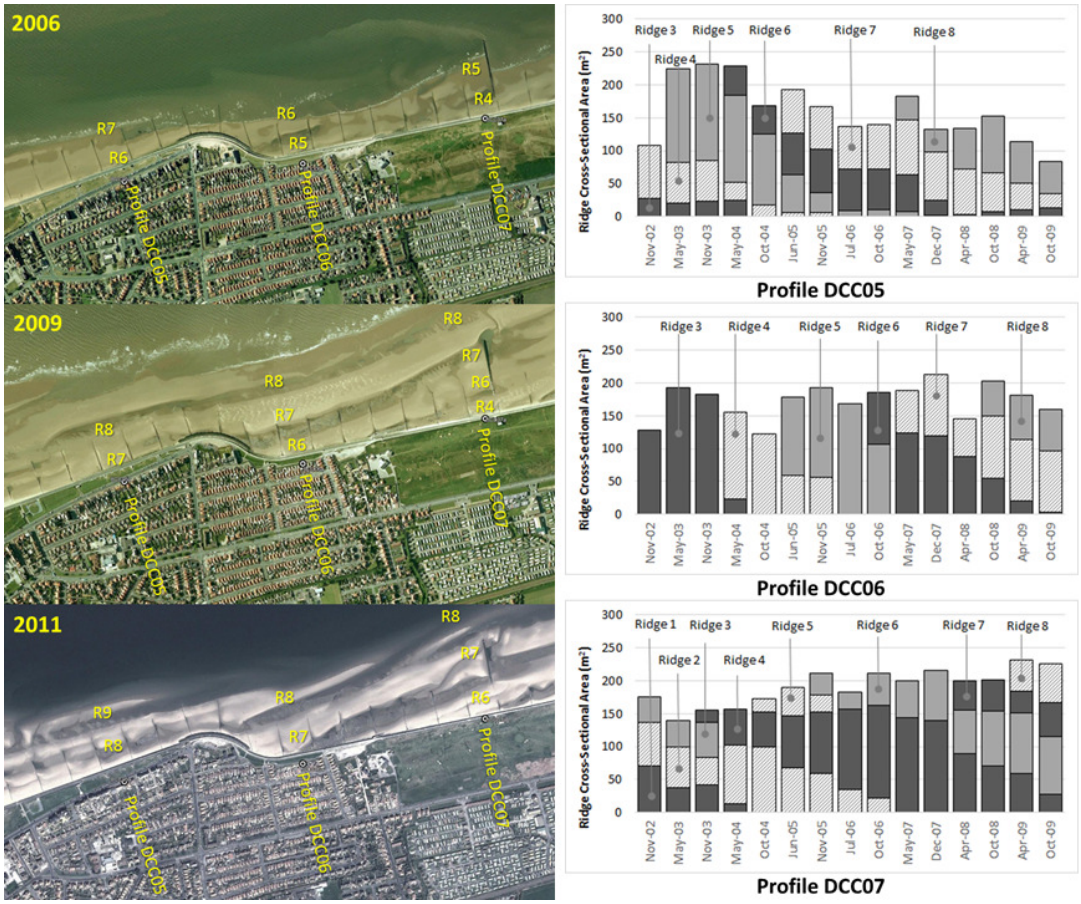



Figure 3-5: East Rhyl nearshore ridge aerial imagery and sequences

Table 3-1: Onshore sediment delivery derived from ridge dynamics

| Location | Profile | Ridge Area (Cross-Section) | Delivery Time Scale | Annual Delivery | Length Scale | Transport Rate |
|---|---|---|---|---|---|---|
| Rhyl | DCC05 | 150 $m^2$ | 4 years | 38 $m^3/m$ | 675m | 25,000 $m^3/yr$ |
| East Rhyl | DCC06 | 180 $m^2$ | 3 years | 60 $m^3/m$ | 370m | 22,000 $m^3/yr$ |
| East Rhyl | DCC07 | 200 $m^2$ | 7 years | 29 $m^3/m$ | 550m | 16,000 $m^3/yr$ |
| East Rhyl | DCC08 | 190 $m^2$ | 6 years | 32 $m^3/m$ | 525m | 17,000 $m^3/yr$ |

### 3.1.2 Coastal hydrology

3.1.2.1 The Water Framework Directive (WFD), Directive 2000/60/EC, is implemented in the England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. There is one WFD surface waterbody that could be affected by the proposed scheme. North Wales is a coastal waterbody adjacent to the proposed scheme extending from Great Ormes Head to the mouth of the River Dee. It is a heavily modified waterbody (HMWB). Table 3-2 below presents summary information on the current WFD status of each of the constituent quality elements of the waterbody. Groundwater bodies designated under WFD are not expected to be affected since ground intrusive works, or excavations to a significant depth, will not occur. Under the WFD, all designated waterbodies should achieve 'good ecological and chemical status' by 2015, derogated to 2027 for under achieving waterbodies.

3.1.2.2 The Directive 2006/7/EC of the European Parliament is implemented in the UK by the Bathing Water Regulations 2013. They control and monitor pollution that may affect human health, including intestinal *Enterococci* and *Escherichia coli*, cyanobacteria, macroalgae and marine phytoplankton, and waste (including tarry residues, glass, plastic or rubber). There are three designated bathing waters in proximity of East Rhyl, the details of which are

summarised by Natural Resources Wales (NRW) bathing water profiles[20].

3.1.2.3 Rhyl bathing waters monitoring point is located opposite Rhyl Sea Life Centre approximately 900m offshore, approximately 2km west of the proposed site. The annual classification for 2017 was sufficient. Rhyl East bathing water monitoring point is located opposite the car park to the west of The Rhyl Sun Centre, approximately 1km westwards along the coast from the proposed site. The annual classification for 2017 was good. Prestatyn bathing waters monitoring point is located approximately 4.2km eastwards along the coast from the proposed site. The annual classification for 2017 was excellent. Each of the bathing waters are subject to short term pollution, caused when heavy rainfall washes faecal material into the sea from livestock, sewage and urban drainage via rivers and stream. Water quality typically returns to normal 1 to 3 days after rainfall. Trace amounts of litter can sometimes be observed during inspections.

Table 3-2: Summary information on the current WFD status of each of the constituent quality elements of the waterbody (data from Waterwatch Wales)

| Waterbody name and ID | Current Overall Status & Objectives | Biological elements | Physio-chemical elements | Chemical elements | Hydromorp-hological elements |
|---|---|---|---|---|---|
| **North Wales (GB641011650000)** | **Current overall status** – Moderate<br>**Objective** – Good by 2021<br><br>**Current ecological potential** – Moderate<br>**Objective** – Good by 2021<br><br>**Current chemical potential** – Fail<br>**Objective** – Good by 2021 | **Phytoplankton** – High<br><br>**Invertebrates** – Good | **Ammonia** – High<br><br>**Dissolved Inorganic Nitrogen (DIN)** - Moderate<br><br>**Dissolved oxygen** – High<br><br>**Annex 8 substances** – High | **Annex 10 substances** – Fail<br><br>**Mercury and its compounds** – Fail | **Flow** – Pass |

## 3.2 Environmental impacts & likely significant effects

### 3.2.1 Coastal hydromorphology

3.2.1.1 The primary impact during construction will be the suspension of material (fine sands and silt) during excavation of the rock armour revetment toe and rainbowing of recharge material onto the beach. It is envisaged that excavation works would mainly be completed on the existing beach between tidal cycles, and would therefore limit the potential for impacts from this operation. Any suspended material mobilised at high tide would be entrained in the mixing zone, be rapidly dispersed in the nearshore region, and become part of the general west-east transport of sediment. The pulse of increased suspended material is unlikely to be detectable downstream of the development site. The excavated material would also be consistent with that generally present on this section of the coastline. Therefore, the impact of increased suspended sediment from excavations during construction and operation has been scoped out of the ES.

3.2.1.2 It is likely that the rainbowing (pumping of sediment mixed with seawater from barge) would be used to deposit beach recharge material onto the beach. The potential impact from this operation is the suspension of fine sediment within the water column. These can remain suspended in the water column for long periods and, depending on the ambient water flows, could potentially be transported significant distances as a sediment plume. The impacts from rainbowing can be mitigated through the undertaking of operations at specific tide states (i.e. slack water), enabling sediment to settle out. The logistics of undertaking this will be

[20] http://environment.data.gov.uk/wales/bathing-waters/profiles/

considered in the ES and so sediment entrainment during construction is provisionally scoped into the ES.

3.2.1.3 It is also assumed that the rock armour revetment toe excavation works and rainbowing of recharge material onto the beach would be undertaken at different phases of the construction works. This would reduce the likelihood of a cumulative interrelationship effect from these construction activities on sediment entrainment.

3.2.1.4 The proposals do not include any structures designed to restrict the longshore transport of sediment, which is the dominant transport pathway within this region. The inclusion of rock armour will, by design, reduce the amount of material previously available from the toe of the structure. However, the area impacted by the armour will be minimal with respect to the nearshore active zone, or the Rhyl coastline, and therefore its inclusion is unlikely to have the potential to significantly impact sediment availability to downstream locations.

3.2.1.5 Environmentally sensitive areas down drift include Gronant Dunes and Talacre Warren (see Chapter 4 for detail on designated sites for nature conservation). However existing year-to-year variation in beach volume occurring at Gronant Dunes and Talacre Warren is considerably larger than the modelled changes in sediment transport as a result of the proposed scheme (as summarised in section 1.3.2). Furthermore, the rock armour will only be fully exposed for much of the tidal cycle, and therefore the opportunity for it to affect sediment transport is reduced. Therefore, the impact of the proposed scheme on the long-term stability of the beach and sediment available for transport during construction and operation is scoped out of the ES.

3.2.1.6 Although no likely significant effects are foreseen during long-term operation to coastal hydromorphology, ongoing modelling work will be considered, and impacts and effects will be revaluated in the ES.

### 3.2.2 Coastal hydrology

3.2.2.1 Construction works generally pose a risk to the water quality through excavation and resuspension of sediment, fabrication of concrete, plant and machinery, and storage of materials. The activities during construction that pose a risk to water quality include:

- accidental spillages of fuels and polluting materials such as concrete;
- exposure of bare ground, earth movement, stockpiling material, mobilising of sediment into surface water receptors through runoff from the site;
- wheel washing run-off, or muddy run-off from construction access tracks within the site;
- pollution due to vandalism of stores or plant; and
- poor/inappropriate storage of materials and chemicals/fuels and wastes such as on permeable surfaces, adjacent to watercourses or without sufficient bunding capacity.

3.2.2.2 Chemical quality elements of WFD are unlikely to be affected by the proposed works. The construction contractor would be expected to apply pollution prevention techniques on site based on industry standard pollution control measures and best practice including Environment Agency Pollution Prevention Guidelines (PPGs). It is considered that pollution prevention would be sufficiently mitigated through such measures, which would be detailed in a Construction Environmental Management Plan, prepared as part of the ES. Sediment disturbed during construction is also unlikely to contain chemical contaminants above Cefas Action Level 1, which is the level that requires further assessment under the WFD guidance issued by the Environment Agency. This is due to a lack of historic contaminating activity of the beach front, and the dynamic nature of a beach environment. A geochemical interpretive report is required to recommend any remediation works, though it is expected these will not be required. This is also considered in Chapter 9.

3.2.2.3 In terms biological quality elements of the WFD, the proposed works will not pose a barrier to fish movement and migration. Noise impacts from operations on the beach are unlikely to impact fish as the works will be undertaken when the working area is above the water level and dry. Noise disturbance impacts from sediment recharge, which would be undertaken from barge at high tide, is not considered significant (refer to Chapter 9).

3.2.2.4 Higher sensitivity habitats under WFD are also not present in proximity to the site. A mussel bed has been recorded in the past and is shown on MAGIC[21], but it was not identified during

[21] http://magic.defra.gov.uk/MagicMap.aspx

the ecological surveys (see Chapter 4). Increased concentrations of suspended sediment in the water column (via beach recharge or sediment mobilisation during construction) has the potential to impact on WFD quality elements (i.e. reduce levels of dissolved oxygen, smother benthic invertebrates, or affect gill function of fish). However, the impact of sediment mobilisation is likely to be localised (see section 3.2.1 above), with any suspended sediment likely to be entrained within the mixing zone further reducing the risk of smothering for benthic invertebrates. Nevertheless, the excavation of sediments, storage of material on the beach, beach recharge and general construction activities on the beach may physically disturb benthic invertebrates (see Chapter 4). Therefore, risks to biological WFD quality elements are scoped in to the ES.

3.2.2.5 The works may affect turbidity in bathing waters through mobilisation of sediments into the water column, which may temporarily impact on the aesthetic quality of bathing waters. However, the effect of this is likely to be low (see section 3.2.1 above). Furthermore, suspended sediment is unlikely to exacerbate bacterial contamination or algal growth, and thus is unlikely to affect bathing water quality as human health shouldn't be impacted. Therefore, effects to bathing water quality are scoped out of the ES.

3.2.2.6 No impacts to water quality and WFD quality elements are predicted as a consequence of the operation of the new rock revetment. Maintenance operations might include re-positioning of rock armour and concrete works, which potentially could have minor impacts, however there is an expectation that these would be mitigated through the application of good site and construction practices. The effects to hydromorphological quality elements of WFD have been considered in the hydromorphological section above.

## 3.3 Proposed methodology

3.3.1.1 The following modelling work is ongoing and the results will be reviewed and assessed for inclusion in the ES.

- Wave transformation modelling has been undertaken using the Delft3D SWAN numerical model. This enables the available offshore wave dataset to be transformed to the nearshore toe locations. The outputs from the modelling study include: significant wave heights, water levels and wave periods for a 200-year return period wave in 2117 at each toe location between Splash Point and the golf course frontage.
- The outputs from the SWAN model will be used, in conjunction of the defence schematisations, to provide inputs to the Overtopping Neural Network (NN). NN is a conceptual design tool used to estimate wave overtopping discharges for coastal structures, and to allow design variations to be evaluated.
- The wave overtopping rates for the various sections of the Rhyl defences will then be used to inform a TUFLOW flood inundation model. The flood defence scheme includes the use of the golf course as a flood storage area. The inundation model will allow the flood defences designs to be refined to ensure that the storage capacity of this area it not exceeded. The overtopping and inundation modelling will therefore be a reiterative process.

3.3.1.2 A Preliminary WFD Assessment will be undertaken in conjunction with the development of the project and EIA process, and will identify if further assessment is required. This would follow guidelines provided in the Environment Agency's Clearing The Waters for All.

# 4 Biodiversity and Nature Conservation

## 4.1 Baseline

### 4.1.1 Designated sites

4.1.1.1 A preliminary desk-based study indicates that the site is located within the proximity of several internationally and nationally designated conservation sites (refer to the Environmental Constraints Plan provided in Appendix A).

4.1.1.2 Liverpool Bay Special Protection Area (SPA) (UK 9020294) is located approximately 400m seaward of the proposed scheme. It consists of an area combining both the English and Welsh Coastlines from Morecambe, past the Ribble and Dee estuaries in England, encompassing Conwy Bay up to Pont Lynas, Anglesey, in Wales. The site is designated for the international importance of its over-wintering bird assemblages, especially of red-throated diver (*Gavia stellate*) and common scoter (*Melanitta nigra*), summarised by JNCC22. The area is also designated under Article 4.2 as supporting an internationally important assemblage of waterbirds by regularly supporting at least 20,000 waterfowl.

4.1.1.3 Liverpool Bay SPA has recently been extended further inshore in order to provide protection to foraging common tern (*Sterna hirundo*) and little tern (*Sterna albifrons*). The extension is located approximately 3.2km east of the proposed scheme. Following consultation, the extension to the SPA was formerly classified on 31st October 2017.

4.1.1.4 The Dee Estuary Special Area of Conservation (SAC) (UK0030131) is representative of Atlantic salt meadows in the north-west of the UK, summarised by JNCC[23]. It forms the most extensive type of saltmarsh in the Dee, and since the 1980s it has probably displaced very large quantities of the non-native common cord-grass *Spartina anglica*. It is located approximately 4.7km east of the proposed site. The Dee Estuary SAC is primarily designated for the following habitats:

- 1140: Mudflats and sandflats not covered by seawater at low tide
- 1310: Salicornia and other annuals colonizing mud and sand
- 1330: Atlantic Salt Meadows (*Glauco-Puccinellietalia maritimae*)

4.1.1.5 The Dee Estuary is also designated as a SPA for European waterbirds, providing feeding and roosting sites for ducks and waders in winter, and supports common tern and little tern during the breeding season.

4.1.1.6 The Gronant Dunes and Talacre Warren Site of Special Scientific Interest (SSSI) is located approximately 4.7km east of the proposed scheme. The SSSI supports a range of habitats associated with coastal dune systems including vegetated shingle, fixed and shifting dunes, saltmarshes and a number of protected species including the largest breeding colony of little tern (*Sterna albifrons*) in Wales, a population of natterjack toad (*Bufo calamita*), and sand lizard (*Lacerta agilis*). Several other SSSIs are located within the 5km of the proposed scheme including Prestatyn Hillside SSSI, which is a limestone grassland and pavement, Graig Fawr SSSI which is a limestone hill with associated grasslands and heathlands, and Maes Hiraddug SSSI which is a neutral grassland.

4.1.1.7 There are two Local Nature Reserves (LNRs) located to the south-west and west of the site; Kinmel Dunes LNR and Brickfields Pond LNR. Overlapping the Gronant Dune and Talacre Warren SSSI is the Gronant Dunes LNR.

4.1.1.8 There are no non-statutory designated sites located within 1km of the proposed scheme. Y Ffrith Local Wildlife Site (LWS) is located approximately 1.2km east of the proposed scheme and consists of dune grassland habitat.

### 4.1.2 Habitats

4.1.2.1 A preliminary ecological walkover survey was carried out on the 30th September 2015, as well as a marine biotope survey carried out on the 24th March 2017, and identified the

[22] JNCC. 2015. Liverpool Bay Special Protection Area. [Online] Available at: http://jncc.defra.gov.uk/pdf/SPA/UK9020294.pdf SPA data form (Accessed 10th November 2015).

[23] JNCC. 2015. Dee Estuary Special Area Conservation. [Online] Available at: http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030131/. (Accessed 10th November 2015].

presence of the following habitats (also see Appendix B).

4.1.2.2 Within the site of the proposed scheme there are numerous boulders along Splash Point which act as rock armour defences in front of the seawall at SJ 02106 82457. These have been colonised by numerous flora and fauna including common periwinkle (*Littorina littorea)*, toothed wrack (*Fucus serratus)* and grass kelp (*Ulva intestinalis)*. Due to the lack of rocky habitat within the vicinity of the study site, and despite being man-made, the boulder habitat is considered to be of medium ecological value.

4.1.2.3 The proposed scheme site and vicinity contains a large concrete seawall which stretches along the coast eastwards of Rhyl and directly in front of Rhyl town centre. Areas of the stepped seawall front are algae covered. The habitat is influenced by freshwater runoff and was dominanted by a dense mat of *Enteromorpha* spp. No other species were recorded within this zone. The sea defences are considered to be of low ecological value.

4.1.2.4 Intertidal sand is an important habitat along the North Wales coastline and at low tide a large expanse of sand flat is exposed. This extensive area provides habitat for numerous invertebrates, bivalves and wading bird species. The intertidal habitats located within the study area include the beach itself which comprises of sand, and some small, sporadic deposited areas of unvegetated shingle and cobbles. Two patches of moderately exposed eulittoral boulders and cobbles are present to the east and west of the proposed scheme upon the sand flat, containing marine invertebrates such as winkles, whelks, mussels, anemones, and seaweeds. A mussel bed habitat is recorded on MAGIC, but this was not identified during the ecological surveys. It is possible that the mussel bed is ephemeral and therefore has the potential to return in the future. The sand also accommodates a strandline of decaying seaweeds with talitrid amphipods. The intertidal habitat is predominantly sand both above and below the mean high-water mark. This habitat is therefore assessed as being of medium ecological value.

4.1.2.5 Moderately exposed or vertical sheltered eulittoral rock, or structures in the form of groynes are present along the beach. These are characterised by characterised by dense barnacles (*Semibalanus balanoides)* with occasional common limpet (*Patella vulgate)*. They also provide additional anchorage points for seaweeds such as toothed wrack. It should be noted that anecdotal evidence suggests that the reef forming honeycomb worm (*Sabellaria alveolate)* has been recorded on one or more of the timber groynes present along the foreshore. This species was not recorded during this survey.

4.1.2.6 Amenity grassland is located within Rhyl Golf Club, just behind the sea wall defences approximately 300m east of the proposed site. This consists of species poor, intensively managed grassland. In addition, the Golf Club contains areas of scattered scrub. There is also a small marginal area between the golf course and the coastal path which contains a narrow strip of tall ruderal grassland with species such as tree marrow (*Lavatera arborea)*, curly-leaved dock (*Rumex crispus)* and teasel (*Dipsacus fullonum)* present. This habitat is considered to be of negligible ecological value.

4.1.2.7 There are numerous small areas of poor semi-improved grassland adjacent to the coastal path, which were in a deteriorating state at the time of the survey and were noted to be species poor with perennial rye-grass (*Lolium perenne)* dominating. The areas were also noted to be heavily disturbed by dog-walkers. The small sporadic grassland areas were also in the process of being replaced with new turf at the time of the survey. These small patches of grassland however, do provide a buffer zone between the residential area of Rhyl and the seafront. Therefore, this habitat is considered to be of low ecological value.

4.1.2.8 An area of fixed dune grassland habitat is present to the east of proposed scheme, within Y Ffrith LWS. This area contains species typical of coastal dune systems and marram grass *(Ammophila arenaria)* in particular dominates with sand couch (*Elytrigia juncea)* and occasional mouse-ear hawkweed (*Hieracium pilosella)*. The dune system is fixed and is located above the strandline and is therefore cut off from the intertidal zone by the existing seawall defences and coastal path. This has resulted in a lack of deposition to the sand dune system. Dune systems are important habitats for a number of specialised plant species which allow rare plant communities to develop. Grassland dune systems also support fauna such as reptile and amphibian species and some ground nesting birds. They also provide habitat for some nationally scare invertebrate species. This habitat is assessed as being of high ecological value.

