

KEY

Site Boundary

1km

1km Offsets from Site Boundary

Zone of Theoretical Visibility

1

Photograph Viewpoint Location
(Refer to Drawing 04 for existing photograph views to site)

5

Photograph Viewpoint Location & Photomontage Location (Refer to Drawings 05 - 08 Photomontage Views)

Notes:

ZTV analysis:

- ZTV analysis points set at 30m offset from breakwater at 2.5m AOD (approx 5.5 mCD) vertical height.
- Existing buildings and selected woodland areas are included in the Digital Terrain Model - building and woodland heights modelled in the DTM are at 10m above ground level.
- Observers eye level 1.7m.
- Extent of ZTV limited to 5km distance from analysis points
- Analysis adjusted for earth curvature / refraction

Client				
Anglesey County Council				
Project				
Holyhead Breakwater Refurbishment Scheme				
Drawing Title				
Visual & Sensory Aspect Areas				
Created by	Reviewer	Sheet Size	Scale	Date Created
CL	MCE	A3	1:20,000	06.03.20
Drawing Nr.				Revision
03				01
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The viewpoint appraisal considered the proposed scheme at low tide, when the components of the scheme would be at their most visible and the magnitude of visual effects would therefore be considered 'worst case'.

14.4.3 Zone of Theoretical Visibility

The ZTV analysis was undertaken to identify:

- the area from which the proposed scheme may be visible;
- locations of potential high sensitivity visual receptors; and,
- the extent of the AONB that may be subject to visual effects.

The ZTV (presented in **Figure 14-1**) was generated using target points located on the outward edges of the proposed Tetrapod units. The ZTV takes into account screening afforded by landform, buildings and significant vegetation belts, but does not take into account other minor, intervening features that, in combination, would further reduce visibility across the study area and consequently alleviate visual effects. As such, the ZTV is considered to represent the 'worst-case' scenario.

14.4.4 Visual receptors

High sensitivity receptors that may be affected by the proposed scheme and were therefore included in the visual appraisal were as follows:

- Users of the Isle of Anglesey Coastal Path;
- Users of the Breakwater; and,
- Walkers and other recreational users of Holyhead Mountain.

14.4.5 Visual detractors

Holyhead Town and the port area are busy working environments with large scale infrastructure and built facilities. The visual character of the town and surroundings is varied, with attractive features and views often compromised by functional features. In the wider study area, there are notable visual detractors:

- Industrial and retail areas to the southeast of Holyhead include the substantial former Anglesey Aluminium works and chimney stack, which is visible for many miles across the landscape and is a prominent feature on the southern skyline;
- Busy road corridors leading into Holyhead and road junction to the south of Holyhead Port; and,
- On Salt Island, three storage silos and the raised roll-on / roll-off vehicular ramps are often prominent in views.

14.4.6 Effects on visual receptors

The assessment of visual effects was determined by a combination of professional judgement, perceived sensitivity of the receptor and predicted magnitude of the effect. The magnitude of visual effects was dependent on several factors related to sea state, highlighted below:

- Height of tide will largely determine the visibility and prominence of the concrete armour. Highest Astronomical Tide (HAT) would submerge between a third to two thirds of the Tetrapod units. At Lowest Astronomical Tide (LAT) the Tetrapods would be fully exposed and the concrete Z-shaped units at the toe of the Tetrapods would be visible above the waterline on the seaward side, and the

ACBM would be partly visible on the leeward side. At Mean Sea Level (MSL) the full width of the Tetrapods would be visible, to a height of approximately 3m above the waterline, but the Z-shaped units and the ACBM would be submerged.

- A rough sea state and high wave height will affect the visibility of the concrete armour. Wave action would intermittently reveal more or less of the Tetrapods, even at lower tides. The visual nature of the seas will be more dynamic with breaking waves and sea spray a constantly changing visual feature alongside the Breakwater. In calm seas the scene will become more visually 'static' and the appearance of the armour is predicted to become more visually prominent.

In the long term, the visual prominence of the concrete armour would be reduced due to the effects of weathering, algal growth and general patination. Storm and exceptional sea conditions will cause a limited amount of displacement to some of the Tetrapods which will provide minor visual relief to the otherwise highly regimented, linear arrangement of the units.

As such, the concrete armament will be most visually prominent in the early operational phase, seen during daytime, at low tide and with calm sea states. This 'worst case' scenario has been assumed for the appraisal.

14.5 Baseline Environment

This section outlines the baseline visual condition of the site and its surroundings, against which the potential effects of the proposed scheme have been identified.