4.1.2.9 There are areas of scattered scrub present within the grounds of Rhyl Golf Club and an area

of dense scrub behind the fixed dune system located approximately 1.2km away from the proposed scheme. The areas of scrub recorded were all dominated by gorse (*Ulex europaeus)* and other species present included tree marrow, and traveller's joy (*Clematis vitalba)*. Scrub is a valuable habitat for nesting and foraging birds and can also provide refuge for reptile species, therefore this habitat is considered to be of medium ecological value.

### 4.1.3 Species

4.1.3.1 The intertidal sandflats have the potential to support feeding waterfowl and wading birds. A wintering bird survey was carried out between October 2016 and April 2017 at the East Rhyl foreshore (provided in Appendix B). The survey programme consisted of 12 vantage point surveys undertaken during the main overwintering and migratory period (August to April inclusive). The foreshore at Rhyl was utilised predominantly by wading and gull species with a total of 36 species recorded during the survey. These were usually in low numbers and generally concentrated at the eastern extent of the study area, approximately 1000m from the proposed options. Peak numbers of birds were recorded on falling tides when the receding tide provided the best foraging opportunities. This was especially the case following storm surges when large numbers of food species such as starfish were revealed on the receding tide and heavily predated by gulls. Flocks of 5 to 6 Common Scoter were recorded within 200m of the proposed works at high tide, foraging when the area was covered by water. Flocks of up to, and over, 1000 were recorded over 1000m offshore. Small numbers of red-throated diver were mostly recorded commuting past the site or occasionally foraging approximately 500m out to sea. A total of 34 further species of wading, wildfowl and gull species were recorded during the survey with a number of these species forming part of the qualifying assemblage for which Liverpool Bay SPA is designated. A peak count of wader numbers was recorded on the 9th of December where approximately 500 oystercatcher, 20 sanderling, 70 dunlin, 5 curlew, 120 redshank and 10 turnstone were recorded over the survey area. These birds were subject to frequent disturbance from dogwalkers and were flushed into the air continually before settling on another part of the beach. These coincided with a falling tide providing the best foraging opportunities.

4.1.3.2 Use of the beach by large numbers of people walking dogs or undertaking other leisure activities was recorded during the wintering bird surveys, this caused large amounts of temporary disturbance on the beach. In these events birds would be flushed from areas used for foraging or loafing, but would generally fly less than 50m before re-settling.

4.1.3.3 The majority of the surveyed intertidal area consists of clean, medium to fine sand, with no coarse sand, gravel or mud present (includes the majority of the works area). It is considered likely that the sediments in this area support *marine invertebrates* and an assemblage of polychaetes and/or amphipod. Bivalves may also be present in varying numbers on the lower shore, and where sediments are stable. Marine invertebrates within the sediment are likely to be an important food source for wading birds.

4.1.3.4 Liverpool Bay supports various fish species of commercial importance including *Clupeidae* species such as herring (*Clupea harengus)* and sprat (*Spratus spratus)* which are known to have nursery grounds in the bay. Other species such as plaice (*Pleuronectes platessa)* and sole (*Solea solea)* also use the bay for spawning and as a nursery area[24].herring and sprat are amongst the most frequently recorded prey species of red-throated divers which is one of the primary reasons for the SPA designation, although this species is also considered to be an opportunistic feeder and can also feed on a broad range of fish species[25]. Using the limited data available, fish are assessed as being of medium ecological value within Liverpool Bay SPA due to the species which depend on them as a food source.

4.1.3.5 A total of 15 species of cetacean have been recorded within waters of the north-west coast of the UK and six are known to be resident or annual visitors of Liverpool Bay (Evans & Shepherd, 2001). These are Risso's dolphin *Grampus griseus* bottlenose dolphin *Tursiops truncates*, short-beaked common dolphin *Delphinus delphis*, harbour porpoise *Phocoena phocoena*, long-finned pilot whale *Globicephala melas* and minke whale *Balaenoptera acutorostrata.* The local record centre provided records for grey seal *Halichoerus grypus* within close proximity of the proposed scheme and a single individual was recorded within

[24] Natural England, Countryside Council for Wales. 2012. Liverpool Bay SPA Conservation Advice Package. [Online] Available at: http://publications.naturalengland.org.uk/publication/3236717. (Accessed 5th January 2016).

[25] Guse, N., Garthe, S. & Schirmeister, B. 2009. Diet of red-throated divers *Gavia stellata* reflects the seasonal availability of Atlantic herring *Clupea harengus* in the southwestern 34 Baltic sea. *Journal of Sea Research*, 62: 268-275.

100m of the proposed work area during the wintering bird surveys carried out in 2016.

4.1.3.6 The dense and scattered scrub and sand dune habitat provides opportunities for foraging and nesting bird species. This is considered to be of medium ecological value for nesting and breeding Birds due to the lack of available nesting habitat within the site and its immediate vicinity.

4.1.3.7 Trees in the vicinity of the site are sub-mature in age and consequently are considered to be of low value to support roosting bat species due to the absence of any features (such as cracks in; or gaps under bark) that could provide Bat roosting opportunities. There is potential that Bats could utilise the surrounding residential area for roost sites. The data search revealed records of numerous bat species within 5km of the study site. However, the closest record is located approximately 2.8km south-east of the site. The study site is considered to be of low ecological value for foraging and commuting Bat species due to the lack of habitat present within the study site, but is assessed as being of medium ecological value for roosting Bat species given the potential of the surrounding residential/urban area.

4.1.3.8 Due to the highly urbanised nature of the immediate site area and the presence of coastal habitats subject to tidal influences it is unlikely that the surrounding environment suitable to support foraging and commuting populations of badger. The wider area does, however, contain numerous habitat features which can be utilised by this species including areas of open grassland, drainage embankments and hedgerows. The data search highlighted numerous records for this species with the closest record located 300m south-east of the site. No evidence of badger was recorded during the preliminary ecological site walkover survey and consequently the area is considered to be of low ecological value for badger.

4.1.3.9 No reptile species were observed during the preliminary ecological site walkover survey. However, the dune grassland provides both shelter and basking sites for reptiles, with records of common lizard present in this area. There are also records of sand lizard within 5km of the study site, however the closest record is located approximately 4km east of the proposed scheme site. The tall ruderal vegetation alongside the Golf Club and mosaic scrub habitats present to the east of the study area also provide potential for reptile species. The habitat to the west of the site is considered sub-optimal for reptiles due to the highly urbanised town centre which has a lack of refuge and foraging opportunities for reptile species. The site is considered to be of low ecological value for reptile species.

4.1.3.10 The coastal dune grassland located to the east of the study site provides habitat for a range of terrestrial invertebrate species. Numerous UKBAP, LBAP and Red Data Book species including records of small heath (*Coenonympha pamphilus)*, latticed heath (*Chiasmia clathrate)*, flea bee-fly (*Phthiria pulicaria)*, large red-tailed bumblebee (*Bombus lapidarius)*, white-tailed bumblebee (*Bombus lucorum)* and holly blue (*Celastrina argiolus)* which were returned from the data search. The protected silver-studded blue butterfly (*Plebejus argus*) which is found mainly on heathland, but can be present on calcareous grassland and dune systems, is distributed across the Graig Fawr SSSI located to approximately 3km south-west of the study site. The Y Ffrith LWS, located to the east of the study site, is known to contain a large population of the uncommon grayling butterfly (*Hipparchia Semele)* which is a Red Data Book and UKBAP species. The study area and immediately adjacent habitats are considered to be of medium ecological value for terrestrial invertebrates. This is a precautionary assessment due to the lack of survey data available.

## 4.2 Environmental impacts & likely significant effects

4.2.1.1 Given that the overwintering and migratory birds present at the site are already habituated to large amounts of disturbance, and the availability of alternate nearby intertidal habitat, it is not considered that disturbance due to the works will result in a significant impact upon the wintering birds that form part of the qualifying assemblage of the Liverpool SPA. Birds were not recorded in high densities, and given that the majority of the works will likely be carried out at low tide, it is considered that there is ample alternative foraging and loafing habitat available nearby.

4.2.1.2 Given the availability of similar habitat locally, it is not considered that the construction of the breakwater or revetment will have a significant impact upon wading species. It should also be noted that relatively few birds were observed utilising the footprint of the proposed works, although, great crested grebe were recorded foraging at high tide in this location. It is not considered that the temporary loss of this habitat will have a significant impact upon common scoter or red-throated diver. Nevertheless, impacts to birds from noise disturbance are

provisionally scoped in until detailed construction plans are provided.

4.2.1.3 The recharge of the beach has the potential to smother intertidal benthic communities, If the beach is recharged with a grain size larger than is currently present, this may also affect the ability for benthic communities to recolonise the area as larger grain sizes often do not provide the stable environment that many benthic invertebrates require.

4.2.1.4 There is also the potential that any fine silts imported with the recharge material will be gradually washed out, causing short-term damage to nearshore benthic communities.

4.2.1.5 There is the potential for the recharge of the beach to impact upon fish species. The potential impact from pumping of sediment mixed with seawater from barge operation is the suspension of fine sediment within the water column. These can remain suspended in the water column for long periods and, depending on the ambient water flows, this has the potential to impact upon fish species and is provisionally scoped in.

4.2.1.6 There is potential for construction works involving the use of materials, vehicles or equipment that have been used on other sites to introduce invasive non-native species. However, it is considered the risk of this occurring is low as only managed areas (hard surfacing, amenity grassland etc) would be used for these purposes, and, as all construction materials and vehicles/equipment would be brought from land, meaning that only terrestrial sources of introducing non-native invasive species are considered possible. Industry standard measures to ensure non-native invasive species are not brought to the site during construction would be set out in a Construction Environmental Management Plan, produced as part of the ES. However, there is also potential that the sea defences and any biological enhancements proposed as part of the scheme could also increase the risk of establishment of non-native invasive species during operation of the works. Further consideration of this would be undertaken as part of the ecological impact assessment.

4.2.1.7 In summary, impacts that could give rise to likely significant effects to biodiversity if no mitigation measures are implemented, and therefore will be considered further in the ES, include:

- Physical disturbance to existing rock armour and associated rocky habitat during construction
- Physical disturbance of scrub adjacent to site, and potentially inhabiting nesting birds, during construction
- Physical disturbance to vegetation and grassland and associated effects to potentially inhabiting reptile and terrestrial invertebrate species during construction
- Physical disturbance and loss of intertidal habitat and potentially inhabiting marine benthic invertebrates during construction
- Physical disturbance of fish during construction
- Non-physical disturbance to Liverpool Bay SPA and overwintering birds (e.g. from noise and visual presence) during construction

4.2.1.8 Mitigation measures that would be implemented to prevent significant effects include:

- Increase rocky habitat for re-colonisation on new structure during operation
- Consideration given to minimising lighting around the site during construction to avoid potential disturbance to roosting/foraging bats
- Adoption of a precautionary method of working to avoid potential harm to reptiles (i.e. if large numbers of reptiles are found during the works, construction should cease immediately, and ecological advice sought)
- Implementation of pollution prevention techniques based on industry standard pollution control measures and best practice (such as Environment Agency Pollution Prevention Guidelines)

4.2.1.9 There is also potential for ecological enhancements to be incorporated into the proposed scheme. it is recommended that consideration is given to potential for part of the new rock armour to be designed to encourage the colonisation of rocky shore invertebrates, such as winkles, limpets, echinoderms, and seaweeds. This could comprise the provision of artificial rock pools, drilled holes/cervices to provide protection for colonising species, and/or using materials with more roughness to aid attachment of species. Engagement with universities and stakeholders that have an interest in marine habitat enhancement measures is currently

being undertaken to explore the potential for this.

4.2.1.10 Impacts to sand dune habitats to the east of the proposed scheme are unlikely to be significant since changes in long-shore sediment drift will be negligible (see Chapter 3 Coastal hydrology and hydromorphology). Consequently, the risk of significant effects the breeding tern populations of the Liverpool Bay SPA, Dee Estuary SPA, and Gronant Dunes and Talacre Warren SSSI are considered unlikely, and are scoped out of the ES.

4.2.1.11 Non-physical disturbance to roosting bats (e.g. noise and light) during construction and operation have been scoped out of further assessment in the ES. This is because the works do not propose to disturb any residential properties that may contain bats. Disturbance to badger has also been scoped out of the ES.

4.2.1.12 Significant impacts to marine mammals are not expected as the works will not require any percussive construction techniques and impacts are considered to be limited to a temporary avoidance of the area during the operation of the barge for the beach recharge.

## 4.3 Proposed methodology

4.3.1.1 The following measures have been, or will be, undertaken to ensure that the sensitive habitats and species identified within and adjacent to the proposed scheme are not impacted upon.

4.3.1.2 An Ecological Impact Appraisal (EcIA) will be undertaken in line with CIEEM guidelines[26].

4.3.1.3 A Preliminary Ecological Appraisal comprising an Extended Phase 1 Habitat Survey and Marine Biotope Survey following Joint Nature Conservation Committee (JNCC) survey methods[27] has been produced and recommendations to avoid impacts upon habitats and species within and adjacent to the proposed works area will be incorporated into the ES.

4.3.1.4 A wintering bird survey has been carried out using the methodologies set out by the British Trust for Ornithology (BTO). This incorporated a data request from the Wetland Bird Survey (WeBS) from the BTO. Consultation with the BTO will also be carried out with regards to impacts upon bird species as a result of the scheme. The results will be used to inform environmental impacts and limit effects through suitable mitigation.

4.3.1.5 A Habitats Regulation Assessment (HRA) scoping exercise will be required to further assess the potential for a significant effect on the adjacent Liverpool Bay SPA, and Dee Estuary SPA, SAC and Ramsar. This would also consider impacts to the bird qualifying features of the sites. An Appropriate Assessment will be required if NRW believe that the proposals are likely to have a Significant Effect upon the site's features. This will be coordinated with EIA in accordance with Regulation 27 of the EIA Regulations.

[26] CIEEM EcIA Guidelines (Terrestrial, Freshwater and Coastal) Second Edition and CIEEM EcIA Guidelines (Marine and Coastal).

[27] JNCC (2010), *Handbook for Phase 1 habitat survey - a technique for environmental audit* & Parry, M.E.V. (2015), *Guidance on Assigning Benthic Biotopes using EUNIS or the Marine Habitat Classification of Britain and Ireland*, JNCC Report 546.

# 5 Landscape and Visual

## 5.1 Baseline

5.1.1.1 The proposed coastal defences are to be located on the beach at Splash Point, Denbighshire, North Wales. It is a coastal area approximately 2km from the centre of Rhyl, with wide open views across the sea and along the Beach. The North Wales Coast Path runs through the site, adjacent to an existing concrete sea defence wall. The pathway provides a route for walking and cycling, and connects with Prestatyn, another seaside town approximately 3km east of the site. Rhyl Golf Club is situated on the landward side of the coast path, adjacent to the site, providing a recreational green space within the built-up fabric of the town.

5.1.1.2 A desk-based study shows the site is not within any international or national landscape designations. The Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB) is approximately 4km southeast of the site. No other landscape designations have been identified at this stage.

5.1.1.3 The landscape character of the area under consideration can be assessed at a variety of different scales, from national to site-based. A number of existing published studies relate to the area under consideration and provide a basis for an assessment of the landscape character and impacts.

5.1.1.4 National Landscape Character Area's in Wales have been published by NRW. The site is within the North Wales Coast Landscape Character Area, which stretches from Great Ormes Head, eastwards to the Point of Ayr. This area is characterised by limestone hills backing the coastline, with seaside resorts and transport links squeezed into the flat land between the hills and the coastline. Most of the coastal strip has been developed for the tourism industry, with many of the towns planned (Llandudno, Colwyn Bay, Rhyl), to accommodate for an influx of tourists from Lancashire and Merseyside in the 19$^{th}$ and 20$^{th}$ centuries. More recently, these areas have been developed with caravan parks and holiday camps. Promenades, sea walls, groynes, rock armour and other forms of sea defences have been built along the majority of the coastline. The local landscape character of the area has been published using LANDMAP which is a national information system for gathering and evaluating landscape information, developed by Countryside Commission for Wales, now NRW. LANDMAP is divided into five categories (aspect layers): Geological Landscape, Landscape Habitat, Visual and Sensory, Historic Landscape and Cultural Landscape. The five aspect layers should be considered to build a picture of the overall landscape character of the area.

5.1.1.5 The Visual and Sensory layer provides a description and value for the visual character of the area, the study area lies within two Visual and Sensory areas, Prestatyn/Rhyl (Unique ID: DNBGHVS004).and Coast West of Prestatyn (Unique ID: DNBGHVS002).

5.1.1.6 Prestatyn/Rhyl aspect area has been described as a seafront area that has neglected and derelict properties with inappropriate seafront development. The Ocean View Amusement Park, caravan parks and holiday camps dominate the areas character and the overall value is low. However, the area has a strong functional – economic, employment, transport and population role and strong links to the adjacent coastline as the settlement was principally developed as a result of tourism generated by the coastal location and seafront.

5.1.1.7 The coastline west of Prestatyn has been described as having a strong and distinct landscape character of open expanses of sky and sea with a sense of remoteness. It is not degraded by the adjacent lower quality settlement frontage, however, there is a significant stretch of sea wall that is relatively imposing, although necessary to serve as a sea defence. The overall value is high, and has been described as a valuable resource with excellent public access.

5.1.1.8 Marine Character Areas have also been published by NRW which identify the character of Wales' seascape into 29 broad-scale Marine Character Areas. The proposed site is within MCA 02 Colwyn Bay & Rhyl Flats, characterised by a low-lying coastline backed by coastal levels, long sandy beaches and shingle storm beaches, shallow waters and extensive offshore sandbanks, and the occurrence of seaside resort towns, creating a traditional

holiday destination.

5.1.1.9 The desk-based study has identified many landscape and heritage designations within 2km of the proposed scheme. These include:

- Rhyl Central Conservation Area;
- A small area of ancient woodland, approximately 1.5 hectares, near Ffordd Offa;
- Many Grade II listed buildings, mostly within Rhyl Central Conservation Area;
- One Grade II* listed building, St Thomas' Church, on Bath Street

5.1.1.10 Visual receptors are people that may experience views of the landscape. These may include residents and visitors to settlements, roads, footpaths, trails, visitor facilities or particular viewpoints. Visual receptors within 2km of the proposed scheme include (refer also the Environmental Constraints Plan in Appendix A):

- The North Wales Coast Path adjacent to the site;
- National Cycle Route 5, adjacent to the site, which runs from Reading to Holyhead;
- Recreational receptors: Splash Point Beach and Rhyl Beach are both within 2km of the proposed scheme. Other tourism receptors lie along the sea front within 2km of the scheme, including Drift Park Water Play Area, SeaQuarium Rhyl, the Pavilion Theatre and Rhyl Golf Club. Two large holiday caravan parks are also within 2km of the proposed scheme, namely New Pines Holiday Home Park and Lyons Robin Hood Holiday Park.
- Residential receptors: The proposed scheme is in an urban area, within the town of Rhyl. Most of Rhyl is within 2km of the proposed scheme, including Rhyl town centre and the area to the north-east of Vale Road. Within 2km is the western edge of the settlement of Ffrith.

5.1.1.11 Although there are a number of receptors within 2km of the site the majority of these would be screened from view by intervening built form. Desktop and site studies have been used to identify the key visual receptors likely to be affected by the proposal.

5.1.1.12 Receptors that have been identified include:

- The North Wales Coast Path;
- National Cycle Route 5;
- The beach at Splash Point.

5.1.1.13 There are a number of residential properties located behind the sea defence wall. Impacts may occur for the residential properties along:

- Garford Road
- Eaton Avenue,
- Molineaux Road,
- Hilton Drive and
- Carlisle Avenue

## 5.2 Environmental impacts & likely significant effects

5.2.1.1 Assessment of the visual effect of the proposals on the local landscape character and marine character area are both scoped in.

5.2.1.2 The proposed height of the new defence wall is 600mm higher than the existing sea defence. This would raise the height of the wall to approximately 1.5m and screen existing views out to sea from the North Wales Coast Path. To mitigate this, the footpath will be raised to allow existing views to be retained. Views out to sea from some ground floor and first floor properties along Eaton Avenue, Molineaux Road, Hilton Drive and Carlisle Avenue may be screened by the proposed raising of the sea defence wall. There is likely to be short term adverse effects during construction for the North Wales Coast Path and National Cycle Route, and long term adverse effects for the residential properties.

5.2.1.3 There is an area of grassland between the North Wales Coast Path and residential properties, that presents an opportunity for landscape enhancement. The area forms a flood storage area, which consists of amenity grassland and embankments rising up to the North Wales Coast Path. It is enclosed by a concrete wall and housing to the south, and the North Wales Coast Path and sea defence to the north. The area has limited visual appeal and

lacks a ‘sense of place’. This area could be improved as part of the scheme, to enhance the area for recreational use and improve visual amenity.

## 5.3 Proposed methodology

5.3.1.1 A Landscape and Visual Impact Assessment (LVIA), appropriate to the nature and scale of the proposed development is proposed to assess the landscape and visual effects. The assessment will be prepared with reference to Guidelines for Landscape and Visual Impact Assessment, 3rd edition (GLVIA3), published by the Landscape Institute and the Institute of Environmental Management and Assessment (IEMA) in 2013.

5.3.1.2 The study will assess the effects of the proposal on the landscape and visual resource of the area. The assessment will involve the following key stages:

- Desk-based research to determine the scope of the study;
- Desk-based research to establish the landscape and visual baseline and identify potential receptors;
- Field work to verify the baseline studies in order to ascertain how the landscape and visual resource would change;
- Assessment and reporting of potential effects; and
- Consideration of mitigation and enhancement measures.

# 6 Cultural Heritage

## 6.1 Baseline

6.1.1.1 An archaeological Desk-Based Assessment of the site and surrounding area was undertaken by the Clwyd-Powys Archaeological Trust in June 2017 (provided in Appendix C).

6.1.1.2 In summary, the foreshore at Rhyl was found to have high archaeological potential, containing evidence for coastal change and prehistoric activity. Immediately west of the proposed development, and further to the east, peat beds are present, which contain remains of a submerged forest.

6.1.1.3 There is evidence of prehistoric activity along the coastal strip. Prehistoric objects have been found on the foreshore at Rhyl that date to around 6500BC. Other artefacts include Neolithic axe heads and a Bronze age socketed spear head and chisel.

6.1.1.4 Further detail is provided in the Desk Based Assessment provided in Appendix C.

## 6.2 Environmental impacts & likely significant effects

### 6.2.1 Direct impacts

6.2.1.1 The desk based assessment identified that the proposals have potential to directly impact on the archaeological potential of the East Rhyl foreshore, in particular the peat beds and submerged forest remains which are exposed periodically, together with likely chance finds relating to prehistoric activity. Further assessment of the direct impacts, in the form of geotechnical sampling and field survey was therefore recommended to identify the likely extent and significance of this resource within the works area.

6.2.1.2 The desk based assessment also identified remains of possible early sea defences or fish traps close to Splash Point, comprising a series of wooden posts set in roughly parallel short trenches filled with stone. These are recorded to have been cut through the peat deposits, rather than being associated with the prehistoric finds that have been recovered from the immediate surrounding area.

6.2.1.3 An archaeological borehole was commissioned as part of the Ground Investigation. This was collected on the beach close to the base of the access ramp, on the eastern side of the site, where any peat deposits associated with the paleo-estuary further east were expected to be at their greatest extent. The borehole only reached 3m depth due the presence of dense sands and gravels at this depth, though to be of glacial origin.

6.2.1.4 The recovered undisturbed borehole samples have been sent to the Archaeology Department at Lampeter University for detailed analysis, however the initial results of the wider Ground Investigation indicate there are generally no thick peat deposits in the proposed excavation area of the beach. It is likely that any peat was reworked by scour during coastline erosion and the formation of the natural the beach, prior to construction of the coastal defences. Peat was encountered under most of the promenade, where the deposits are now protected from erosion by the sea wall, but at a depth underneath the promenade which is unlikely to be affected by the proposals (below 4 m from the surface of the promenade).

6.2.1.5 Further consideration would be given in the ES to the to the likely significant effect of the proposals on the archaeological resource of the foreshore, taking account of the any results available from analysis of the archaeological borehole provided to Lampeter University. Proposals for mitigation of impacts resulting from chance find would also be scoped into the ES.

6.2.1.6 While a small number of maritime wrecks and crashed aircraft are known from the wider area, all are sufficiently distant to be unaffected by the scheme. Direct impact on wrecks is therefore scoped out of further assessment.

### 6.2.2 Indirect impacts

6.2.2.1 The proposals are likely to introduce visual impacts for heritage assets in the immediate area, and so the potential impacts are considered to be relatively slight, although these will

need to be fully assessed in the ES. Visual impacts for heritage assets is therefore scoped into the ES.

6.2.2.2 Any change to the existing coastal defences has the potential to result in indirect physical impacts further along the coast as a consequence of changing coastal currents. This is particularly relevant in relation to the peat deposits and the possibility of further artefactual evidence for prehistoric activity further to the east (direction of sediment transport). Consideration has been given to the impact of the proposed scheme on long-term beach stability and sediment transport in Chapter 3, which concluded it is unlikely to have a significant effect. Assessment of the indirect impact of coastal processes on the wider archaeological resource of the foreshore is therefore scoped out of the ES.

## 6.3 Proposed Methodology

6.3.1.1 The revised Design Manual for Roads and Bridges (DMRB), Volume 11 Section 3 Part 2, HA 208/07 (August 2007), though not specifically focused on developments of this nature, provides a suitable, general framework for assessing cultural heritage. The approach to the cultural heritage which it promotes, although designed for road developments, is relevant as a methodology for the proposed development and would be adopted in line with the methodology provided above in Section 2.4 Proposed Approach to EIA.

6.3.1.2 Data sources that would need to be consulted as part of the cultural heritage impact assessment include records held at the regional Historic Environment Record (HER), maintained by CPAT in Welshpool; the National Monument Record (NMR), maintained by RCAHMW in Aberystwyth; the National Library of Wales, Aberystwyth; Flintshire Record Office, Hawarden; Denbighshire Record Office, Ruthin. Consultation would also need to take place with the Archaeology Department at Lampeter University, concerning any available results of the archaeological borehole collected as part of the Ground investigation.

# 7 Socio-economics and Human Health

## 7.1 Baseline

7.1.1.1 Rhyl is within the county of Denbighshire in North Wales, which had an estimated population of 94,805 in mid-2016[28]. According to the Welsh Index of Multiple Deprivation (WIMD), Rhyl is a deprived area, with some areas of the town, particularly in the west, the most deprived areas in Denbighshire and among the most deprived areas in Wales[29]. Rhyl East 3, covering the promenade along Splash Point and the amenity areas along East Parade and Marine Drive, ranks as the 99th most deprived in Wales out of 1,909. It ranks as 78th for income, 46th for employment, and 19th for health. Rhyl East 1, covering the residential areas backing the proposed scheme, is ranked as the 389th most deprived, and ranks as 379th for income, 261st for employment, and 392nd for health. Particular issues for the population include health of the population and employment levels[30]. 73.9% of individuals of working age are economically active, compared to 78.0% in Great Britain as a whole. 4,400 residents of Denbighshire are out of work due to a long-term sickness, or 7.9% of the working age population. This is compared to 4.9% of the working age population of Great Britain[31].

7.1.1.2 The majority of the workforce in Rhyl is employed in the public sector[31], as in the past the private sector has shown a reluctance to invest in the area. The three largest employment sectors in the private sector are retail, leisure and tourism. Jobs in these sectors are often low-paid and seasonal[32].

7.1.1.3 Since the 19th century, Rhyl's economy has been largely dominated by the tourism, retail and leisure sectors, traditionally attracting both large numbers of day visitors and those who stay for longer. However, the economy of Rhyl has found the changes in the UK tourism sector challenging and has remained dependent on long family holidays in the UK, even as these have steadily declined[33]. Other coastal resorts along the North Wales coast, such as Colwyn Bay and Llandudno, have changed to continue to appeal to holiday-goers and as a result this failure to adapt has resulted in Rhyl's peak season being short. Due to this, a high proportion of employment in Rhyl is seasonal and poorly paid. This has been a significant driver in the increasing levels of deprivation in many areas[33]. Since the economic crash in 2008, unemployment levels in Rhyl have increased sharply, with younger residents (16-24) the most affected[31].

7.1.1.4 The health of the population of Denbighshire is broadly similar to the health of the Welsh population in most aspects. Approximately 5% of people in Denbighshire suffer from coronary heart disease, which is associated with low physical inactivity, poor diet and obesity, and smoking[34]. Approximately 4% of people suffer from the disease in North Wales. Furthermore, in 2013/14 58% of adults in Denbighshire were observed as being overweight or obese, which is the same percentage as reported for Wales[35].

7.1.1.5 Physical activity statistics for Denbighshire and Wales show that in 2013/14, the average number of days of physical activity per week reported adults was 2.5 and 2.4, respectively[35]. The National Survey for Wales also revealed the types of activities that are undertaken by people in Denbighshire and Wales in the last 12 months[36]:

- 75% of people in Denbighshire said they had been walking (72% in Wales);
- 12% of people in Denbighshire said they had been running (17% in Wales);
- 20% of people in Denbighshire said they had been wildlife watching (16% in Wales);

[28] https://statswales.gov.wales/Catalogue/Population-and-Migration/Population/Estimates/Local-Authority/populationestimates-by-localauthority-year

[29] https://jamestrimble.github.io/imdmaps/wimd2014/

[30] WIMD (Welsh Index of Multiple Deprivation), 2014. Denbighshire Local Authority (W06000004). [Online] Available at: http://wimd.wales.gov.uk/geography/la/W06000004?lang=en#&min=0&max=10&domain=overall

[31] Labour Market Profile for Denbighshire – [Online] Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157386/report.aspx

[32] Denbighshire Economic & Community Ambition Strategy 2013-2023 [Online] Available at: https://www.denbighshire.gov.uk/en/your-council/strategies-plans-and-policies/corporate-strategies/economic-and-community-ambition-strategy-en.pdf

[33] Denbighshire County Council Local Development Plan 2006-2021 [Online]. Available at: http://www.denbighldp.co.uk/Webfiles/Adoption/Adopted%20LDP%20text%20english.pdf

[34] http://www.wales.nhs.uk/sitesplus/documents/888/4831%20SC%20Wales%20Health%20Info%20Graphic%20-%20Denbighshire%20PROOF%208.pdf

[35] http://www.publichealthwalesobservatory.wales.nhs.uk/whs-trends-2015

[36] National Survey for Wales – [Online] Available at: https://statswales.gov.wales/Catalogue/National-Survey-for-Wales

- 61% of people in Denbighshire said the do not undertaken frequent sporting activity (53% in Wales).

7.1.1.6 Open space and areas for recreation are an important resource for the local population in Rhyl, as they offer a means to enjoy the local area and undertake physical activity. This benefits health and well-being. Recreational routes within the proposed site include the Wales Coast Path and National Cycle Route 5 (a traffic-free cycle route) which runs from Reading to Holyhead. The beach at Splash Point partly lies within the proposed scheme and provides important space for recreation. Fishing activity is also prominent along the promenade. Other tourism receptors lie along the sea front within 2km of the scheme, including Drift Park Water Play Area (1.3km), SeaQuarium Rhyl (650m), the Pavilion Theatre (adjacent) and Rhyl Golf Club (adjacent). Two large holiday caravan parks are also within 2km of the proposed scheme, New Pines Holiday Home Park (250m) and Lyons Robin Hood Holiday Park (700m). These provide space for recreation and enjoyment of the local area for the local population and visitors.

7.1.1.7 The proposed scheme is in an urban area, within the town of Rhyl. Most of Rhyl is within 2km of the proposed scheme, including Rhyl town centre and the area to the north-east of Vale Road. Within 2km is the western edge of the settlement of Ffrith (750m).

## 7.2 Environmental impacts & likely significant effects

7.2.1.1 Population health concerns the health outcomes of a given population, including the distribution of health outcomes and patterns of health determinants. Consideration is therefore given to the likely significant effects of the proposals on health and wellbeing of the population as a result of changes to distribution of health outcomes and patterns of health determinants (for example access to greenspace and the effect this has on health and wellbeing). Direct effects on individuals' health, for example as a result of exposure to increased levels of exposure to noise during construction, is considered in Chapter 9 Other construction effects.

7.2.1.2 The operation of the scheme could have direct and indirect benefits on the health and wellbeing of residents in Rhyl. Operation of the coastal defence scheme will facilitate use of the promenade and beach, by reinstating recreational routes and providing access to the beach, contributing to increasing levels of physical activity in the local area. This may lead to improvements in mental and physical wellbeing[37]. However, access restriction to the beach and promenade during construction may have implications for physical exercise and health of the local population in the short-term. It may also disrupt recreational activities associated with the beach such as fishing and water sports.

7.2.1.3 The proposed scheme is likely to create jobs in the local area within the construction industry during the construction phase. Furthermore, increased use of local amenities and businesses by the workforce may benefit the local economy. The new coastal defence structure may also increase the attractiveness of Rhyl waterfront, which may increase the opportunities for local people and businesses to benefit from new jobs and investment, leading to higher incomes and employment in the local area. *Health in Environmental Impact Assessment*, written by IEMA, Ben Cave Associates and the Faculty of Public Health, states that "*Higher income is closely associated with better health, reduced mortality and improved mental wellbeing*" [37].

7.2.1.4 The scheme would decrease the likelihood of flooding around East Rhyl. This is likely to make the local area a more desirable place to live, and may lead to an increase in house prices and a decrease in insurance premiums. It may also alleviate stress and anxiety, thereby improving the mental health and wellbeing of residents.

7.2.1.5 The proposed scheme could have a range of effects on the tourism economy in East Rhyl. The proposed scheme will reduce the likelihood of flooding in nearby holiday parks, which could increase the attractiveness and competitiveness of Rhyl as a holiday destination, aiding the economy. Alternatively, larger coastal defences could be seen by some as a visual impact on the landscape, and could potentially block views out to sea from the North Wales coast path or from adjacent tourist accommodation. Temporary noise and traffic created by

[37] Health in Environmental Impact Assessment: A primer for a Proportionate Approach, IEMA, 2017 [Online]. Available at: https://www.iema.net/assets/newbuild/documents/IEMA%20Primer%20on%20Health%20in%20UK%20EIA%20Doc%20V11.pdf

the construction of the scheme could impact on tourism.

7.2.1.6 Consideration has also been given to the impact of localised closure of public rights of way (PRoW)/public space on tourism and health and wellbeing, with reference to severance assessment in Chapter 8 Traffic and Transport.

7.2.1.7 Socio-economic impacts and effects on the local economy and employment, as well as population health and recreation as result of changes to access to open space are scoped into the ES.

## 7.3 Proposed methodology

7.3.1.1 A social impact assessment will be undertaken to inform the ES. It will examine the physical impacts of the proposed scheme and examine how the communities' knowledge or understanding of the scheme, as well as the scheme itself, may cause socio-economic impacts and affect socio-economic behaviours, aspirations, and health and well-being.

7.3.1.2 Further analysis of baseline data will be required to understand the current situation prior to the implementation of the proposed scheme and thus enable insights into its socio-economic impact on the local community. The Coastal Community Typology Report (2015) categorises Rhyl and the associated North Wales Coastline as being within a B2 "Resorts and Ports" area. Whilst providing a strategic perspective across Wales, this study also offers some benchmarks against which to analyse the situation and trends relating directly to Rhyl, including local economic factors, issues for vulnerable groups and change factors.

# 8 Traffic & Transport

## 8.1 Baseline

### 8.1.1 Road traffic

8.1.1.1 Construction of the proposed scheme would require the haulage of construction materials via the local highway network. The roads adjacent to the proposed site are single carriage way with a 30mph speed restriction. They are residential roads often with cars parked. There are also numerous restrictions to heavy goods vehicles (HGVs) on the local highway networks, which have been taken into consideration in selecting haulage routes. There are two main haulage routes proposed from the A55, either approaching from the west of the site, or the east of the site.

8.1.1.2 Route 1, approaching from the west, comprises: A55 (J27) → St Asaph Road (A525) → Ffordd Abergale (A547) → St Asaph Avenue → Foryd Road (A548) → Ffordd Wellington (A548) → West Parade (B5118) → East Parade (B5118) → Marine Drive (B5118).

8.1.1.3 Route 2, approaching from the east, comprises: A55 (J27) → St Asaph Road (A525) → A525 → A547 → Ffordd Talargoch (A547) → Meliden Road (A547) → Ffordd Pendyffryn (B5120) → Penisardre Road (B5120) → Bridge Road (B5120) → Bastion Road (B5120) → Victoria Road (A548) → Victoria Road West (A548) → Rhyl Coast Road (A548) → Tynewydd Road (B5118) → Marine Drive (B5118).

8.1.1.4 A further route, Route 3, is proposed for deliveries coming from the east, following the A548 up from its connection at the A494 at Deeside (Weighbridge Road), or from its connection with the A5119 in Flint from the A55 (J33). This would comprise: Prestatyn Road (A458) → Nant Drive → Gronant Road (A547) → Ffordd Pendyffryn (B5120) → Penisardre Road (B5120) → Bridge Road (B5120) → Bastion Road (B5120) → Victoria Road (A548) → Victoria Road West (A548) → Rhyl Coast Road (A548) → Tynewydd Road (B5118) → Marine Drive (B5118).

8.1.1.5 Baseline data for traffic counts has been provided by Denbighshire County Council along these routes (Figure 8-1). The annual average daily flow (AADF) of HGVs over 11.6m in 2016 on each road link is shown in Table 8-1.

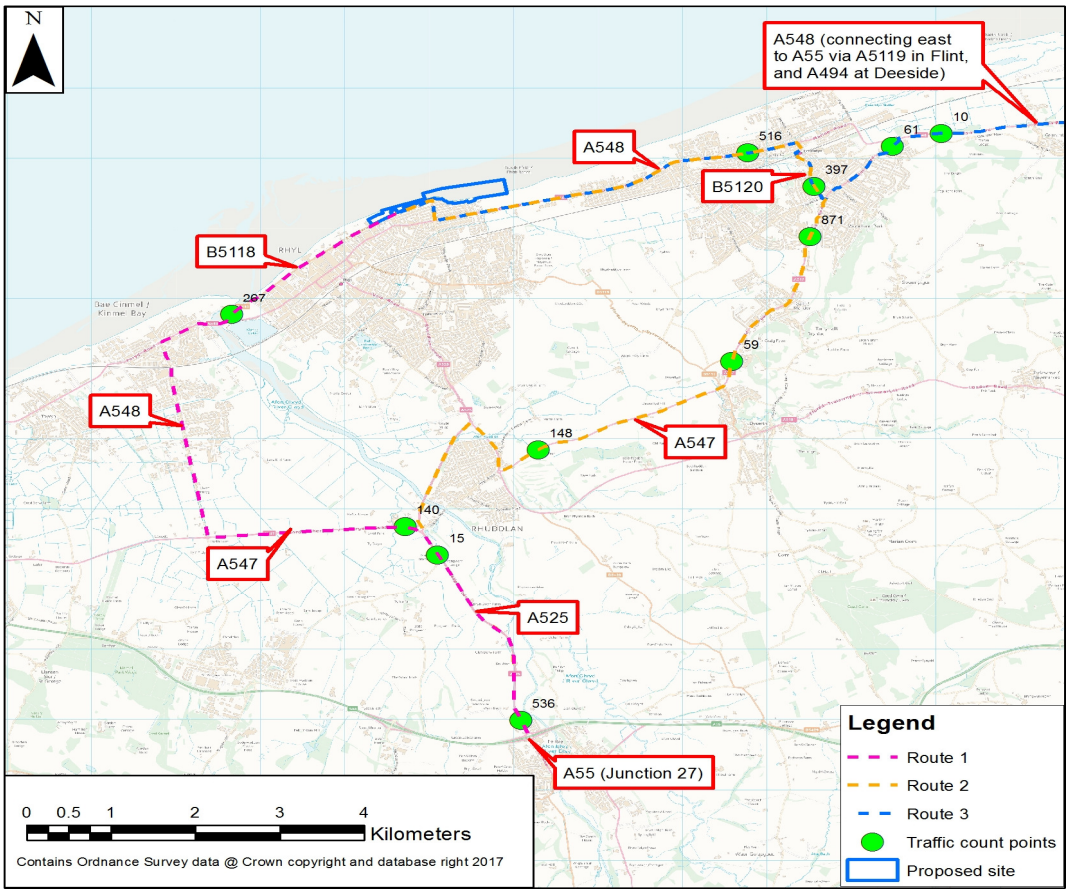



Figure 8-1: Location of traffic count points and roads.

### 8.1.2 Pedestrian traffic

8.1.2.1 Public rights of way (PRoW) are footpaths, bridleways, restricted byways, and byways open to all traffic, on which the public have a legally protected right to pass and re-pass. These are recorded on definitive maps maintained by the local authority. Within the site boundary, there are two short sections of footpath. Footpath 207/10 at the eastern end of Hilton Drive extending east, and footpath 207/11 at the northern end of Garford road extending east.

8.1.2.2 PRoWs require a temporary traffic regulation order (TRO) in order for a change to be made during construction, including temporary diversion. These would be required for footpath 207/10 and 207/11 as a result of the proposed scheme. This must not result in the obstruction of pedestrians to their destination.

## 8.2 Environmental impacts & likely significant effects

### 8.2.1 Road traffic

8.2.1.1 There is potential for an impact on highway users (and associated effects) as a result of construction of the scheme, due to the increased traffic movements associated with the delivery of bulky materials. Initial estimates are 55,000 tonnes of rock armour, 30,000 of underlayer and 10,000 of quarry run to be delivered to site. Increased traffic is associated with development can give rise to a number of environmental effects including:

- Severance;
- Driver Delay;
- Pedestrian Delay;
- Pedestrian Amenity;
- Fear and Intimidation; and
- Accidents and Safety

8.2.1.2 Other effects associated with construction traffic including visual impacts, noise and vibration, and air pollution and dust are considered in Chapter 5 Landscape & Visual Effects and Chapter 9 Other Construction Effects.

8.2.1.3 The Institute of Environmental Assessment (IEA) publication 'Guidelines on the Environmental Assessment of Road Traffic' provide various thresholds above which it is necessary to assess the environmental effects of traffic in more detail. The guidelines state that where the increase in traffic flows (or number of HGVs) as a result of the development is less than 30% then no further assessment is required.

8.2.1.4 Changes in traffic of greater than 30% are considered the limit at which changes become perceptible to humans, and are therefore considered to give rise to significant effects. Changes in traffic flows of less than 10% are generally accepted as within daily variance in traffic flows, and would therefore have no discernible environmental impact. However, where a receptor is considered sensitive, such as a quiet residential street, a conservation area, a hospital or an accident black spot, a greater than 10% change in traffic could be considered significant, and so the IEA guidelines state that the threshold is reduced to 10% for sensitive links.

8.2.1.5 Along route 1, the B5118 along West Parade through to Marine Drive can be considered a sensitive link. It has residential property located close to the roadside, as well as a children's play area, leisure facilities, and business associated with tourism. Therefore, it is likely to be busy in summer months with heavy pedestrian traffic beside and crossing the road. Beach amenity areas are located to the north. It also fringes Rhyl Conservation Area. Along route 2 is Prestatyn Conservation Area as well as Prestatyn High School located along the A547. However, residential property is set further back from the roadside along the A548 Victoria Parade. Consideration will be given to the most appropriate route to take given the sensitivities of the links, the required distances and direction of travel.