14.5.1 General study area

The study area encompasses the northern shoreline of Holy Island and the primary settlement of Holyhead Town, with secondary settlements at Pont Hwfa and Llaingoch extending west towards Holyhead Mountain and Kingsland extending inland to the south (see **Figure 14-1**).

Holyhead Port lies at the core of the town, defined by relatively dense settlement patterns that have emerged through the development of the port as a commercial hub and latterly as a leisure and tourism gateway to and from Ireland. The port character is strongly industrial and dominated by large ferry terminal buildings and railway stations. Salt Island is partly reclaimed from the sea and extends the port facilities seawards into Holyhead Bay. The Breakwater extends across the bay to the north, providing essential shelter to both the town and the port. Holyhead Marina is located to the west of the New Harbour and has cruising vessel moorings. Marina landside facilities include apartments, shops, a sailing club and lifeboat station shop, part of the listed Trinity House workshops and office complex.

Newry Beach forms the southern shoreline to New Harbour. A wide concrete promenade allows views across the harbour. The beach margin is sheltered by grass banks to the south and elevated areas of open amenity grassland that are bisected by Beach Road. To the east of Newry Beach there are rocky and sandy sections of beach between jetties. Facilities include the Maritime Museum and a restaurant located in the former lifeboat house, also a listed building. To the east is Mackenzie Landing and an industrial complex of marine, boatyard facilities and the Coastguard Maritime Rescue centre.

14.5.2 Topography

Holy Island consists of low, undulating landforms, with characteristic and frequent rocky outcrops and knolls. Inland topography typically reaches between 10m AOD to 35m AOD, rising towards the west of the study area and culminating in the rocky-topped Holyhead Mountain. The mountain is the highest feature on Holy

Island (and the Isle of Anglesey as a whole) and forms an important and highly distinct backdrop to most views.

14.5.3 Public Rights of Way

The long-distance Isle of Anglesey Coastal Path circumnavigates Anglesey and Holy Island, with the official starting point at Holyhead. The path passes coastal margins to the north of Holyhead via existing tracks, public rights of way or minor roads (see **Figure 14-2**). The route passes Newry Beach, to Soldier's Point (at the base of the Breakwater) and then on to the rocky headland of Ynys Wellt. It follows the northern shoreline, rising onto cliff tops immediately north of Holyhead Mountain. There is a relatively dense network of paths to the west of Holyhead and north of Llaingoch that extend across the foothills and peaks of Holyhead Mountain. Elevated paths obtain extensive panoramic views. There are areas of open country to the west of Holyhead.

14.5.4 Designations

Landscape designations within the study area relevant to the appraisal are set out below and their locations are shown on **Figure 14-2**.

14.5.4.1 Area of Outstanding Natural Beauty

The Anglesey AONB lies partly within the study area. The footprint of the proposed scheme is located 1.3km from the AONB boundary.