8.2.1.6 Initial estimates of HGV movements are in the region of a maximum of 20 movements per day per day during the main period of material stockpiling. On all proposed routes, the 30% threshold is exceeded at some point. This is above the threshold for further assessment, and therefore traffic assessment will be undertaken by a specialist traffic consultant, and included within the ES. This is only regarding effects to pedestrian amenity, fear and intimidation, and accidents and safety due to busier roads. Severance, driver delay, and

pedestrian delays is unlikely to result from the scheme, since no roads will be closed or diverted. However, given a TRO would be required for footpath 207/10 and 207/11, consideration would be given to the temporary stopping up and rerouting of these footpaths. Pedestrian severance and delay during construction as a result of TROs is considered further below.

Table 8-1: Baseline average annual daily traffic (2015/16) for proposed routes, and likely percentage increase of HGVs

| Site number / location | Total vehicle count | HGV count | Number of construction HGVs | Percentage increase (HGVs) |
|---|---|---|---|---|
| Route 1 | | | | |
| 536 – A525 | Mon-Fri - 20840<br>Saturday - 17509<br>Mon-Sun - 19568 | Mon-Fri - 351<br>Saturday - 113<br>Mon-Sun - 281 | Mon-Sun - 20 | Mon-Fri - 5.70%<br>Saturday - 17.70%<br>Mon-Sun - 7.12% |
| 15 – A525 | Mon-Fri - 23574<br>Saturday - 18426<br>Mon-Sun - 21692 | Mon-Fri - 374<br>Saturday - 218<br>Mon-Sun - 307 | Mon-Sun - 20 | Mon-Fri - 5.35%<br>Saturday – 9.17%<br>Mon-Sun – 6.51% |
| 140 – A547 | Mon-Fri - 14525<br>Saturday - 12870<br>Mon-Sun - 13788 | Mon-Fri - 185<br>Saturday - 95<br>Mon-Sun - 150 | Mon-Sun - 20 | Mon-Fri – 10.81 %<br>Saturday – 21.05%<br>Mon-Sun – 13.33% |
| 267 – B5118 | Mon-Fri - 7801<br>Saturday - 8024<br>Mon-Sun - 7700 | Mon-Fri - 34<br>Saturday - 3<br>Mon-Sun - 29 | Mon-Sun - 20 | Mon-Fri – 58.82%<br>Saturday – 666.67%<br>Mon-Sun – 68.97% |
| Route 2 | | | | |
| 536 – A525 | Mon-Fri - 20840<br>Saturday - 17509<br>Mon-Sun - 19568 | Mon-Fri - 351<br>Saturday - 113<br>Mon-Sun - 281 | Mon-Sun - 20 | Mon-Fri - 5.70%<br>Saturday - 17.70%<br>Mon-Sun - 7.12% |
| 15 – A525 | Mon-Fri - 23574<br>Saturday - 18426<br>Mon-Sun - 21692 | Mon-Fri - 374<br>Saturday - 218<br>Mon-Sun - 307 | Mon-Sun - 20 | Mon-Fri - 5.35%<br>Saturday – 9.17%<br>Mon-Sun – 6.51% |
| 148 – A547 | Mon-Fri - 12861<br>Saturday - 10758<br>Mon-Sun - 11991 | Mon-Fri - 111<br>Saturday - 33<br>Mon-Sun - 89 | Mon-Sun - 20 | Mon-Fri – 18.02%<br>Saturday – 60.61%<br>Mon-Sun – 22.47% |
| 59 – A547 | Mon-Fri - 15801<br>Saturday - 13817<br>Mon-Sun - 14854 | Mon-Fri - 99<br>Saturday - 41<br>Mon-Sun - 78 | Mon-Sun - 20 | Mon-Fri – 20.20%<br>Saturday – 48.78%<br>Mon-Sun – 25.64% |
| 871 – A547 | Mon-Fri - 12931<br>Saturday - 11341<br>Mon-Sun - 12205 | Mon-Fri - 158<br>Saturday - 76<br>Mon-Sun - 128 | Mon-Sun - 20 | Mon-Fri – 12.66%<br>Saturday – 26.32%<br>Mon-Sun – 15.63% |
| 397 – B5120 | Mon-Fri - 12083<br>Saturday - 11511<br>Mon-Sun - 11498 | Mon-Fri - 49<br>Saturday - 39<br>Mon-Sun - 42 | Mon-Sun - 20 | Mon-Fri – 40.82%<br>Saturday – 51.28%<br>Mon-Sun – 47.62% |
| 516 – A548 | Mon-Fri - 13336<br>Saturday - 13324<br>Mon-Sun - 13015 | Mon-Fri - 374<br>Saturday - 218<br>Mon-Sun - 307 | Mon-Sun - 20 | Mon-Fri – 43.48%<br>Saturday – 80.00%<br>Mon-Sun – 51.28% |
| Route 3 | | | | |
| 10 – A548 | Mon-Fri - 11557<br>Saturday - 12403<br>Mon-Sun - 11503 | Mon-Fri - 92<br>Saturday - 50<br>Mon-Sun - 78 | Mon-Sun - 20 | Mon-Fri – 21.74%<br>Saturday – 40.00%<br>Mon-Sun – 25.64% |
| 61 – A547 | Mon-Fri - 5936<br>Saturday - 5971<br>Mon-Sun - 5751 | Mon-Fri - 374<br>Saturday - 218<br>Mon-Sun - 307 | Mon-Sun - 20 | Mon-Fri – 34.48%<br>Saturday – 86.96%<br>Mon-Sun – 41.67% |
| 397 – B5120 | Mon-Fri - 12083<br>Saturday - 11511<br>Mon-Sun - 11498 | Mon-Fri - 49<br>Saturday - 39<br>Mon-Sun - 42 | Mon-Sun - 20 | Mon-Fri – 40.82%<br>Saturday – 51.28%<br>Mon-Sun – 47.62% |
| 516 – A548 | Mon-Fri - 13336<br>Saturday - 13324<br>Mon-Sun - 13015 | Mon-Fri - 374<br>Saturday - 218<br>Mon-Sun - 307 | Mon-Sun - 20 | Mon-Fri – 43.48%<br>Saturday – 80.00%<br>Mon-Sun – 51.28% |

8.2.1.7 There are some assumptions with the data presented and limitations with the assessment. Past data has been used as a proxy for future trends, as predicted future trends are unavailable on the relevant link roads. However, future traffic counts are likely to increase, therefore by using past data the impact assessment is more precautionary, as percentage increases are more sensitive. Furthermore, HGVs counts considered here are those vehicles over 11.6m. Some HGVs will be less than 11.6m and therefore the baseline count may be slightly higher than presented here. However, a higher estimate of the percentage increase in HGVs as a result of the proposed scheme is given, adopting a precautionary

approach.

8.2.1.8 Mitigation could include the timely delivery of materials (e.g. between 0800 and 1700, or possibly outside peak travel hours), parking restrictions on roads to ensure access is maintained, and resurfacing of road following completion of the proposed scheme if necessary.

### 8.2.2 Pedestrian traffic

8.2.2.1 TROs of PRoWs should not result in the obstruction of users to their destination, under the requirements of the Road Traffic Regulation Act 1984. A possible mitigation measure could be the establishment of a temporary manned crossing point over the promenade to ensure suitable plant/people segregation. Such measures will be agreed as part of the TRO, but would be considered further in the ES and is therefore provisionally scoped in.

## 8.3 Proposed methodology

8.3.1.1 A detailed traffic assessment will be undertaken by a specialist traffic consultant, and will be used to inform impacts and mitigation in the ES.

# 9 Other Construction Related Effects

## 9.1 Baseline

9.1.1.1 The environmental baseline is set out in the preceding chapters of this scoping report.

### 9.1.2 Construction operations

9.1.2.1 There would be significant plant and machinery movements on the foreshore during construction. The plant and machinery would access the site on the foreshore between the compound at Rhyl Sun Centre/Rhyl Pavilion, and therefore temporary removal of the groynes at the head of the beach is required. Access along this part of the beach is required for transporting rock material to the site and stockpile area from the compound, as the promenade is unlikely to be able to support the weight of bulk material movements. However precast concrete material would be transported from the compound along the promenade via lightweight tractor and trailer. Turning areas and passing points may need to be constructed to facilitate this. A second site compound will be located at Garford Road. Access from this compound will be via an existing slipway, which may require minor improvements (widening, edge protection, pedestrian access) to facilitate access. Compounds will also accommodate welfare, office, and parking facilities.

9.1.2.2 The bulk construction materials offloaded at the Rhyl Sun Centre/Rhyl Pavilions compound, would need to be tipped, sorted and then stockpiled on the foreshore. Significant excavation of the beach would be required to construct the toe of the rock armour revetment. The sorted bulk materials would then be placed into the excavation and built up in layers. This would comprise a geotextile sheet overlain with quarry run fill, an infiltration layer formed in a triple interlocking layer, and rock armour formed in a double interlocking layer. Demolition of the upstand concrete sea wall would be required for reconstruction of the new concrete sea wall. Two sets of concrete access steps would also be constructed to maintain existing access to the beach through the newly constructed rock armour revetment. Tie-in works with the existing coastal defence would be required to complete the main phase of construction works.

9.1.2.3 It is likely that following the main phase of construction, dredged recharge material would be transported by barge from the Liverpool Bay dredging area (Marine aggregate extraction Area 392/393, known as Hilbre Swash) located approximately 10km to the north of Rhyl. The material is likely to be deposited on the beach using 'rainbowing' (i.e. pumped with seawater onto the beach).

### 9.1.3 Dust and air quality

9.1.3.1 It is recognised that construction activities generate dust as a result of vehicles movements on bare ground, movement and tipping of material, as well as from the exhaust of diesel powered machinery, and have potential to generate significant increases in fine particulate matter less than 10µm ($PM_{10}$) locally. It is also recognised that in coastal areas, salt spray gives rise to elevated levels of $PM_{10}$. Given this, there is potential for construction works associated with the sea defence scheme to exacerbate dust impacts.

9.1.3.2 Available data on annual mean $PM_{10}$ in 1km$^2$ areas surrounding the site (grid references: 301500, 382500; 302500, 382500; 301500, 381500; 302500, 381500) in 2015[38] details concentrations of between 10.43µg m$^{-3}$ and 13.02µg m$^{-3}$. This is substantially below the national air quality objectives and European Directive limit and target values for the protection of human health of 40µg m$^{-3}$ annual mean concentrations[39]. The construction works associated with the sea defence scheme has the potential for to temporarily increase $PM_{10}$ to potentially unacceptable levels locally.

9.1.3.3 Nitrogen oxides (NOx), primarily nitric oxide (NO) and nitrogen dioxide ($NO_2$), result from the combustion of fuels such as hydrocarbons. Air concentrations are often high nearby roads, due to the combustion in vehicle engines which act a significant source of pollution. The proposed scheme at East Rhyl may result in the increase of NOx emissions from increased road traffic from plant and the delivery of materials to site.

9.1.3.4 Available data on annual mean $NO_x$ in 1km$^2$ areas surrounding the site (grid references:

[38] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015

[39] https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update.pdf

301500, 382500; 302500, 382500; 301500, 381500; 302500, 381500) in 2015 details concentrations of between 8.08µg $m^{-3}$ and 11.27µg $m^{-3}$. This is substantially below the national air quality objectives and European Directive limit and target values for the protection of human health of 30µg $m^{-3}$ annual mean concentrations. Furthermore, there are no air quality management areas in Denbighshire, meaning the concentrations of air pollutants are low and not actively managed. Therefore, the effects of $NO_x$ emissions from the scheme, and other air quality pollutants, are scoped out of further assessment in the ES.

### 9.1.4 Noise and vibration

9.1.4.1 East Rhyl is considered to be a low noise environment, with background noise sources mainly comprising noise from human visitors, the natural environment (birds, wind, and waves), and traffic noise along the adjacent roads. Recreational activities along the beach may also cause variations in background noise levels. However, given the exposed location of East Rhyl, background noise level can vary considerably depending on the weather conditions. Given the short distance of residential properties from the proposed construction works, humans are considered to be important noise receptors.

## 9.2 Environmental impacts and likely significant effects

### 9.2.1 Dust and air quality

9.2.1.1 Construction activities, especially beach recharge and movement of vehicles over the beach, could be associated with fugitive dust emissions. Volume of dust creation is dependent on site conditions, weather conditions, work practices, vehicle access routes etc. Dust creation may cause disturbance or damage to local designated sites (most notably Liverpool Bay SPA), and become a nuisance to local residents or impact their health. Works will conform to best practice guidelines contained within Institute of Air Quality Management (IAQM) Guidelines on the Assessment of Dust from Demolition and Construction.

9.2.1.2 Mitigation will likely include dampening materials, establishment of solid compounds to prevent mud and dirt on the highway, tyre washing and bowser spraying upon construction vehicles leaving site. Nevertheless, fugitive dust emissions during construction will be considered in the ES and is therefore provisionally scoped in.

### 9.2.2 Noise and vibration

9.2.2.1 Construction works could lead to temporary increases in noise and vibration, particularly due to tipping of material and the movement of plant and machinery. Local residents in proximity to the site would be a sensitive receptor to noise generated from construction of the scheme. East Rhyl is a coastal resort town and a large proportion of its economy is based around tourism, which could be adversely impacted by substantial noise pollution. There is also the potential for increased noise disturbance to qualifying bird species of the Liverpool Bay SPA, although given the birds are already habituated to large amounts of disturbance, the construction work is not anticipated to have a significant impact. Construction impacts can also be minimised by avoiding the over-wintering bird period. This issue is considered in Chapter 4. Noise impacts during construction will be considered further in the ES. Consideration would also be given to potential mitigation measures such as solid hoarding with acoustic barriers surrounding compounds, vibration monitoring, where possible avoidance of use of generator (if required), and timely delivery of materials. Further consideration of this would be given in the ES.

9.2.2.2 The area surrounding the proposed scheme contains valuable intertidal habitat for invertebrates and birds, and sublittoral habitat for fish and marine mammals (see Chapter 4). The proposed construction has the potential to disturb or damage marine biotopes via underwater noise and vibration[40,41]. However, works would only take place in the intertidal areas on an exposed beach when the tidal window allows, which would reduce the potential for underwater noise impacts. Beach recharge is likely to be undertaken at high tide, but the frequency of noise from this operation would be low, resulting only in localised disturbance of fish and marine mammals. On this basis, likely significant effects of underwater noise

[40] The deliberate disturbances of marine European Protected Species. Guidance for English and Welsh territorial waters and UK offshore marine area. Joint Nature Conservation Committee (JNCC). March 2008. http://jncc.defra.gov.uk/PDF/consultation_epsGuidanceDisturbance_all.pdf

[41] EUROPEAN COMMISSION 2007 Guidance document on the strict protection of animal species of community interest under the Habitats Directive 92/43/EEC.

during construction is scoped out of the ES.

### 9.2.3 Geotechnical and environmental considerations

9.2.3.1 Limited ground investigation has been undertaken to date to inform the outline design proposals. Further geo-environmental and geotechnical investigations are currently underway at the time of writing, and would be used to inform contaminated land and ground stability in the detailed design proposals. Although considered low risk, should remediation works or changes to the construction methodology be recommended by the further investigations underway, these would be considered in detail in the ES with regards to impact on the environment and any mitigation that may be required. Environmental impacts from land contamination & ground stability issues are therefore provisionally scoped into the ES.

## 9.3 Proposed methodology

9.3.1.1 The following guidance documents will be consulted during the assessment for this chapter in the ES:

- The code of practice for noise and vibration control on construction and open sites BS 5228-1:2009.
- Institute of Air Quality Management Guidance on the assessment of dust from demolition and construction.

### 9.3.2 Construction Environmental Management Plan

9.3.2.1 A Construction Environmental Management Plan (CEMP) will be produced to accompany the ES, and would detail any environmental mitigation and practices to manage environmental issues during construction. This would include recommendations of industry best practice to avoid marine pollution and harm to the environment during construction.

# 10 Sustainability and Climate Change

## 10.1 Baseline

10.1.1.1 The Environment Act (Wales) 2016 aims to position Wales as a low carbon, green economy, ready to adapt to the impacts of climate change. Key parts of the act that are particularly relevant to sustainability and climate change include:

- Part 1: Sustainable management of natural resources – enables Wales' resources to be managed in a more proactive, sustainable, and joined-up way.
- Part 2: Climate change – provides Welsh Ministers with powers to put in place statutory emission reduction targets, including at least an 80% reduction in emissions by 2050 and carbon budgeting to support their delivery.

### 10.1.2 Carbon footprint

10.1.2.1 The coastal defence scheme is a response to coastal erosion and flooding, which could be seen to be accelerating, in part, due to climate change. However, carbon emissions would result from construction of the scheme, in particular as a result of the transport of materials via heavy vehicle movements. Carbon emissions would also be associated with the operation of construction equipment, and the embodied energy in construction materials (such as concrete and steel). Although difficult to quantify, the sustainability impact of the proposals is a factor of the benefits afforded from climate change resilience, versus the carbon emissions associated with a large number of vehicle movements during construction.

10.1.2.2 Emissions of carbon dioxide ($CO_2$) and other greenhouse gases (GHGs) such as methane ($CH_4$) and nitrous oxide ($N_2O$) from human activities, have caused global warming and climate change[42]. The total $CO_2$ emissions emitted from Denbighshire Local Authority area in 2015 was 600,500,000 kg$CO_2$[43]. The total for Wales in 2015 was 30,162,000,000 kg$CO_2$[44]. It should be noted that these figures do not take into account non-$CO_2$ sources of GHGs, such as methane and other aerosols. This is measured in $CO_2$-equivalent (CO2e) and is unavailable for the Denbighshire area. However, the total emissions for Wales in 2015 was 45,698,900,000 kgCO2e[45].

### 10.1.3 Climate change resilience and adaptation

10.1.3.1 Marine and coastal related impacts of climate change that are of relevance to the proposed development have been considered to establish the baseline for this chapter. This consists of changes in sea level, storm surges, and wave heights, and storminess. Projected changes in these factors have been sourced from the United Kingdom Climate Projections 2009 (UKCP09). These are based on three emission scenarios: low, medium, and high. A high emissions scenario is associated with very rapid economic growth, a peak in global population in 2050 of 8.7 billion, and a rapid introduction of new and efficient fossil fuel intensive technologies[46]. Projections used here are mainly based on the high emissions scenario to capture the worst-case scenario (adopting the precautionary principle). Where this is not the case, it has been stated.

10.1.3.2 Projected sea level rise for specific years can be obtained from the UKCP09 user interface[47]. Under the high emissions scenario, the central estimate (50$^{th}$ percentile) for sea level rise by 2100 for the area surrounding East Rhyl is 0.509m above 1990 levels. The 5$^{th}$ percentile is 0.186m (meaning there is 5% chance that sea level rise will be less than this). The 95$^{th}$ percentile is 0.832m (meaning there is a 5% chance that sea level rise will be more than this).

[42] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

[43] https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2015

[44] https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2015

[45] http://naei.beis.gov.uk/reports/reports?section_id=4

[46] Warren, R. 2009. Annex 1: Emissions Scenarios Used in UKCP09. [Online] Available at: http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87884&filetype=pdf (Accessed 11 August 2017)

[47] UKCP09. 2009. UK Climate Projections User Interface. [Online] Available at: http://ukclimateprojections-ui.metoffice.gov.uk/ui/admin/login.php (Accessed 18 August 2017)

10.1.3.3 Storm surges are high water levels that occur due to atmospheric forcing (atmospheric pressure and winds associated with storms). Changes in storm surge and extreme water levels can be reflected in the modelled exceedance of present day astronomical tides (tidal height as a result of astronomical forcing alone such as the gravitational pull of the sun and moon) by projected future extreme water level (extreme water levels as a result of storm surges and sea level rise due to climate change). The UKCP09 uses a medium emission scenario to model storm surges. The central estimate for the exceedance level for a 50-yr return level for 2095, which is the level expected to be exceeded on average once in a 50-yr period, is projected to be between 1.5m and 1.8m surrounding East Rhyl[48]. For comparison, the central estimate for the present-day exceedance level above present day astronomical tides for a 50-year return level is between 0.9m and 1.2m for East Rhyl[48].

10.1.3.4 Wave model results presented in the Marine and coastal projections report, show a slight reduction in mean and extreme winter wave heights to the north of the UK, under a medium emissions scenario (based on a mid-climate sensitivity version of the Met Office wind forcing)[48]. However, there is a large amount of uncertainty associated with this, and further work is needed to fully interpret wave projections in light of changes in weather patterns from climate model results.

10.1.3.5 There has been an increase in severe gales over the past century[49]. The distribution and frequency of storms in the UK is linked to the North Atlantic Oscillation (NAO); high pressure differences between the Azores islands and Iceland coincide with the stormiest periods in the last century[50]. Furthermore, evidence suggests an increase in storms that take a more southerly track towards the UK, which has been typical of the recent storms that have occurred in the UK in the early half of this decade[51]. However, there is limited evidence to suggest increases in storminess are due to anthropogenic climate change[51]. Models generally predict limited changes in sea level pressure due to climate change. Under the high emissions scenario, the projected annual changes in sea level pressure between 2070 and 2099 for the Irish Sea and North Channel are likely to be between -0.444hPa (5$^{th}$ percentile – 5% chance of being below) and 1.13hPa (95$^{th}$ percentile – 95% chance of being below). The central estimate (50$^{th}$ percentile) is 0.342hPa. Further research is required to investigate the relationship between storminess in the UK, climate change, the NOA, and how this can be projected in the future.

10.1.3.6 A summary of climate change projections is provided in Table 10-1.

Table 10-1: Summary of projected climate change impacts to Hurst Spit from UKCP09.

| Climate change impact | 5$^{th}$ Percentile | 50$^{th}$ Percentile | 95$^{th}$ Percentile | Emissions scenario |
|---|---|---|---|---|
| Sea level rise by 2100 (m) | 0.186 | 0.509 | 0.832 | High |
| Extreme water levels (Exceedance of present day astronomical tide - 50-yr return level for 2095 (m)) | - | 1.5 - 1.8 | - | Medium |
| Winter mean and extreme wave heights | - | Decrease | - | Medium |
| Sea level pressure for 2070-2099 (hPa) | -0.444 | 0.342 | 1.13 | High |

## 10.2 Environmental impacts & likely significant effects

10.2.1.1 Much of the material to construct the flood defence would comprise rock armour (likely granite and limestone) in front of the stepped access concrete wall, and reinforced concrete to the upstand recurve wall. Allowance for a small beach recharge of 20,000 cubic metres has been made to maintain the beach at existing levels. These materials will have carbon

[48] Lowe et al. 2009. UK Climate Projections science report: Marine and coastal projections. [Online] Available at: http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87906&filetype=pdf [Accessed 15 August 2017)

[49] Jenkins, G., Perry, M. & Prior, J. 2008. The climate of the United Kingdom and recent trends. Met Office Hadley Centre, Exeter, UK. [Online] Available at: http://www.ukcip.org.uk/wp-content/PDFs/UKCP09_Trends.pdf (Accessed 10 August 2017)

[50] Allan, R. (2006). Impacts of Climate Change on Storminess in Marine Climate Change Impacts Annual Report Card 2006 (Eds. Buckley, P.J, Dye, S.R. and Baxter, J.M), Online Summary Reports, MCCIP, Lowestoft, www.mccip.org.uk

[51] Met Office. 2014. The Recent Storms and Floods in the UK. [Online] Available at: http://nora.nerc.ac.uk/505192/1/N505192CR.pdf (Accessed 15 August 2017)

emissions derived from their manufacture and production, termed embodied carbon emissions.

10.2.1.2 The delivery of bulk materials, and emissions from plant and machinery will also produce carbon emissions. An initial assessment of the likely carbon emissions associated with the transport of materials to site is provided, based on the high-level estimates below:

- A total of 3500 vehicle deliveries to site are expected for bulk materials.
- An early estimate of the deliveries comprises 70% of bulk materials coming from North Wales (approximately 30km), 15% from Derbyshire (approximately 135km), and 15% from Cumbria (approximately 210km).
- A $CO_2$ emission value 0.977 kg$CO_2$e/km is assumed.

10.2.1.3 Based on this information, a total of 254,625km is estimated to be travelled due to the delivery of bulk materials. This would generate $CO_2$e emissions of approximately 250,000 kg$CO_2$e. This would have resulted in a 0.00000678% contribution to 2015 $CO_2$e emissions in Wales, and a 0.000516% contribution to $CO_2$ emissions in Denbighshire in 2015.

10.2.1.4 The coastal defence scheme would ensure the long-term stability and sustainability of East Rhyl seafront in order to protect residential properties and that back the current sea wall. In this context, it is unlikely that any impact of carbon/GHG emissions from the construction of proposals on global climate change would be considered significant.

10.2.1.5 Sustainable sources of material would be procured in order to increase the sustainability of the scheme. Any waste arising from the scheme will also would be reduced, reused, or recycled where possible in line with the waste hierarchy. Where not possible, waste would be disposed of responsibly to minimise impacts to the environment.

10.2.1.6 Natural disasters such as storms may affect the proposed scheme. However, construction would be phased to reduce the risk vulnerability from storm events (i.e. upstand wall demolition could be scheduled to take place in the summer months). Therefore, the effects of natural disasters during construction are scoped out of the ES. The effects of natural disasters during operation are scoped in to the ES, given the proposals would reduce the risk of wave overtopping of the coastal defences at East Rhyl.

10.2.1.7 A statement on the impact of the proposals on sustainability and climate change would be provided in the ES. Emissions associated with plant and machinery movement, embodied carbon in construction materials and transport of materials, will be included in the assessment.

## 10.3 Proposed methodology

10.3.1.1 The assessment within this chapter of the ES will follow IEMA EIA guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance[52], and Climate Change Resilience and Adaptation[53].

[52] IEMA & Arup.2017. Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance.

[53] IEMA & Mott MacDonald. 2015. IEMA Environmental Impact Assessment Guide to: Climate Change Adaptation and Resilience.

# 11 Cumulative effects

## 11.1 Baseline

11.1.1.1 Regulation 17(3) of the EIA Regulations requires with reference to paragraph 5 of Schedule 4, a consideration of cumulative effects is included in the Environmental Statement '*A description of the likely significant effects of the development on the environment resulting from…*

*(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources…*

*The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC(1) and Directive 2009/147/EC(2).*'

11.1.1.2 Cumulative effects are therefore assessed with regard to (i) the environmental impacts of the development proposals when considered cumulatively with the environmental impact of other existing adjacent and approved developments at the time of submission of the ES; and (ii) the cumulative effect of inter-relationships between different environmental impacts considered in the ES.

11.1.1.3 Regarding (i), the spatial and temporal scope of the EIA would take into account the following:

- the physical extent of the proposed works, as defined by the limits of land to be used (temporarily or permanently) as denoted in the planning application by the Red Line Boundary of the Site;
- the nature of the existing baseline environment, including the location of sensitive receptors;
- the geographical extent of impacts beyond the site, e.g. effects from traffic, visual effects and disturbance of ecological receptors;
- the geographical boundaries of the political and administrative institutions and authorities, which provide the planning and policy context for the project; and
- the timing of the works.

11.1.1.4 Cumulative effects would therefore consider the impacts of any other committed developments where these would coincide with the temporal and spatial scope of the development proposals. The environmental impacts of the respective developments are assessed collectively to determine where this could give rise to likely significant effects.

11.1.1.5 A search of Denbighshire County Council planning applications identified developments which may cause cumulative effects[54]. Development projects that meet the above criteria have been identified as:

- 45/2017/1112 – Prior notification for the proposed demolition of a Children's Village Unit.
- 45/2017/1164 – Demolition of existing school buildings and erection of replacement school accommodating 920 pupils incorporating playgroup, nursery, primary and secondary places with associated play space, grass pitch, all weather pitch, hard play areas, access and car parking arrangements.
- 45/2017/0985 – Prior notification of proposed demolition of projecting two-storey accommodation to rear of no's 2-16, Aquarium Street.
- 44/2017/0455 – Change of use of land to form a touring caravan site and caravan storage. Erection of an office building, toilet/shower blocks. Installation of a cesspool and landscaping including a bund.
- 43/2017/0947 – Prior notification for the demolition of disused Bodnant Infants School.

[54]http://planning.denbighshire.gov.uk/Planning/lg/plansearch.page?org.apache.shale.dialog.DIALOG_NAME=gfplanningsearch&Param=lg.Planning

- 40/2017/1058 – Change of use of land to caravan storage including amendments to existing access.

11.1.1.6 NRW publish lists of applications received and determined for marine licences[55]. The following projects/schemes are within the vicinity of the proposed scheme:

- SC1711 - Rhyl Yacht Club Harbour Wall and Flood Defence Renewal (Screening);
- CRML1655 - Rhyl Golf Club Flood Water release scheme – Phase 4 outfall (Marine licences non-EIA - issued);
- CML1615 - Rhyl – Marina Quay redevelopment (Marine licences non-EIA - issued);
- BUML1506 – Fford Harbour, Rhyl (Dredging – issued);
- MM004/10LTM & MM004/10/NSB - Marine aggregate extraction Area 392/393, known as Hilbre Swash (Dredging - EIA-issued);

11.1.1.7 The National Infrastructure Planning website was also consulted to check for proposed major infrastructure projects within England and Wales[56]. The Burbo Bank Extension offshore wind farm was granted permission by the Planning Inspectorate in September 2014. The development was commissioned in April 2017. Given that the development is now complete and the distance of the wind farm from Rhyl, cumulative effects are unlikely, and are scoped out of the environmental statement.

## 11.2 Cumulative environmental effects

11.2.1.1 The EIA Regulations state that committed development should be considered for cumulative effects in EIA. However, at this scoping stage planning applications pending a decision have also been identified, and will be reconsidered within the ES (Table 11-1).

Table 11-1: Potential cumulative effects of identified planning applications within Rhyl and Prestatyn.

| Planning / Marine Licence Reference Number | Description | Location | Potential Cumulative Effects | Status |
|---|---|---|---|---|
| 45/2017/1112 | Prior notification for the proposed demolition of a Children's Village Unit. | Unit C<br>Block 3<br>Rhyl Children's Village<br>West Parade<br>Rhyl<br>LL18 1HZ | • Disturbance from both projects could adversely affect residents of Rhyl and/or qualifying species of local designated sites, most notably Liverpool Bay SPA.<br>• Both works could create airborne dust, which could create a more substantial effect on Liverpool Bay SPA and local residents.<br>• Could temporarily increase construction traffic along similar routes as the East Rhyl Coastal Defence Scheme. | Pending |
| 45/2017/1164 | Demolition of existing school buildings and erection of replacement school accommodating 920 pupils incorporating playgroup, nursery, primary and secondary places with associated play space, grass pitch, all weather pitch, hard play areas, access and car parking arrangements. | Blessed Edward Jones High School and Ysgol Mair Primary School<br>Cefndy Road<br>Rhyl<br>LL18 2EU | • Could temporarily increase construction traffic along similar routes as the East Rhyl Coastal Defence Scheme. | Pending |

[55] https://naturalresources.wales/media/683745/applications-received-and-determined-december-2017.pdf

[56] https://infrastructure.planninginspectorate.gov.uk/

| Planning / Marine Licence Reference Number | Description | Location | Potential Cumulative Effects | Status |
|---|---|---|---|---|
| 45/2017/0985 | Prior notification of proposed demolition of projected two-storey accommodation to rear of no's 2-16 (evens). | 2-16 (Evens) Aquarium Street Rhyl LL18 1PG | • Could temporarily increase construction traffic along similar routes as the East Rhyl Coastal Defence Scheme.<br>• Noise from both projects could become a combined nuisance for residents of central Rhyl. | Planning Permission Not Required |
| 44/2017/0455 | Change of use of land to form a touring caravan site and caravan storage, erection of an office building, toilet & shower blocks. Installation of a cesspool and landscaping, including a bund. | Land adjoining Morfa Lodge Abergele Road Rhuddlan Rhyl LL18 5UE | • Could temporarily increase construction traffic along similar routes as the East Rhyl Coastal Defence Scheme.<br>• Could increase tourism related traffic along routes potentially used by construction traffic for the East Rhyl Coastal Defence Scheme. | Pending |
| 43/2017/0947 | Prior notification for the demolition of disused Bodnant Infants School. | Bodnant Infant School Marine Road Prestatyn LL19 7HD | • Could temporarily increase construction traffic along similar routes as the East Rhyl Coastal Defence Scheme. | Granted |
| 40/2017/1058 | Change of use of land to caravan storage including amendments to existing access. | Blairmore Nurseries St Asaph Road Rhuddlan Rhyl LL18 5UG | • Could temporarily increase construction traffic along similar routes as the East Rhyl Coastal Defence Scheme.<br>• Could increase tourism related traffic along routes potentially used by construction traffic for the East Rhyl Coastal Defence Scheme. | Pending |
| SC1711 | Rhyl Yacht Club Harbour Wall and Flood Defence Renewal | Rhyl | • Disturbance from both projects could adversely affect residents of Rhyl and/or qualifying species of local designated sites, most notably Liverpool Bay SPA.<br>• Both works could create airborne dust, which could create a more substantial effect on Liverpool Bay SPA and local residents.<br>• Could temporarily increase construction traffic along similar routes as the East Rhyl Coastal Defence Scheme. | Screening |
| CRML1655 | Rhyl Golf Club Flood Water release scheme – Phase 4 outfall | Rhyl | • Could temporarily increase construction traffic along similar routes as the East Rhyl Coastal Defence Scheme. | Issued (non-EIA) |
| CML1615 | Rhyl – Marina Quay redevelopment | Rhyl | • Disturbance from both projects could adversely affect residents of Rhyl and/or qualifying species of local designated sites, most notably Liverpool Bay SPA.<br>• Both works could create airborne dust, which could create a more substantial effect on Liverpool Bay SPA and local residents.<br>• Could temporarily increase construction traffic along similar routes as the East Rhyl | Issued (non-EIA) |

| Planning / Marine Licence Reference Number | Description | Location | Potential Cumulative Effects | Status |
|---|---|---|---|---|
| | | | Coastal Defence Scheme. | |
| BUML1506 | Fford Harbour, Rhyl | Rhyl | • Disturbance from both projects could adversely affect residents of Rhyl and/or qualifying species of local designated sites, most notably Liverpool Bay SPA. | Dredging (issued) |
| MM004/10/LTM & MM004/10/NSB | Marine aggregate extraction Area 392/393, known as Hilbre Swash | Hilbre Swash (10km north of Rhyl) | • Disturbance on SPA designated bird species at the area of dredging, transport via barge, and deposition of material on beach. | Dredging (EIA-issued) |

11.2.1.2 Direct environmental effects arising from the dredging of material from the Liverpool Bay dredging area is considered within environmental statements as part of marine licencing consents. Whist these direct effects will not be considered in the scope of the East Rhyl Coastal Defences Environmental Statement, consideration will be given to the cumulative effect of dredging material together with its transport to and deposition on the foreshore at East Rhyl.

## 11.3 Proposed methodology

11.3.1.1 Committed development that overlap spatially and temporally with the proposed scheme will be assessed in detail for cumulative effects in the ES. The additive and interactive effects between the proposed scheme and other developments will be included in the cumulative effects assessment. Furthermore, the inter-relationship effects between impacts associated with the proposed scheme will be considered in the ES.

# 12 Conclusions

## 12.1 Recommended EIA scope

12.1.1.1 The EIA Scoping Report has provided an overview of the likely significant effects of the proposed development. Based upon this, a professional judgement has been made on which of these topics or particular aspects of them can be 'scoped in' and those that can be 'scoped out' of the EIA. A summary of the environmental issues which will comprise the technical scope of the EIA and reported in the ES are set out in Table 12-1 below.

Table 12-1: Summary of likely significant effects screened in/out of EIA.

| Environmental Topic | Likely Significant Effect | Construction | Operation |
|---|---|---|---|
| Key: Scoped in (✓), Scoped Out (×), Provisionally Scoped In (?✓) | | | |
| Coastal Processes and Geomorphology | Sediment plumes from beach excavation and disturbance | ?✓ | × |
| | Long term stability of beach levels and changes in sediment supply/transport down drift, in particular the environmentally sensitive areas of Gronant Dunes and Talacre Warren | × | × |
| | Revaluation of ongoing modelling and long term effects to coastal hydromorphology | N/A | ?✓ |
| | Biological WFD quality elements. | ✓ | × |
| | Bathing water quality | × | × |
| | Chemical WFD quality elements/marine pollution | × | N/A |
| | Hydromorphological WFD quality elements | ?✓ | × |
| Biodiversity and Nature Conservation | Physical disturbance to existing rock armour and associated rocky habitat | ✓ | × |
| | Physical disturbance of scrub adjacent to site, and potentially inhabiting nesting birds | ✓ | × |
| | Physical disturbance to vegetation and grassland and associated effects to potentially inhabiting reptile and invertebrate species | ✓ | × |
| | Physical disturbance and loss of intertidal habitat and potentially inhabiting marine benthic invertebrates within footprint of proposed works during construction | ✓ | × |
| | Non-physical disturbance to Liverpool Bay SPA and overwintering birds (e.g. from noise and visual presence) during construction | ?✓ | × |
| | Impacts to sand dune habitats and breeding tern populations, associated with the Liverpool Bay SPA, Dee Estuary SPA, SAC, Ramsar site, and Gronant Dunes and Talacre Warren SSSI. | × | × |
| | Impacts on bats and terrestrial and marine mammals | × | × |
| | Impacts to fish and nursery habitat | ?✓ | × |
| | Introduction/spread of non-native invasive species | ✓ | ✓ |
| Landscape and Visual | Landscape and visual effect on the local landscape character | ✓ | ✓ |
| | Landscape and visual effect on the marine character area | ✓ | ✓ |
| Cultural Heritage | Direct impacts on archaeological resource of the foreshore (buried peat and chance finds) | ✓ | × |
| | Direct impacts on wrecks | × | × |
| | Indirect setting impacts on built heritage setting | × | ✓ |
| | Indirect impact on the wider archaeological resource of the foreshore | × | × |
| Socioeconomics & Human Health | Socioeconomic effect of the scheme on the local economy and employment. | ✓ | ✓ |
| | Population health effect as a result of access to public space, amenity, green spaces/beach and recreational routes. | ✓ | ✓ |
| Traffic & Transport | Severance, diver delay & pedestrian delay | × | × |
| | Pedestrian amenity, fear and Intimidation, and accidents and safety | ✓ | × |
| | Closure and redirection of public rights of way (PRoW) | ?✓ | × |
| | Fugitive dust emissions | ?✓ | N/A |

| Environmental Topic | Likely Significant Effect | Construction | Operation |
|---|---|---|---|
| Other Construction Related Effects | Nitrogen dioxide emissions | × | N/A |
| | Surface noise & vibration | ✓ | N/A |
| | Underwater noise | × | N/A |
| | Environmental impacts from land contamination & ground stability issues | ?✓ | N/A |
| | Marine pollution | × | N/A |
| Sustainability & Climate Change | Sustainable use of resources & waste disposal | ✓ | × |
| | Greenhouse gas emissions | ✓ | × |
| | Climate change adaptation & resilience to natural disasters | × | ✓(Positive) |
| Cumulative Effects | Cumulative from other proposed developments | ✓ | ✓ |
| | Interrelationship effect on a single resource/receptor when combined with other effects of the proposed scheme | ✓ | ✓ |

12.1.1.2 Detailed environmental surveys and assessment would be required to determine the likelihood of the potential impacts identified above to have a significant environmental effect. Liaison with relevant officers of Denbighshire Council and Natural Resources Wales would be required to confirm the scope of further environmental surveys on the basis of the selection of the preferred option. Further recommended surveys and assessment are likely to include:

- Further sediment modelling refinements could further enhance understanding of likely effects of the preferred option on coastal processes.
- Ecological Impact Assessment in accordance with guidelines provided by the Chartered Institute of Ecology and Environmental Management. This would need to be supplemented by additional benthic invertebrate sampling on intertidal sand flats to ascertain the presence and abundance of species, and therefore the importance of the affected areas intertidal sand flat for bird foraging habitat. It is also recommended that any potential compound locations are investigated by a suitably qualified ecologist.
- Habitats Regulations Assessment (HRA) Screening to determine if there is potential for adverse effects to European sites, primarily Liverpool Bay SPA, and Dee Estuary SPA, SAC, and Ramsar site, and the species it is designated for (e.g. red-throated diver and common scoter, little tern, common tern).
- Preliminary WFD assessment to determine if the preferred option has potential to impact on the North Wales coastal water body.
- Landscape & Visual Impact Assessment to determine visual impact on existing views (including from archaeological receptors), and impact on the character of the exiting landscape/seascape.
- Archaeological investigations informed by the results of the geotechnical investigations (i.e. sampling and analysis of peat deposits recovered during coring). Should the Ground Investigation involve trial trenching, then these would need to be supervised under an archaeological watching brief).
- Socioeconomic assessment to consider the impact of the preferred option on recreational amenity and tourism.
- Climate change and sustainability assessment to consider the impact of the preferred option on use and transport bulky materials and resilience/adaptability to climate change.
- Cumulative effects assessment to ascertain the collective impact of the preferred option together with other coastal defence works that have been undertaken or are committed to in the surrounding area.

12.1.1.3 There are a number of potential wider environment benefits, and enhancement measures that could be incorporated into the scheme to improve the local environment. These could include:

- Biodiversity enhancements to the rock structures in order to provide a net gain in biodiversity value at the site as well as provide educational case study for the utilisation of biological enhancements in coastal defence structures.
- Information from ground investigations would contribute to paleo-environmental research being undertaken by University of Wales, Trinity St David on the submerged forest at Rhyl.

- Beach replenishment may reinstate eroded beach amenity and protect heritage assets locally on the foreshore from further erosion.
- Improvements to Wales Coast Path are possible, such as raising the footpath and enhancing the amenity and recreational use of the grassland behind the footpath.
- Improved resilience to the effects of climate change (increased coastal flooding) as a result of improved coastal defences.

## 12.2 Recommended ES content & structure

12.2.1.1 The outcome of the EIA will be reported in an ES that would accompany the planning application submission. The ES will set out the detailed assessment methodology, including the methods used for the collection of data and assessment of significant environmental effects. Any limitations or assumptions will be clearly stated in the ES.

### 12.2.2 Recommended ES content

12.2.2.1 In accordance Regulation 17(3) of the EIA Regulations the ES includes at least:

- *A description of the proposed development comprising information on the site, design, size and other relevant features of the development;*
- *a description of the likely significant effects of the proposed development on the environment;*
- *a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
- *a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;*
- *a non-technical summary of the information referred to above; and*
- *any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.*

12.2.2.2 The ES will comprise a printed bound document including drawings, a non-technical summary and, if necessary, technical appendices, but will also be made available in digital format.

12.2.2.3 The Non-Technical Summary summarise the proposal, its likely environmental effects and proposed mitigating measures in non-technical language. It is intended to inform people who have an interest in the development, but who are not concerned with the details of the technical assessment. The Non-Technical Summary will also be available separately as a stand-alone document and in a digital format.

12.2.2.4 The introductory chapters to the ES will include:

- a description of the development and the rationale for the scheme, together with information on the general appearance, illustrated by design drawings;
- an outline of the alternative designs which have been considered and rejected;
- a description of the construction phase, its programme and activities and a general assessment of the likely environmental effects of the construction phase;
- a description of how the development will operate and would be maintained; and
- a consideration of how and when the development would need to be decommissioned or replaced.

12.2.2.5 The main text of the ES will be organised on an environmental assessment topic basis as proposed in Table 2-2. For each environmental topic a brief review of the legislative and planning policy context will be undertaken. The topic-specific baseline conditions will be collected and used to inform the assessment. The environmental impacts and likely significant effects of the proposed development will be determined for each of the above scoped in aspects of the environment, plus any additional impacts and effects that come to light. Mitigation measures would be proposed to reduce the significance of effects where possible, and the resulting residual effect will be reported. Each environmental topic chapter presented in the ES will follow the same format for consistency and ease of cross

reference:

X.1 Introduction

X.2 Legislative and Planning Policy Context

X.3 Baseline Conditions

X.4 Assessment Methodology and Significance Criteria

X.5 Environmental Impacts & Likely Significant Effects

X.6 Mitigation Measures

X.7 Residual Effects

12.2.2.6 Details of the consultation process followed throughout the environmental assessment process will be set out in the ES. The approach to environmental assessment process would be iterative, influencing and taking account of Scheme design changes and consultation.