14.5.4.2 Conservation Areas

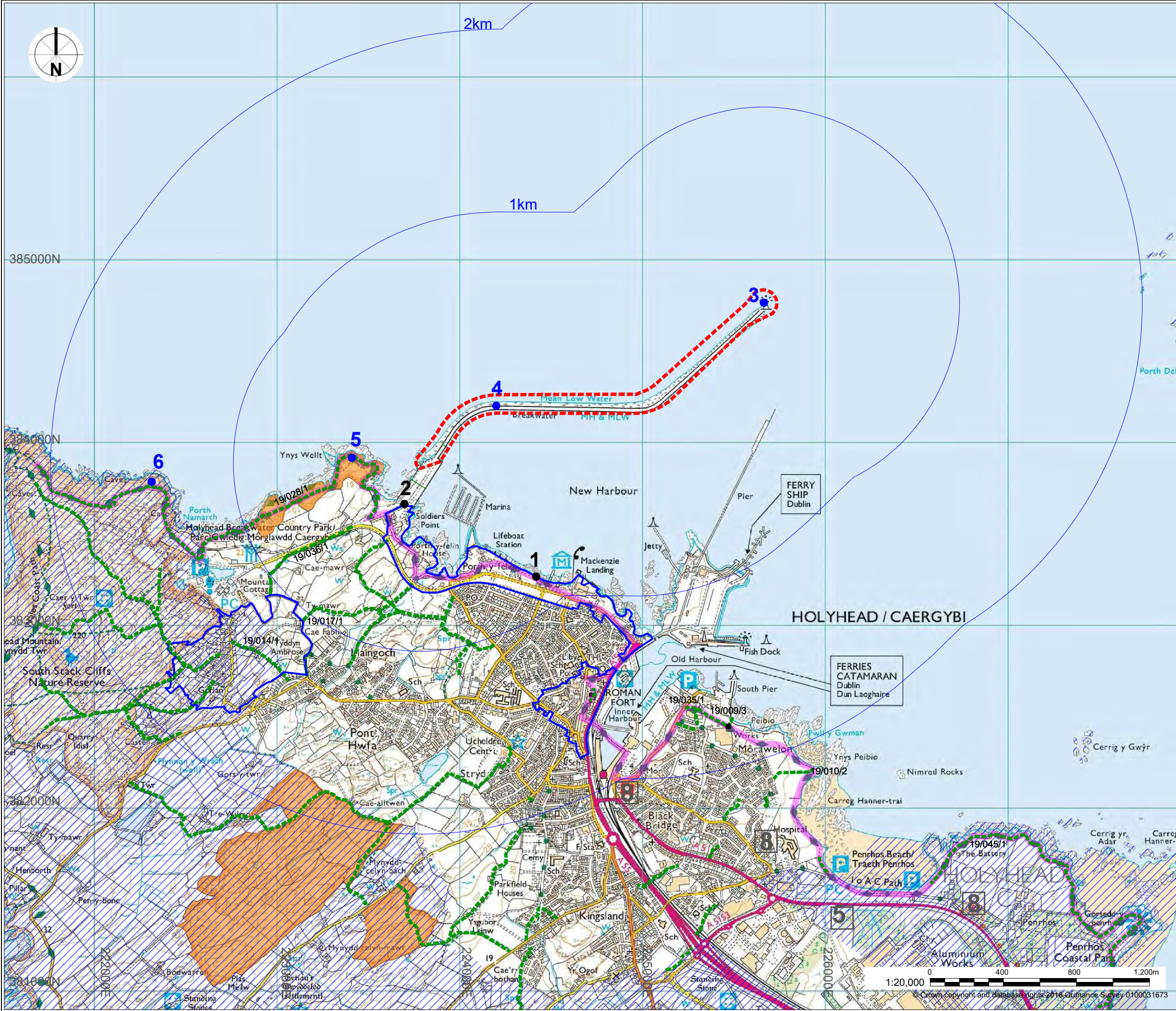
There are three Conservation Areas within the study area: Holyhead Mountain Village, Holyhead Central and Holyhead Beach. Most relevant to this assessment is the Holyhead Beach Conservation Area; the western boundary extends to Soldier's Point, approximately 200m from the footprint of the proposed scheme and potentially adjacent to the concrete-batching centre should it be located at Soldier's Point.

The Holyhead Beach Conservation Area extends along the coast between Holyhead Old Harbour and Soldier's Point. The ability to obtain relatively uninterrupted views into and out of the area are considered to be important to its overall character. In particular, the more open areas of parkland in the central zone that include views from 'the upper and lower promenades towards the lively new harbour, enormous breakwater, harbour lighthouse and passing ferries, Holyhead Mountain and Quarry and Porth-y-Felin House and Soldier's Point'. Important views towards the Conservation Area include those from the sea (ferry passengers), from the Breakwater, from New Harbour (towards the promenades and greens) and from Soldier's Point (also across New Harbour towards Trinity Yard Workshops and the greens beyond).

14.5.4.3 Listed buildings

There are a number of important listed buildings both within and in close proximity to the site boundary:

- Holyhead Breakwater (Grade II*);
- Holyhead Breakwater Lighthouse (Grade II);
- Soldier's Point House and associated screen wall (Grade II);
- Porth-y-Felin House (Grade II); and,
- Trinity House Office and workshops (Grade II).



KEY

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1km Offsets from Site Boundary

1 Photograph Viewpoint Location
(Refer to Drawing 04 for existing photograph views to site)

5 Photograph Viewpoint Location & Photomontage Location (Refer to Drawings 05 - 08 Photomontage Views)

Anglesey Area of Outstanding Natural Beauty

Conservation Area

Open Country

06/14 Bridleway with Reference Number

06/14 Footpath with Reference Number

06/14 07/16 Reference Number Change Point

Long Distant Route:
Isle of Anglesey Coastal Path

8 Sustrans NCN:
Route 8 (Lon Las Cymru)
Route 5 (North Wales Coastal Route)

Client

Anglesey County Council

Project

Holyhead Breakwater Refurbishment Scheme

Drawing Title

Landscape Constraints

Created by	Reviewer	Sheet Size	Scale	Date Created
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Drawing Nr.	Revision
Figure 14-2	01

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Design & Assessment

Representative viewpoints used in the appraisal are considered to provide an indication of the likely effects upon views to and from the listed buildings, although issues relating to the setting of listed buildings and specific visual effects are addressed in **Chapter 15 Cultural Heritage**.