### 12.2.3 Recommended ES structure

12.2.3.1 Given the above considerations in this scoping report it is anticipated that the ES would be structured as follows:

**Non-Technical Summary**

**Chapter 1 Introduction**

1.1 Background

1.2 Site Description and History

1.3 Legislative Basis of the Environmental Statement

1.4 Purpose of the ES

1.5 Scope and Content of ES

1.6 Related Technical Information

**Chapter 2 The Proposed Development**

2.1 Alternatives and Design Evolution

2.3 Description of the Proposed Development (including Construction, Operation & Decommissioning)

**Chapter 3 Environmental Impact Assessment Methodology**

3.1 Outcomes of EIA Screening & Scoping

3.2 Summary of Consultation

3.3 Assessment Methodology and Significance Criteria

3.4 Limitations and Assumptions

**Chapter 4 Coastal hydrology & hydromorphology**

**Chapter 5 Biodiversity & nature conservation**

**Chapter 6 Landscape and visual impact**

**Chapter 7 Cultural heritage**

**Chapter 8 Socio-economics**

**Chapter 9 Traffic & Transport**

**Chapter 10 Other construction effects**

**Chapter 11 Sustainability and climate change**

**Chapter 12 Cumulative Effects**

12.1 Interrelationship Effects Between Topics

12.2 Cumulative Effects with Other Committed Developments

**Chapter 13 Conclusions**

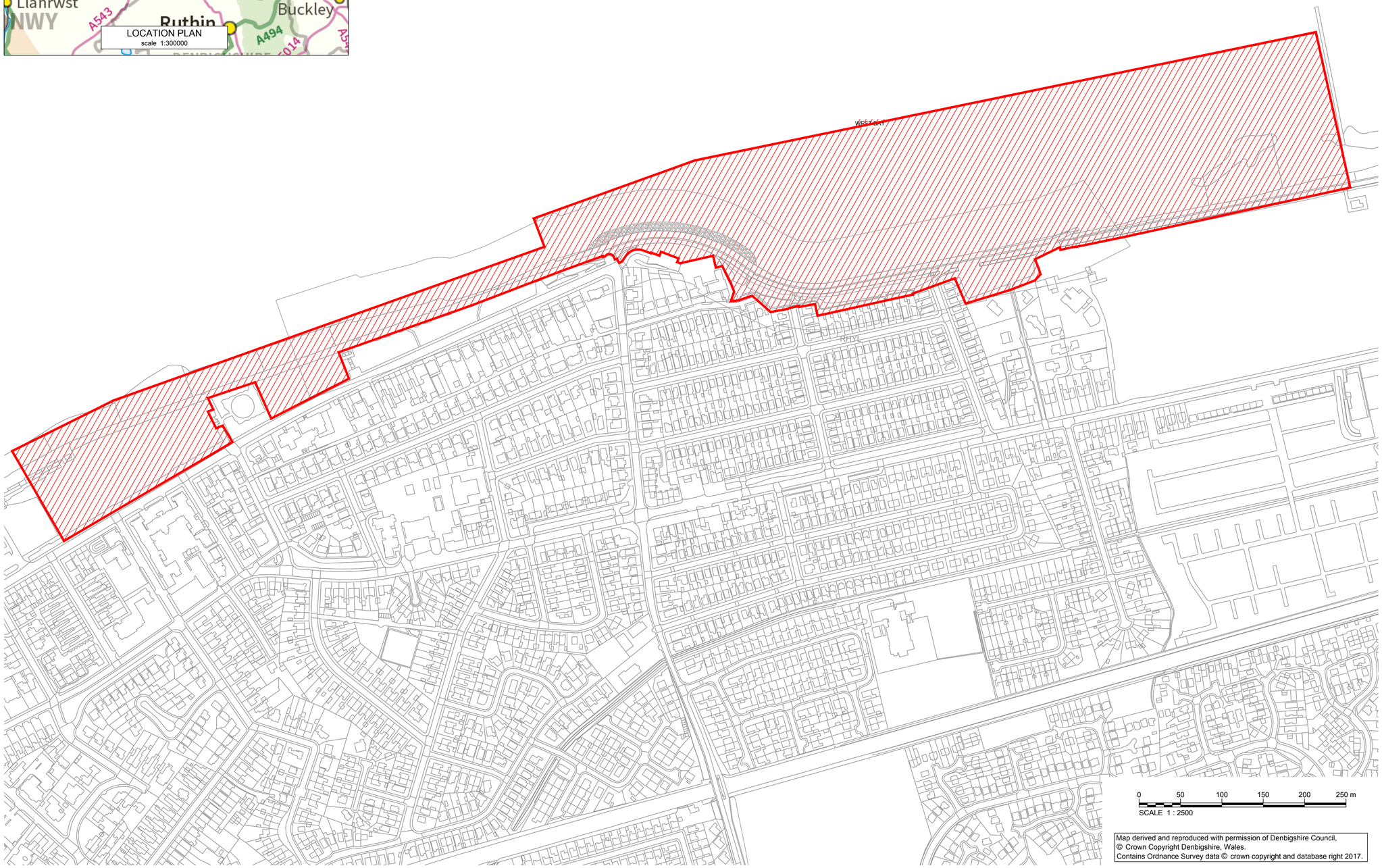
13.1 Summary of Significant Issues

13.2 Summary of Mitigation Measures and Residual Effects

13.3 Follow-up, Feedback and Monitoring

**Technical Appendices**

# Appendix A


0 50 100 150 200 250 m
SCALE 1 : 2500



| Construction Risks | Public Risks | Environmental Risks |
|---|---|---|
| • Surveying around private property and on golf course<br>• Restricted access and egress through Rhyl<br>• Working in an exposed coastal environment<br>• Tidal working conditions<br>• Unknown ground conditions | • Working on public amenity beach and public open space<br>• Working adjacent to public right of way | • Pollution hazards associated with working near the sea<br>• Risk of damage to flora and fauna |

In addition to the hazards/risks normally associated with the types of work detailed on this drawing take note of the above.
It is assumed that all works detailed on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

KEY

SITE BOUNDARY
TOTAL HECTARES = 22.0

| Rev. | Comments | Date | Drawn | Designed | Checked | Approved |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| P03 | Project boundary changed | 22/01/18 | RG | GK | AD | GK |
| P02 | Project boundary changed | 18/12/17 | RG | AD | GK | GK |

Client Approval

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

| Purpose of Issue | Status |
|---|---|
| For comment | Concept |

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DENBIGHSHIRE COUNCIL- EAST RHYL COASTAL DEFENCE SCHEME

EAST RHYL
SITE BOUNDARY
LOCATION

for

Cyngor sir ddinbych denbighshire County Council

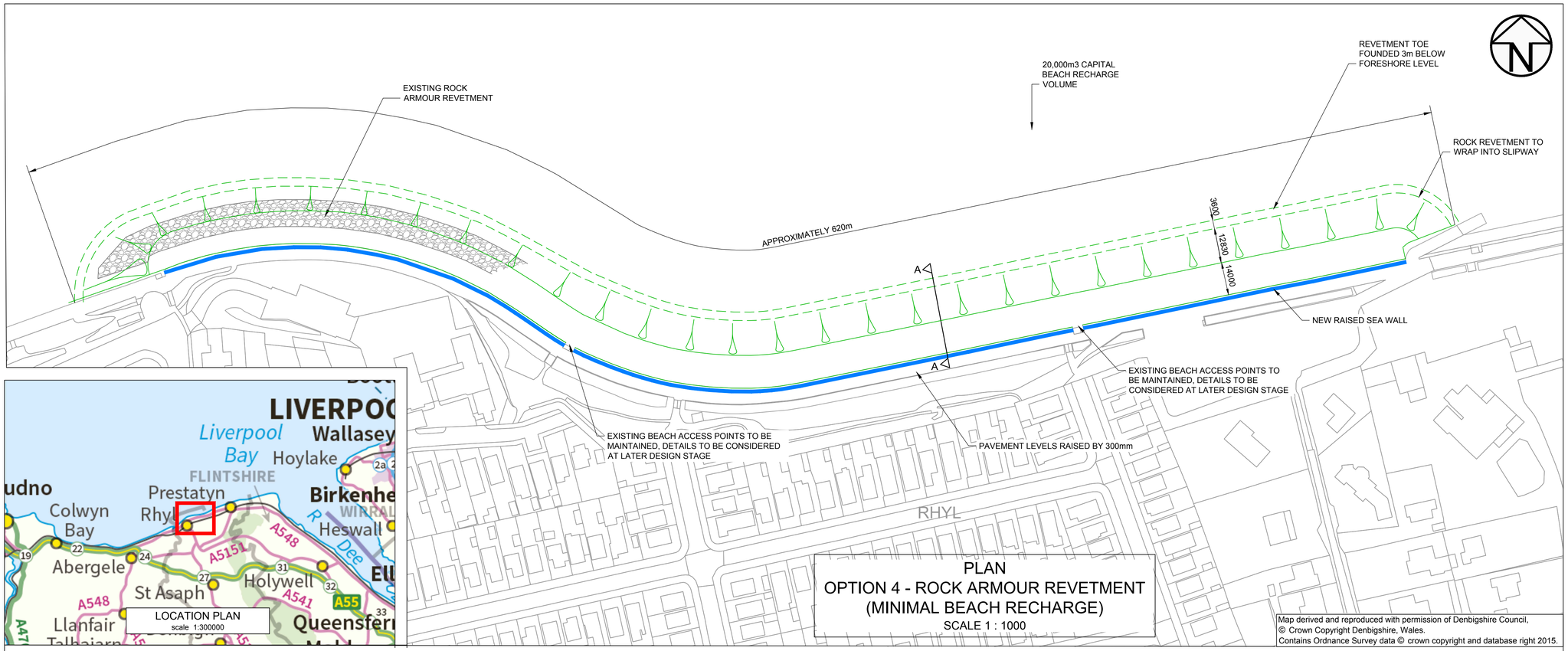


| Scale: | | | |
|---|---|---|---|
| 1:2500 @ A1 | Drawn: | R. Groves | 29/09/17 |
| | Designed: | A. Dane | 29/09/17 |
| | Checked: | G. Kenn | 29/09/17 |
| | Approved: | G. Kenn | 29/09/17 |

Digital File Name: ER-JBA-02-00-DR-C-0001-S8-P03.dwg

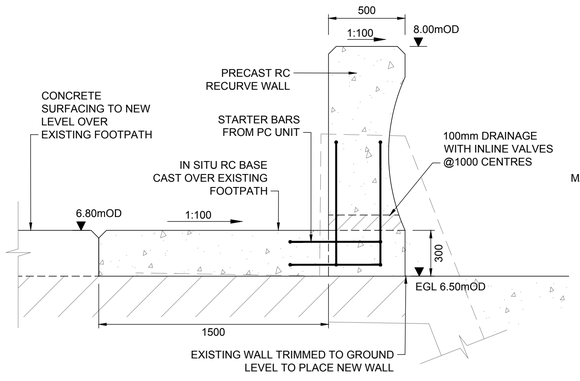
Drawing Number: ER-JBA-02-00-DR-C-0001-S8

Revision: P03

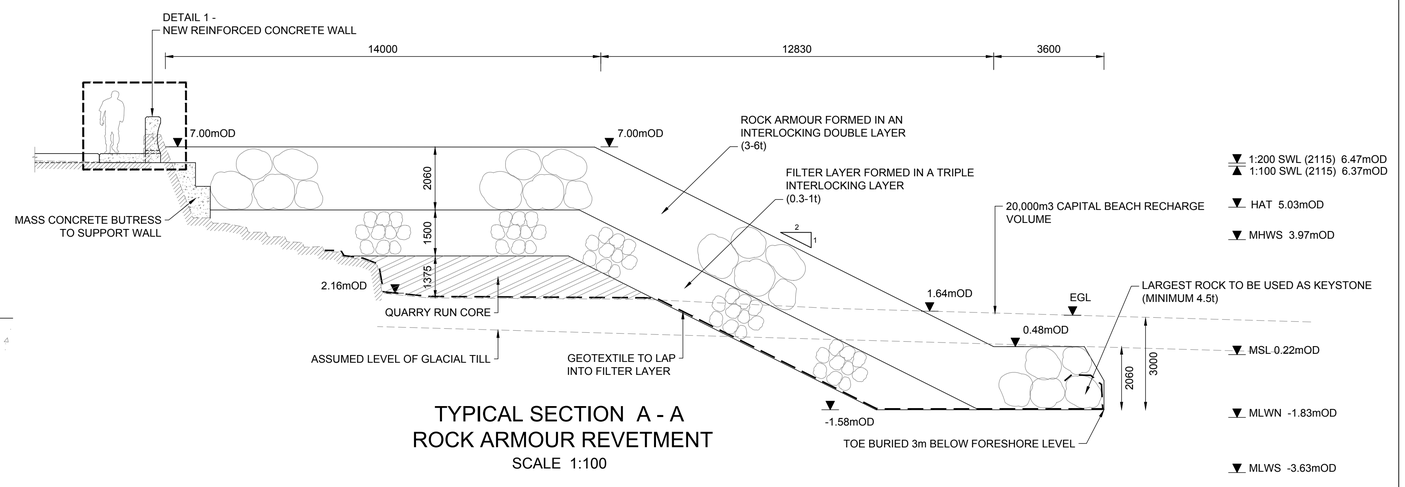



# PLAN
# OPTION 4 - ROCK ARMOUR REVETMENT (MINIMAL BEACH RECHARGE)
SCALE 1 : 1000






## DETAIL 1
scale 1:20




## TYPICAL SECTION A - A
## ROCK ARMOUR REVETMENT
SCALE 1:100

| | | |
|---|---|---|
| • Restricted access and egress through Rhyl<br>• Working in an exposed coastal environment<br>• Movement of plant in and around the sea<br>• Tidal water ingress to excavations<br>• Unstable excavations | • Working on public amenity beach and public open space<br>• Public interaction with rock armour<br>• Working adjacent to public right of way<br>• Unauthorised site access | • Pollution hazards associated with working near the sea<br>• Risk of damage to flora and fauna |
| Construction Risks | Public Risks | Environmental Risks |

In addition to the hazards/risks normally associated with the types of work detailed on this drawing take note of the above.
It is assumed that all works detailed on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

General Notes

1. All dimensions shown are in millimetres unless otherwise stated and levels are in metres to Ordinance Datum.
2. Do not scale from this drawing. All dimensions must be checked/verified on site.
3. All levels quoted on drawings were derived from LiDAR.
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.

Design Notes

1. Services information unknown. The Contractor will confirm the location of any services prior to the commencement of any works.
2. Care to be taken when excavating adjacent to existing sea wall.
3. Rock armour to be sourced in accordance with BS13383-1:2002.
4. Landscape enhancements to be developed during detailed design.
5. EGL = Existing ground level

| Rev.: | Comments | Date | Drawn | Designed | Checked | Approved |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| P02 | Minor ammendments | 18/12/17 | RG | AD | GK | GK |

Client Approval

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

| Purpose of Issue | Status |
|---|---|
| For comment | Concept |

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DENBIGHSHIRE COUNCIL - DETAILED DESIGN

EAST RHYL
ROCK ARMOUR REVETMENT
(MINIMAL BEACH RECHARGE)
PLAN AND SECTION
for

Cyngor sir ddinbych denbighshire County Council



| Scale: | | | |
|---|---|---|---|
| As shown @ A1 | Drawn: | R.Groves | 04/07/17 |
| | Designed: | A. Dane | 04/07/17 |
| | Checked: | G. Kenn | 12/07/17 |
| | Approved: | G. Kenn | 12/07/17 |

Digital File Name: 2016s-5126/.../ ER-JBA-00-00-DR-C-0002 OPTION 4.dwg

| Drawing Number: | Revision |
|---|---|
| ER-JBA-00-00-DR-C-0002 | S8-P02 |

# Appendix B

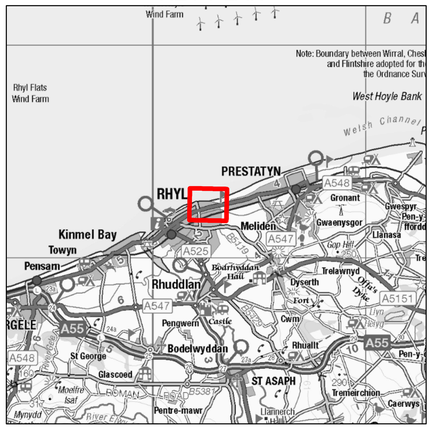

# LEGEND

- Offshore breakwater area
- Rock armour revetment
- Timber Groynes
- LR.HLR.MusB.Sem.Sem
- LR.HLR.MusB.Sem.LitX
- LR.FLR.Eph.Ent
- LS.LSa.FiSa
- LR.FLR.Eph.EntPor

**Phase 1 Habitat**

- A2.1
- A2.2
- B6
- H4
- H6.5
- J1.2
- J3.5
- J3.6
- J4

KEY PLAN






| Rev. | Modifications | Date | Drawn | Checked | Approved |
|---|---|---|---|---|---|

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for

**Balfour Beatty**

# Phase 1 Habitat and Marine Biotope Survey



| | | | |
|---|---|---|---|
| Scale: 1:4,500 | Drawn | JO | 05/07/2017 |
| | Checked | JH | 14/07/2017 |
| | Approved | PBL | 14/06/2017 |

Digital File Name: 2016s5126 - East Rhyl Environmental Constraints v0-1

| Drawing Number: | Sheet No.: | Status: | Rev.: |
|---|---|---|---|
| | 1 of 1 | DRAFT | - |

# Appendix C

**CPAT Report No. 1505**

# East Rhyl Coastal Defence Scheme

## DESK-BASED ASSESSMENT

YMDDIRIEDOLAETH ARCHAEOLEGOL CLWYD-POWYS

CLWYD-POWYS ARCHAEOLOGICAL TRUST

| | |
|---|---|
| Client name: | JBA Consulting |
| CPAT Project No: | 2211 |
| Project Name: | Rhyl Flood Defences |
| Grid Reference: | SJ 02265 82483 |
| County/LPA: | Denbighshire |
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Cover photo: CPAT image 3781-0001 showing PRN 123322: Rhyl foreshore structures at Splash Point

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# Summary

The Clwyd-Powys Archaeological Trust have conducted a desk-based assessment, on behalf of JBA Consulting, in connection with proposals for a new coastal flood defence scheme at Rhyl, Denbighshire. The results will assist in determining whether Option 3 or Option 4 is chosen as the preferred option.

The study revealed that the foreshore at Rhyl has a high archaeological potential, containing evidence for coastal change and prehistoric activity. Peat beds which are in places associated with the remains of a submerged forest are known to exist immediately to the west of the scheme, as well as further to the east. While there is currently no information available for the locations of Options 3 and 4 it is reasonable to assume that these deposits extend into this area. A significant number of prehistoric artefacts have also been recovered from foreshore and further finds might be expected in the areas of both options.

While a small number of maritime wrecks and crashed aircraft are known from the wider area all are sufficiently distant to be unaffected by either option.

Given the current lack of data for sediments in the areas potentially affected by the proposals it is not possible to indicate whether Option 3 or Option 4 is likely to present the lower potential direct impact on the archaeological resource and once a decision is made further stages of assessment will be required in order to develop appropriate mitigation.

# 1 Introduction

1.1. The Clwyd-Powys Archaeological Trust was invited by JBA Consulting to conduct a desk-based assessment in connection with proposals for a new coastal flood defence scheme at Rhyl, Denbighshire (Fig. 1; SJ 02265 82483).

1.2. A Project Appraisal Report has already been prepared for the scheme by JBA Consulting, which identified the problem of coastal flooding at Rhyl and described the current, short-term and long-term management approach as consisting of 'hold the line', which has been implemented through hard and soft coastal defences that will be maintained into the future. This involves a number of hard and soft approaches which are used to provide a continued coastal defence throughout the Denbighshire coastline. The most significant weakness to this defence is seen as the western Ffrith Beach; from 'Splash Point', past Garford Road and along the Rhyl Golf Course.

1.3. The report identified that, based on existing sediment, hydraulic and deterioration trends, the following processes are expected to occur in the future:

1 The defence will continue to overtop, causing an increasing risk to pedestrians walking on the promenade and an increasing the flood risk to all property behind the defence.

2 The beach will continue to lower, allowing larger waves to reach the defence. This will increase wave overtopping, continue to expose defence foundations and put a greater wave loading on critical defence elements such as the toe.

3 At some stage a breach could form as a result of the continued scour of the defence wall toe. Over a longer term due to the combination of scour, beach lowering, increased wave loads a complete failure of the seawall could occur.

1.4. A number of hard and soft defence options were considered to increase the coastal resilience at western Ffrith Beach, of which two options are now being considered further: Option 3 - a rock armour revetment for 435m-long section of the sea defences to the east of Splash Point, together with beach recharge; and Option 4 - a breakwater (c. 335m by 50m) to be positioned a short distance offshore, together with beach recharge.

1.5. The Study Area encompassed both options under consideration and lies to the north-east of Rhyl town, taking in around 3.5km of the coastline and extending around 700m out into Rhyl's intertidal zone. It also incorporates around 350m of Rhyl's sea frontage, comprising the coast road, residential and commercial properties located directly behind a promenade and a number of different coastal defences which vary in form, material and age.

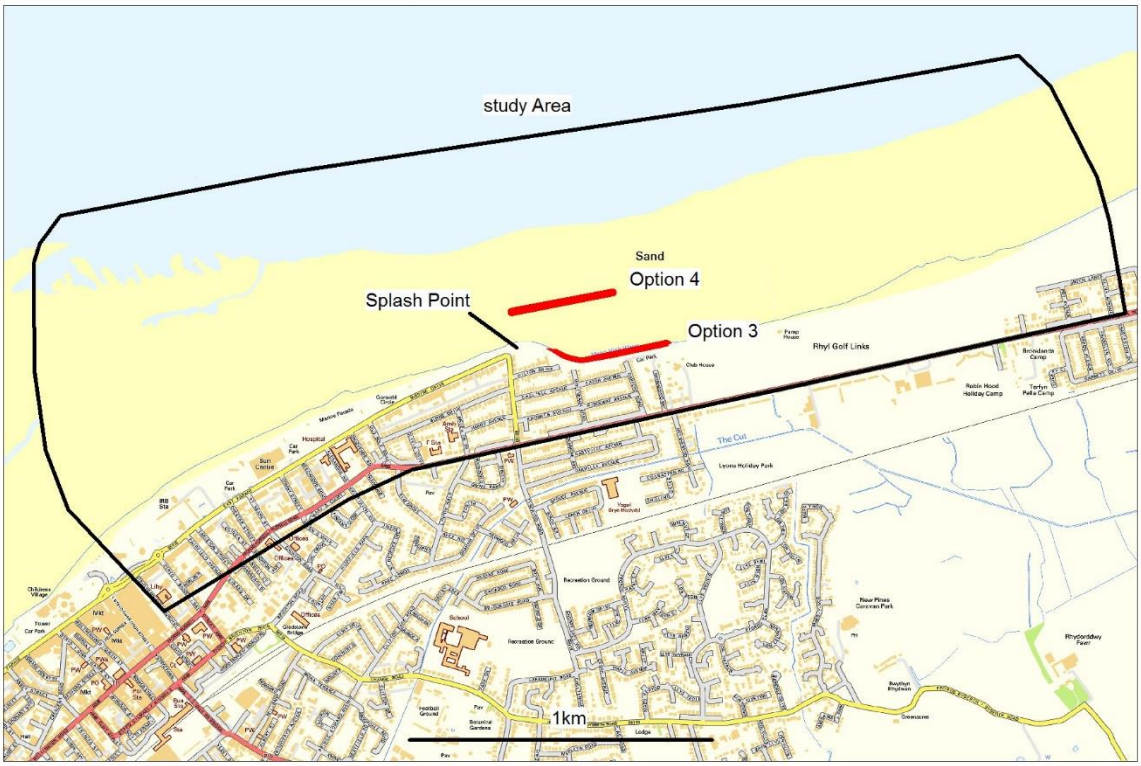




Fig. 1 Location of Study Area

# 2 Methodology

2.1. The assessment consisted of a desk-based study of readily available primary and secondary sources in order to provide a historical framework for any surviving archaeological remains. This included relevant records held at the following repositories: the regional Historic Environment Record (HER), maintained by CPAT in Welshpool; the National Monument Record (NMR), maintained by RCAHMW in Aberystwyth; the National Library of Wales, Aberystwyth; Flintshire Record Office, Hawarden; Denbighshire Record Office, Ruthin.

# 3 Sources of Information & Guidance

3.1. Cultural heritage is deemed to include the complete range of man-made features that have been introduced into the landscape from the Palaeolithic, more than two hundred and fifty thousand years ago, up to and including the 20th century. Some of these features will be visible as upstanding remains on the ground; others will be buried and only become apparent during ground disturbance, whilst others may be objects that have been discarded, lost or deliberately deposited. Some will have an archaeological interest and importance; others will be more historical in their origin. In addition, some natural features will be relevant because of the information they contain; peat bogs, for instance, hold pollen that can throw light on past human activity in the area. Collectively, all these features are known as heritage assets.

3.2. The revised Design Manual for Roads and Bridges (DMRB), Volume 11 Section 3 Part 2, HA 208/07 (August 2007), though not specifically focused on developments of this

nature, provides a suitable, general framework for assessing the cultural heritage. The approach to the cultural heritage which it promotes, although designed for road developments, is relevant as a methodology for the proposed development and has been adopted here. The relevant sections relating to determining the value of assets and the magnitude and significance of potential impacts is reproduced in Appendix 2.

3.3. The desk-based assessment was undertaken with reference to the principles and methods for assessing heritage assets laid out in the *Standard and Guidance for Archaeological Desk-based Assessments* (2014) produced by the Chartered Institute for Archaeologists (CIfA), the regulatory body for the profession.

## Administration

3.4. At a national level, it is Cadw, the historic environment service within Welsh Government, which holds the remit for the cultural heritage resource. Another national body, Natural Resources Wales, has a particular interest in historic landscapes.

3.5. At a regional level, the cultural heritage resource is monitored by the Heritage Sections of the regional archaeological trusts. The Clwyd-Powys Archaeological Trust (CPAT) act as archaeological advisers to Denbighshire County Council.

3.6. While the broad concern of all these bodies is with the preservation of the cultural heritage, there are inevitably differences in emphasis between regional and national organisations, and in the laws and regulations that govern the ways in which they operate.

## The categorisation and conservation of the cultural heritage resource

3.7. The cultural heritage resource is not a single body of equally significant assets, but an infinitely complex set of individual assets, the number of which increases and alters in form and relationships on a continual basis. They range in importance from internationally significant sites to features of minor and even negligible value, with those perceived to be of greater importance being categorised by designation (statutory) or registration (which may be statutory or non-statutory).

### *World Heritage Sites*

3.8. This is the only category of international importance, although the designation of a World Heritage Site (WHS) does not confer additional statutory protection. Instead, the protection of World Heritage Sites in the UK is managed through existing designation (i.e. Conservation Areas) and planning regimes (i.e. Local Development Plans).

### *Scheduled Ancient Monuments*

3.9. SAMs are designated features of national importance. They are protected under the Ancient Monuments and Archaeological Areas Act, 1979, as amended by the Historic Environment (Wales) Act 2016. The settings of SAMs are also protected, as articulated in Planning Policy Wales (9th edition, 2016), specifically Chapter 6 (Conserving the Historic Environment) which notes that 'the desirability of preserving an ancient monument and its setting is a material consideration in

determining a planning application' (6.5.1). Setting in relation to all heritage assets, whether designated or not, is discussed further below.

### *Listed Buildings*

3.10. These are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990, as amended by the Historic Environment (Wales) Act 2016. All listed buildings are nationally important, but are graded in order of significance as Grade I, II* or II. Grade I buildings are considered to be of equal status to Scheduled Ancient Monuments. Local planning authorities must have special regard to the desirability of preserving the setting of a listed building regardless of its grade, and it also requires planning proposals to meet the test of determining the extent to which a development affects views to and from a listed building. Planning Policy Wales (9th edition, 2016) requires a 'general presumption in favour of the preservation of a listed building and its setting, which might extend beyond its curtilage' (6.5.10).

### *Conservation Areas*

3.11. These are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. This Act requires local planning authorities to have special regard to the desirability of preserving the setting of a Conservation Area, and it also requires planning proposals to meet the test of determining the extent to which a development affects views to and from such an area. Planning Policy Wales (9th edition, 2016) states that there 'will be a strong presumption against the granting of planning permission for developments … which damage the character of appearance of a conservation area or its setting to an unacceptable level' (6.5.19).

### *Registered Parks and Gardens, and Historic Landscapes*

3.12. The Historic Environment (Wales) Act 2016 provides for the creation of a statutory Register of Parks and Gardens of Special Historic Interest in Wales. Parks and gardens are graded using the same categories as listed buildings (i.e. I, II*, II). Parks and gardens are therefore 'registered' rather than 'designated' assets, though for practical purposes this distinction appears to be of little significance. Planning Policy Wales (9th edition, 2016) states that local authorities should 'protect and conserve' registered parks and gardens and their settings, and that Cadw must be consulted on any development which is 'likely to affect the site of a registered historic park or garden or its setting' (6.5.24). Similarly, the inclusion of an area on the (non-statutory) Register of Historic Landscapes is a planning consideration, and again Cadw should be consulted on any development 'within a registered historic landscape area that requires an Environmental Impact Assessment' (6.5.25).

### *Battlefields*

3.13. England has a Battlefields Register, but there is at present nothing comparable for Wales. A Welsh register is currently in preparation, but its form and composition is not known, nor when it will be made available.

### *Designated wrecks*

3.14. The Protection of Wrecks Act 1973 allows the designation of a restricted area around a wreck to prevent uncontrolled interference. These protected areas are likely to

contain the remains of a vessel, or its contents, which are of historical, artistic or archaeological importance. There are six designated wrecks in Wales.

### *Aircraft Crash sites*

3.15. All military aircraft crash sites in the United Kingdom, its territorial waters, or British aircraft in international waters, are controlled by the Protection of Military Remains Act 1986. Under this act it is an offence to tamper with, damage, move, or unearth any remains without a licence from the Ministry of Defence.

### *Undesignated assets*

3.16. These are undesignated heritage assets which may survive both above ground where they are still visible and/or buried beneath the surface. These could range in date from the prehistoric era through to the 20th century.

### *Setting*

3.17. As noted above, Planning Policy Wales (8th edition, 2016) identifies the desirability of preserving the setting of a World Heritage Site, a nationally important ancient monument (whether scheduled or unscheduled), a listed building, a Conservation Area and a site on the Register of Historic Parks and Gardens in Wales. This desirability will be a material consideration when assessing the potential impact of a development proposal on the historic environment. Further, Technical Advice Note 24 (2016) defines setting as: 'the surroundings in which it is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve' (1.21). Guidance is being prepared by Cadw, but is not yet published. However the wording in PPW and TAN 24 closely follows that of English legislation and guidance, and so it is expected that guidance for Wales will echo that prepared by Historic England (2015).

### *Status of legislation*

3.18. The legislative framework for the historic environment in Wales has recently been revised by the The Historic Environment (Wales) Act 2016. The 2016 Act amended the Ancient Monuments and Archaeological Areas Act 1979 and the Planning (Listed Buildings and Conservation Areas) Act 1990. It extended the definition of scheduled monuments an enhanced their protection, as well as making changes to the process of scheduled monument consent. Changes were also made to the protection of listed buildings. The 2016 Act also provided for statutory a register of historic landscapes, a statutory list of place names, and imposed a statutory duty on Welsh Ministers to compile and maintain Historic Environment Records (HERs). Most of the provisions of the 2016 Act had come into force by 31 May 2017.

3.19. Chapter 6 of Planning Policy Wales was revised and re-issued in November 2016. Technical Advice Note 24: *The Historic Environment* (TAN 24)came into force on 31 May 2017, and replaced previous Welsh Office Circulars 60/96 *Planning and the Historic Environment: Archaeology*; 61/96 *Planning and the Historic Environment: Historic Buildings and Conservation Areas*; and 1/98 *Planning and the Historic Environment: Directions by the Secretary of State for Wales*.

# 4 HISTORICAL BACKGROUND

4.1. From the end of the last glaciation (c. 10,000 BC) to the early Neolithic (*c.* 4,000 BC) sea-levels rose rapidly (Tooley 1985), followed by a period of lesser oscillatory movements. The local effects were often complicated, not least as a result of isostatic recovery, so that Tooley has identified 12 periods of what he terms 'transgressive overlap tendancies' and a further 12 'regressive overlap tendancies' (Tooley 1982; 1985; 1986). In other words, the sea level rose and fell in broad patterns, but with local variations which sometimes overlapped. Sea level appears to have reached a maximum at about 2,300 BP before falling again (Tooley 1978; 1985). During more stable times, land surfaces would have developed, only to be inundated and subsequently buried beneath marine and estuarine deposits.

4.2. The effect of successive marine transgressions on the area around the mouth of the River Clwyd has been examined by Manley (Manley 1981; 1989), based largely on the results of borehole data. During the Mesolithic period major transgressions may have made Rhuddlan a coastal location, with the low-lying area between Rhyl and Prestatyn transgressed. Areas of elevated boulder clay might have remained above sea level and been occupied as the most seaward habitable land. This may account for the distribution of shell beds and Mesolithic finds reported around Rhyl. The more major transgressions may have covered the elevated boulder clay, although during periods of regression it is possible that low lying areas may have been settled before being inundated by later transgressions. It is clear that during this period vast tracts of coastal plain were inundated, although the highest absolute sea levels probably occurred during the Roman and early post-Roman period.

4.3. Borehole data from 1984, which was analysed by Manley (1989), revealed peat, suggesting former landsurfaces, at two separate depths, with an upper level at around 2m OD and a lower peat at 1 to 2m below OD. Based on the distribution of cores containing the upper peat deposit Manley postulated the position of a prehistoric coastline in the area of Rhyl town, perhaps dating between *c.* 4000 BC and 3000 BC, between 125m and 600m inland of the present coast.

4.4. Further evidence for coastal change is provided by the remains of a submerged forest on the foreshore, which was noted by Thomas Pennant near Abergele (1784, 349), while a similar phenomenon was revealed at Rhyl in 1893, as detailed in the following account from the North Wales Chronicle (11 February 1893):

> 'The action of the tide at Rhyl within the last few days has disclosed the singular sight of an ancient forest, which, for a period of eighty years has been completely covered by the sea. The scoured portion of the beach where the remarkable sight is presented is situated opposite the Marine Drive, about a mile east of the pier. The town surveyor Mr R. Hughes has made an accurate plan of the place, which shows about thirty trees rooted as they grew, whilst there are a number of horizontal trunks which appear to rest as they fell. Several of the trees have been proved to be of oak and elm, and the remainder appeared to be birch, alder and hazel. The stumps vary in diameter from 12 to 24 inches, and are situated about 100 yards from the edge of the sandhills and are covered during high spring tides by about 10 feet of water. The scoured portion in the sands, which exposes these old roots, extends for about 550 yards in length and

varies in width from 7 to 35 yards. Folk lore asserts that this is part of an old forest, the portion in question being known as 'Coed Mawr y Rhyl'.

4.5. The remains on Rhyl beach were recorded again in October 1912 when around 200 tree stumps were recorded between Rhyl pier and about half way from the east end of Rhyl to the centre of Prestatyn, while in august 1918 up to 100 stumps were noted. Birch and scots pine are most commonly found, but also oak, elm and alder (Ashton 1920, 175).

4.6. Archaeological evidence for prehistoric activity along the coastal strip comes entirely from artefactual evidence. Glenn (1935, 207) recorded over 70 prehistoric objects from peat and estuarine or marine clays on Rhyl foreshore, which have also produced an antler mattock, found in 1910, from near Splash Point, which has been dated to 6560±80 BP (Bonsall and Smith 1990). This one of only two such artefacts from Wales and their contexts of discovery suggest that they may have been used for digging, perhaps for shellfish, in soft coastal sediments (Lynch *et al.* 2000, 29). Other artefacts include Neolithic axe heads and a Bronze Age socketed spear head and a bronze chisel.

4.7. Evidence for a continuation of the peat beds, as well as further elements of the submerged forest, has come to light recently in studies associated with the construction of an on-shore cable connection for the Burbo Bank Offshore Windfarm. Fieldwalking of the intertidal zone identified several areas of exposed peat and one tree stump around 1.25km east of Splash Point (Rutherford 2016).

4.8. The full extent of the peat deposits are currently unknown, although they have considerable potential for artefactual remains and palaeoenironmental data which is considered to be potentially of national importance. As such these deposits are viewed as having high value, according to the DRMB criteria (Appendix 2).

4.9. A number of Roman coins have been recovered around Rhyl, on the beach, on Marsh Road and at Rhydwen Drive although there are no known remains of this date within the Study Area.

4.10. Although there are documentary references to Rhyl dating back to the 14th century, these probably refer to an area rather than a settlement as such. The early form of the name is thought to be 'Hull', translatable as 'hill', and perhaps referring to the collection of low sandbanks here, raised a little above the level of the low ground which was in the past subject to flooding in high tides. Until the beginning of the 19th century the area seems to have contained only a handful of scattered farms and cottages.

4.11. A Bill was passed in 1794 authorising the construction of a sea defence and land drainage channels to control flooding (Owen 1994). Remains of possible early sea defences or fish traps (PRN 123322) have been identified within the study area, close to Splash Point, comprising a series of wooden posts set in roughly parallel short trenches filled with stone. These are recorded to have been cut through the peat deposits, rather than being associated with the prehistoric finds that have been recovered from the immediate surrounding area (Denbighshire Archaeology Service).

Figs 2 and 3 Features exposed in December 2013 immediately east of Splash Point, including peat deposits, timbers and possible fish traps and small vessels (Photos Fiona Gale)

4.12. Rhyl was the earliest of the North Wales coast resorts to develop. Growth of the town began in the late 1820s with the building of two hotels and a number of lodging houses. By the time of the Tithe survey in 1839, a number of roads had been set out, but there were very few new buildings. Large areas of common still survived on the land nearest to the sea. Inland, there was much arable land and a large number of

strip fields and quillets were depicted, and some of these were visible along the southern edge of the Study Area.

4.13. It is also evident that the depiction of the sea front on the Tithe map is some 140m further inland than the present front, which has undergone considerable redevelopment, particularly for the leisure and tourism industry.

4.14. The Royal Alexandra Hospital along Marine Drive was used for the care of wounded soldiers during the First World War and German prisoners of war were recorded at Rhyl, and were possibly accommodated in a camp there, in the years after the Second World War.

# 5 The Baseline Assessment

## Designated and Registered Heritage Assets within the Study Area

5.1. The assessment includes designated and registered heritage assets within the Study Area, summarised in Table 1, although the only designated assets relevant to this study are all listed buildings.

5.2. Table 1: Designated and Registered Heritage Assets within the Study Area

| Designated Asset | Within Study Area |
|---|---|
| World Heritage Site | 0 |
| Scheduled Ancient Monument | 0 |
| Listed buildings | 7 |
| Registered historic parks and gardens | 0 |
| Registered Battlefields | 0 |
| Designated wrecks | 0 |
| Aircraft crash sites | 2 |
| Conservation areas | 0 |

5.3. Seven Listed Buildings have been identified within the Study Area all of which are concentrated within its south-western corner, within Rhyl town (Fig. 4 and Table 2).




Fig. 4 Listed Buildings within the Study Area

Table 2: Listed buildings within the Study Area.

| List entry | Grade | Name | Period | NGR |
|---|---|---|---|---|
| 14290 | II | Royal Alexandra Hospital | 19th Century | SJ0148182102 |
| 1510 | II | Lookout Tower in Boundary Wall at Nos 39 and 40 East Parade | 19th Century | SJ0108881897 |
| 14281 | II | No 23 Grafton Lodge, Fairfield Avenue (East side) | 19th Century | SJ0100581804 |
| 14280 | II | No 21 Grafton Lodge, Fairfield Avenue (East side) | 19th Century | SJ0101481800 |
| 14276 | II | War Memorial, East Parade (North side) | 20th Century | SJ0100681935 |
| 14137 | II | Boundary Wall and Gate Piers at No 4 The Gables, Bath Street | 19th Century | SJ0092581691 |
| 14136 | II | No 4 The Gables, Bath Street (East side) | 19th Century | SJ0093381701 |

## Undesignated Assets

5.4. The assessment has identified 25 undesignated assets within the Study Area. Of these, eight are find spots and are listed in Table 4, two are ship wreck sites and two are air crash sites, both of which are listed in Table 5. The remaining undesignated assets are listed in Table 3 and their distribution shown in Fig. 5.

Table 3: Undesignated Assets within the Study Area.

| PRN | Name | Period | NGR |
|---|---|---|---|
| 123322 | Rhyl foreshore (Splash Point) structures | Post-Medieval/ Prehistoric | SJ0205082470 |
| 106402 | Rhyl foreshore causeway | Post-Medieval | SJ0190082500 |
| 17103 | Rhyl foreshore submerged landscape | Prehistoric | SJ0230082400 |
| 142079 | Rhyl Prisoner of War camp | Modern | SJ0150082000 |
| 120709 | Rhyl, Bath Street 5-9, Morfa Hall | Post-Medieval | SJ0090081660 |

| | | | |
|---|---|---|---|
| 120706 | Rhyl, Esplanade/Church Street, Belvoir Hotel | Post-Medieval | SJ0083081679 |
| 37700 | Rhyl, Volunteers' rifle range | Post-Medieval | SJ0278882579 |
| 128935 | Rhyl, Mantelet Targets | Post-Medieval | SJ0316282708 |
| 128933 | Rhyl Coast, building I | Post-Medieval | SJ0321382540 |
| 128934 | Rhyl Coast, building II | Post-Medieval | SJ0320782529 |
| 128932 | Rhyl Coast, building III | Post-Medieval | SJ0365282716 |
| 128931 | Rhyl Coast, building IV | Post-Medieval | SJ0294582511 |
| **NPRN** | **Name** | **Period** | **NGR** |
| 416369 | Earthworks of Farms and Fields, Rhyl Sea Front | Post Medieval | SJ0293782440 |




Fig. 5 Undesignated assets within the Study Area

**Find Spots**

5.5. The assessment has identified eight find spots within the Study Area (Fig. 4; Table 4).




Fig. 6 Find spots within the Study Area

Table 4: Find Spots identified within the Study Area

| PRN | Name | Period | NGR |
|---|---|---|---|
| 33099 | Rhyl foreshore (Splash Point) antler mattock | Mesolithic | SJ0200082500 |
| 101937 | Rhyl foreshore bronze chisel | Bronze Age | SJ0205082470 |
| 101903 | Rhyl foreshore bronze spearhead | Bronze Age | SJ0238082470 |
| 58796 | Rhyl foreshore macehead | Neolithic/ Bronze Age | SJ0150082200 |
| 101936 | Rhyl foreshore Neolithic axes | Neolithic | SJ0190082500 |
| 58795 | Rhyl foreshore post medieval finds | Medieval | SJ0238082470 |
| 120560 | Rhyl, Axehead | Neolithic | SJ0238082470 |
| 141424 | Rhyl, wood and metal object | Unknown | SJ0238082470 |

**Wreck Sites and Crash Sites**

5.6. The assessment has identified two potential ship wreck sites and two potential air crash sites within the study area (Table 5; Fig. 7). All of these lie within the intertidal zone although none of them have been located exactly to the National Grid Reference listed below. It should also be noted that the remains of the two air crashes are designated as a Protected Place under the Protection of Military Remains Act 1986. For further information on this Act and its administration with regard to aircraft, the Joint Casualty and Compassionate Centre, RAF Innsworth, Gloucester, GL3 1R should be contacted.

5.7. Table 5: Ship wrecks and crash sites within the Study Area

| NPRN | Name | Period | NGR |
|---|---|---|---|
| 515607 | Boulton Paul Defiant I N1770, Crash Site | Modern | SJ0059582522 |
| 515475 | Armstong Whitworth Whitley V BD204, Crash Site | Modern | SJ0078282558 |
| 525228 | Mayflower, Wreck Site | Post Medieval | SJ0089282244 |
| 271558 | St Olaf, Wreck Site | Post Medieval | SJ0246882901 |

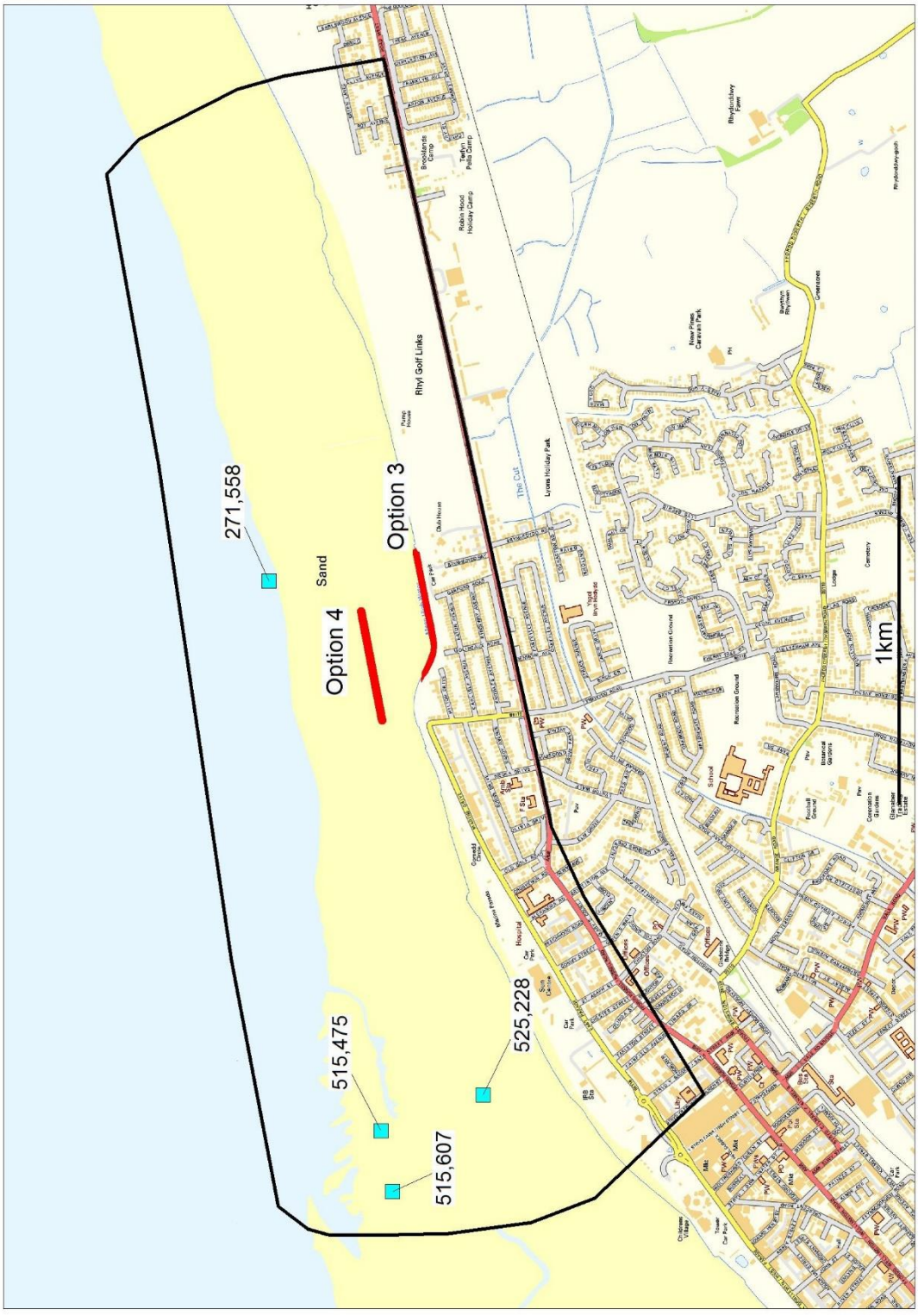




Fig. 7 Potential ship wrecks and aircraft crash sites within the Study Area

# 6 Assessment of Options 3 and 4

6.1. The following presents a preliminary assessment of potential impacts, both direct and indirect, which may result from the two options under consideration. Further stages of assessment will be undertaken once the final scheme has been chosen.

## Option 3 - rock armour revetment

### *Direct impacts*

6.2. The foreshore has a high archaeological potential, containing evidence for coastal change and prehistoric activity, such as the peat beds and submerged forest remains which are exposed periodically, together with numerous chance finds. Further assessment, in the form of geotechnical sampling and field survey, will be required to identify the likely extent and significance of this resource within the area, although it is clear that Option 3 has the potential to have a direct impact.

6.3. There are no predicted impacts on the four recorded maritime and aircraft wreck sites, or any heritage assets above the high water mark.

### *Indirect impacts*

6.4. While the re-armouring of the existing defences may introduce visual impacts for heritage assets in the immediate area, the potential impacts are considered to be relatively slight, although these will need to be assessed in full at a later stage should this option be chosen.

6.5. Any change to the existing coastal defences has the potential to result in indirect physical impacts further along the coast as a consequence of changing coastal currents. This is particularly relevant in relation to the peat deposits and the possibility of further artefactual evidence for prehistoric activity further to the east.

## Option 4: offshore breakwater

### *Direct impacts*

6.6. The foreshore has a high archaeological potential, containing evidence for coastal change and prehistoric activity, such as the peat beds and submerged forest remains which are exposed periodically, together with numerous chance finds. Further assessment, in the form of geotechnical sampling and field survey, will be required to identify the likely extent and significance of this resource within the area, although it is clear that Option 4 has the potential to have a direct impact.

6.7. There are no predicted impacts on the four recorded maritime and aircraft wreck sites, or any heritage assets above the high water mark.

### *Indirect impacts*

6.8. The construction of an offshore breakwater may introduce visual impacts for heritage assets in the immediate area, although the potential impacts are considered to be relatively slight. The closest listed building lies 700m to the south-west. Potential visual impacts will need to be assessed in full at a later stage should this option be chosen.

6.9. The construction of an offshore breakwater has the potential to result in indirect physical impacts further along the coast as a consequence of changing coastal currents. This is particularly relevant in relation to the peat deposits and the possibility of further artefactual evidence for prehistoric activity further to the east.

# 7 Conclusions

7.1. The desk-based assessment has revealed that the foreshore at Rhyl has a high archaeological potential, containing evidence for coastal change and prehistoric activity. Peat beds which are in places associated with the remains of a submerged forest are known to exist immediately to the west of Splash Point, as well as further to the east. While there is currently no information available for the locations of Options 3 and 4 it is reasonable to assume that these deposits extend into this area. A significant number of prehistoric artefacts have also been recovered from foreshore and further finds might be expected in the areas of both options.

7.2. While a small number of maritime wrecks and crashed aircraft are known from the wider area all are sufficiently distant to be unaffected by either option.

7.3. Given the current lack of data for sediments in the areas potentially affected by the proposals it is not possible to indicate whether Option 3 or Option 4 is likely to present the lower potential direct impact on the archaeological resource.

7.4. It is understood that a programme of geotechnical investigations will be conducted once a decision has been made between the two options and the results from this will be crucial to predicting the likely direct impacts and developing an appropriate mitigation strategy.

7.5. Both options have the potential for indirect physical impacts on sensitive archaeological deposits and artefact scatters further to the east, although the potential significance of these impacts this will depend on predicted changes in currents and wave patterns, information which is not currently available.

7.6. Finally, further assessment will need to be undertaken to determine potential visual impacts which may result from the final scheme.

# 8 Sources

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1871 Ordnance Survey 1st edition 25" map, Flintshire 1.10

1871 Ordnance Survey 1st edition 25" map, Flintshire 1.11

1889 Ordnance Survey 2nd edition 25" map, Flintshire 1.10

1889 Ordnance Survey 2nd edition 25" map, Flintshire 1.11

# Appendix 1: Gazetteer of Heritage Assets

## Designated Assets

### Listed Buildings

***Listing No 14290 The Royal Alexandra Hospital: Grade II***

The Royal Alexandra Hospital was built as a children's hospital and convalescent home, designed by Alfred Waterhouse, architect of Manchester, and probably finished by his son, Paul Waterhouse. The west wing and central block are dated 1899 and 1900, and opened in 1902 - these are the work of Alfred Waterhouse. The east wing was completed 1908-10, and is possibly by Paul Waterhouse. The hospital's siting on the sea-front and its plan - notable for the integral open balconies and verandahs of the west wing - reflected the importance then attached to fresh-air treatment. The chapel had originally been built for an earlier hospital building on another site in c1874 but was incorporated in Waterhouse's plans from the outset. It was designed by John Douglas, architect of Chester.

***Listing No 1510 Lookout Tower in Boundary Wall at Nos 39 and 40 East Parade: Grade II***

Said to have been built by Mr John Tarleton as a semaphore signalling station for the paddle steamers which operated between the Foryd Harbour, Rhyl and Liverpool. Probably built some time after 1831. Circular two-storey tower, of rubble construction with freestone dressings, corbelled and crenellated parapet.

***Listing No 14281 No 23 Grafton Lodge, Fairfield Avenue (East side): Grade II***

Probably c1820-30, one of the earliest private villas to be built after the sale of land for building by the Rhuddlan Marsh Embankment Trust between 1807 and 1827. A house on the site is clearly shown on a map of 1852, and in a lithograph of c1855-7. The original house was extended and remodelled in the mid-late C19, and may have been subdivided laterally at some time (it is shown divided in this way in the Ordnance Survey map of 1871). Some alterations were made in 1885, when Fairfield Avenue was laid out. The rear wings now form a separate dwelling.

***Listing No 14280 No 21 Grafton Lodge, Fairfield Avenue (East side): Grade II***

Probably c1820-30, one of the earliest private villas to be built after the sale of land for building by the Rhuddlan Marsh Embankment Trust between 1807 and 1827. A house on the site is clearly shown on a map of 1852, and in a lithograph of c1855-7. The original house was extended and remodelled in the mid-late C19, and may have been subdivided laterally at some time (it is shown divided in this way in the Ordnance Survey map of 1871). Some alterations were made in 1885, when Fairfield Avenue was laid out. The rear wings now form a separate dwelling.

***Listing No 14276 War Memorial, East Parade (North side): Grade II***

Originally erected to commemorate those who died in the Boer War, and unveiled in 1904, its original site was further west on the promenade near High Street. It was moved to its present site and the Garden of Remembrance opened in 1948. White ashlar. Two short cenotaph pylons flank a high central plinth on which stands the statue of a uniformed soldier.

***Listing No 14137 Boundary Wall and Gate Piers at No 4 The Gables, Bath Street: Grade II***

Low brick and terracotta wall, with pairs of gate-piers to either end, built 1893, and probably also designed by the architect of the house, Henry Beswick of Chester.

***Listing No 14136 No 4 The Gables, Bath Street (East side): Grade II***

Built in 1893, to the designs of Henry Beswick, architect, of Chester. Used as holiday or long-let flats since c1924. Brick with terracotta and painted brick dressings and hipped slate roof with axial and end wall stacks. Arts and Crafts style.

## Undesignated Assets

### Air Crash Sites

***NPRN 515607 Boulton Paul Defiant I N1770, Crash Site***

This Defiant was built by Boulton Paul, Wolverhampton, and, at time of loss, was assigned to 256 Squadron. The aircraft's engine cut out and it crash landed on the beach at Rhyl on 31 August 1941.

***NPRN 515475 Armstong Whitworth Whitley V BD204, Crash Site***

This Whitley V was built by AWA, Baginton, and was assigned to 24 OTU. On 17 May 1943, the aircraft's engine cut out and it belly-landed on mudflats at Rhyl.

### Ship Wrecks

***NPRN 525228 Mayflower, Wreck Site***

The MAYFLOWER was a wooden sloop built in 1784 at Cardigan. Technical and configuration specifications are given as 22 tons burthen; 37ft 2in length x 12dt 6in breadth x 6ft 3in depth in hold; 1 deck, 1 mast, sloop rigged with a standing bowspit, square sterned, carvel built. At time of loss, the vessel was owned by John Evans of Beaumaris, mariner (28); Charles Evans of Beaumaris, marine (20); Owen Richard of Beaumaris, blacksmith (12); and Jane Hughes of Bangor, spinster (4). The sloop's Port of Beaumaris Shipping Register entry is closed with the annotation 'Wrecked off Rhyl 13 September 1837'.

***NPRN 271558 St Olaf, Wreck Site***

The SAINT OLAF was a 128nt wooden brig built in 1852 and registered in Norway. At time of loss on 14 May 1884, the vessel was owned by A Hansen of Mandal. The brig was carrying pit woode from Mandal to Connah's Quay when it was blown ashore during a northwesterly force 6 gale.

### Find Spots

***PRN 33099 Rhyl foreshore (Splash Point) antler mattock***

Perforated Mesolithic antler mattock found near Splash Point, Rhyl.

***PRN 101937 Rhyl foreshore bronze chisel***

Bronze chisel found in 1913 on a peat bed. The blade is 2.5 inches long and 1.25 inches wide and is housed at the National Musuem of Wales.

***PRN 101903 Rhyl foreshore bronze spearhead***

Bronze socketed spearhead 4.4 inches long found on the Rhyl beach. Now lost.

***PRN 58796 Rhyl foreshore macehead***

Pebble macehead found on submerged land surface in this area in the early 20th century.

***PRN 101936 Rhyl foreshore Neolithic axes***

Various Neolithic objects found on submerged land surface in this area in the early 20th century including three Graig Lwyd axes (in the NMW) and two polished stone axes.

***PRN 58795 Rhyl foreshore Post Medieval finds***

Various post medieval objects of bronze found on submerged land surface in this area in the early 20th century.

***PRN 120560 Rhyl, Axehead***

Axehead of a dark grey, fine-grained stone, very hard and heavy. Stone slightly mottled, with inclusions, some of which have been leached out. Signs of wear/abrasions, perhaps from being moved around on the beach by the sea.

***PRN 141424 Rhyl, wood and metal object***

An unidentified object of possible modern date. The object consists of a curved sub-oval piece of wood, one edge of which has been covered in copper alloy. The wood is cracked and frayed due to drying out and the copper alloy encrusted and corroded. Seven circular rivets attach the copper alloy to the wood. Possibly nautical, though its size suggests perhaps from a smaller vessel rather than ship. Possibly the copper/bronze tipping of an oar blade, a fitting off a cutter or lifeboat? Although found within a blue clay layer the rivets suggest a more modern date.

## Undesignated Assets

***PRN 123322 Rhyl foreshore (Splash Point) structures***

A series of wooden posts set in roughly parallel short trenches filled with stone. At least three trenches set roughly at right angles about a common axis. Large wooden posts set roughly axially may be the remains older groynes and unrelated to the trenches. Apparently dug through peat deposits exposed on Rhyl beach at Splash Point. Possibly part of fish traps or some sort of redundant sea defence. However note presence of antler mattock, stone axes, a stone macehead and other prehistoric finds from Splash Point and presence of apparent stone causeway nearby.

***PRN 106402 Rhyl foreshore causeway***

Stretch of stones visible at low tide, possibly a causeway measuring 5-8m wide. Composed of angular stones. Around 15m in length was visible, before disappearing into the rising beach.

***PRN 17103 Rhyl foreshore submerged landscape***

Peat and boulder clay along Rhyl foreshore from which Neolithic and Bronze Age finds have been recovered. New borings indicate the presence of a lower peat which may indicate a former coastline some 100-400m south of the present coast. Upper peat may be dated by analogy to c.4000-3000 BC (late Mesolithic/Early Neolithic).

***PRN 14079 Rhyl Prisoner of War camp***

German prisoners of war were recorded at Rhyl, and were possibly accommodated in a camp there, in the years after the Second World War.

***PRN 120709 Rhyl, Bath Street 5-9, Morfa Hall***

Three storey, yellow brick building with a conical tower. Built as a private house, then became the Parade and Pier Hotel, later a women's convalescent home.

***PRN 37700 Rhyl, Volunteers' rifle range***

Local volunteer force rifle range recorded during Dee Estuary Historic Landscape Survey. On OS 1st ed 25" 1871, now Golf Links (Jones, N W, 1998). It doesn't appear on the OS 2nd edition 25" map of 1899.

***PRN 128935 Rhyl Mantelet Targets***

Mantelet Targets depicted on the 1st edition Ordnance Survey map of 1871.

***PRN 128933 Rhyl Coast, building I***

Rectangular building aligned east-west depicted on 1st edition OS mapping of 1871. Earthworks are visible on Next Perspectives aerial photography (2006). A smaller building lies to the south (PRN 128934) and both are surrounded by small fields.

***PRN 128934 Rhyl Coast, building II***

Small building depicted on 1st edition Ordnance Survey map of 1871. Faint earthworks are visible on Next Perspectives aerial photography of 2006. A larger building lies to the north (PRN 128933) and both are surrounded by small fields.

***PRN 128932 Rhyl Coast, building III***

Rectangular building aligned east-west depicted on 1st edition Ordnance Survey map of 1871. Likely to have been at least partially truncated by the coastal road.

***PRN 128931 Rhyl Coast, building IV***

Small square building depicted on 1st edition OS map of 1871.

***NPRN 416369 Earthworks of farms and fields, Rhyl sea front***

A series of linear banks and ditches representing the remains of post-medieval farms and fields were visible as earthworks on the Rhyl seafront Golf Links. Photographed during RCAHMW aerial reconnaissance on 27 July 2011.

# APPENDIX 2: DRMB Significance Criteria

Table 3.1: Definition of Value of Heritage Assets

| | |
|---|---|
| Very High | World Heritage Sites (including those nominated)<br>Assets of acknowledged international importance<br>• Assets that can contribute significantly to acknowledged international research objectives. |
| High | Scheduled Ancient Monuments (including those proposed)<br>Undesignated monuments which could potentially be worthy of scheduling<br>Listed Buildings – Grade I, II* and II<br>Registered Historic Landscapes, Parks and Gardens<br>• Undesignated assets that can contribute significantly to acknowledged national research objectives. |
| Medium | Conservation Areas<br>• Undesignated assets that contribute to regional research objectives. |
| Low | Undesignated assets of local importance<br>Assets compromised by poor preservation and/or poor survival of contextual associations<br>• Assets of limited value, but with the potential to contribute to local research objectives. |
| Negligible | • Assets with very little or no surviving cultural heritage interest. |
| Unknown | • Importance of the asset not ascertained. |

The assessment of the magnitude of effect considers the extent to which a heritage asset may be changed or affected by the proposed development through the introduction of new structures or the infrastructure. The thresholds for assessing magnitude of effect are set out in Table 3.2 which is derived from the DMRB Volume 11 Section 3 Part 2, Annex 5/13, 2007, although in a slightly form for each cultural heritage sub-topic (archaeology, buildings, etc) has its own set of determining factors, which are set out in detail in the DRMB.

Table 3.2: Definition of Magnitude of Effect

| | |
|---|---|
| Major | • Changes to most or all of the key cultural heritage elements such that the assets<br>Comprehensive changes to setting<br>• Extreme visual effects |
| Moderate | Changes to many key cultural heritage elements such that the asset is clearly modified<br>Considerable changes to setting which affect the character of the asset<br>• Visual changes to many key elements |
| Minor | Changes to key cultural heritage elements such that the asset is slightly altered or different<br>Sight changes to setting<br>• Slight visual changes to a few key elements |
| Negligible | Very minor changes to cultural heritage elements, or setting<br>• Virtually unchanged visual effects |
| No Change | • No change |

A part of the EIA process is to extrapolate the degree of significance from the predictions of impact. No formal guidance from Welsh government currently exists for the assessment of significance of effects on heritage assets, but the DMRB does provide an alternative. The severity of the effect on heritage assets depends on both the magnitude of effect and the value or importance of the asset, as exemplified in the two tables above. Table 3.3 illustrates how information on the value of the asset and the magnitude of effect can be combined to arrive at an assessment of the significance of effect. This process ensures consistency in assessing the significance of effect, and serves as a check to ensure that judgements regarding value, magnitude and significance of effect are balanced. While the correlation of these two sets of criteria is a mechanical process, professional judgement provides the reasoned explanation of the rationale behind the conclusions that are drawn. For example, a highly valued heritage asset may require only a limited amount of change to result in an effect that is assessed as moderate or major, whereas a greater magnitude of change is likely to be required to result in equivalent effects on a less sensitive asset.

Table 3.3: Matrix for assessing significance of direct and indirect impacts on heritage assets

| **Magnitude of Effect** | **Value of Heritage Asset** | | | | |
|---|---|---|---|---|---|
| | **Very High** | **High** | **Medium** | **Low** | **Negligible** |
| Major | Very Large | Large/ Very Large | Moderate/ Large | Slight/ Moderate | Slight |
| Moderate | Large or Very Large | Moderate/ Large | Moderate | Slight | Neutral/ Slight |
| Minor | Moderate/ Large | Moderate/ Slight | Slight | Neutral/ Slight | Neutral |
| Negligible | Slight | Slight | Neutral/ Slight | Neutral/ Slight | Neutral |
| No change | Neutral | Neutral | Neutral | Neutral | Neutral |

In the context of the EIA Regulations an impact judged to be moderate or greater is deemed to be 'significant'. Any effect which is considered significant under the EIA Regulations is flagged as such in the text of the main report.

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