14.5.5 The Breakwater and environs

The Breakwater emerges from the north east of Soldier's Point; a rocky headland located to the north west of Holyhead. Soldier's Point quay forms the initial 300m section of the structure and is approximately 90m wide. The structure narrows to 17m in width and forms the main breakwater superstructure. The narrow 'Z' shape form of the jetty sweeps to the east in a gentle arc, follows a straight alignment (west – east) for approximately 780m and then sweeps to the north east and a 780m straight section, terminating at the walled lighthouse at the roundhead. The unusual, square, black and white lighthouse stands approximately 16m above the Breakwater. It is an important navigational aid and forms a local landmark in views.

The outer, seaward facing wall is constructed from massive 10tn limestone blocks, raised as a parapet that shelters an upper, masonry landing and lower landing on the leeward side. The parapet wall stands approximately 10mAOD, the masonry landing approximately 8.8mAOD and the lower landing at 4.2mAOD. During construction of the Breakwater, the lower landing area carried a railway track and was used to transport stone material from Holyhead Mountain. The track was later downsized for use by maintenance engines and then decommissioned in the 1980s with the use of wheeled maintenance vehicles. The lower landing is surfaced in stone aggregate and areas of stone flags on the approach to the lighthouse.

At LAT, approximately 22m width of the rubble and rocky base to the Breakwater becomes exposed on the seaward side and a narrow, intermittent margin of the base is seen on the leeward side. On average tides, the Breakwater walls are awash.

The Breakwater is an important visual landmark, cultural heritage asset and recreational feature; the upper and lower landings provide elevated promenades that are often used by walkers, cyclists and fishermen drawn towards the lighthouse at the roundhead.

14.5.6 Views from the Breakwater

The Breakwater provides a range of views that are experienced by numerous recreational visitors. Views shift focus on the outward and return journeys and can be attractive or dramatic, depending on weather and sea state. The initial section from Soldier's Point passes the ruined Soldier's Point House and the screen wall to the house (both Grade II Listed).

There is a sense of neglect on the quayside approach with general waste, rough grassland, ponded stone aggregate surfaces, abandoned boats and material stockpiles detracting from the quality and character of the view. A large warehouse building and associated yard area emphasise the active working aspect of the quayside area. Views west from the quayside are across a rocky shoreline and pebble beach to the low cliff headland of Ynys Wellt. Contrasting views east are more urban in character, looking across Holyhead Marina to Orthios Jetty, the town, and its port facilities.

Moving seaward along the Breakwater views rapidly become more open and exposed. There is often the dramatic sound of waves breaking against seaward defences, the call of gulls and rush of the wind. The solidity of the Breakwater's structure and mass of the stonework become apparent, although in context of the vast surrounding sea and sky above, its scale is diminished, and the serpentine form retains a certain grace. Views are shifted from open seas to the northwest then to the east and southeast, across Holyhead Bay and distant land masses on Anglesey.

The wide stone parapet wall stands approximately 1.2m above the upper landing and, looking directly out towards the sea, it prevents views down onto the base of the Breakwater. The base and lower wall can be seen in views along the length of the Breakwater, where the observer has sight of the opposing sweep of the wall.

The lighthouse at the roundhead is the focal point of the outward journey. It is generally seen to sit below the distant land mass of Anglesey but the unusual square white tower with black band remains a distinct feature in the local scene and is the destination for recreational users of the Breakwater. The roundhead comprises of a lozenge shaped landing enclosed by a massive stone parapet wall. The area provides a full vista of the surrounding seascape and bay. Passenger ships pass close, adding scale and drama to the scene. The roundhead projects out into the seaward and leeward side of the Breakwater, allowing views back along the outer walls of the Breakwater. The view along the near vertical, dark stone wall on the seaward side, draws the eye unavoidably to Holyhead Mountain. Waves are often seen and heard crashing against the outer wall.

Inward views towards Holyhead include distant views to shipping and other features at Salt Island and the port. Ferries docked at Salt Island Terminals 3 & 5 are visible in the skyline, seen behind the Orthios Jetty that extends out into the sheltered waters of New Harbour. Holyhead town forms a low, rising horizon to the south. Holyhead Mountain is the dominant land mass to the southwest, forming a dramatic focal point on the return journey. The Snowdonia and Llyn Peninsula mountain ranges are seen on the far horizon to the southeast.

Views north and northwest are marked in contrast. Expansive and rougher open waters stretch out to the far horizon and there are distant views to The Skerries and the lighthouse which sits atop the highest point of the islands. Carmel Head and the low peak of Mynydd-y-Garn can be seen on Anglesey.

14.5.7 Views towards the Breakwater

The Breakwater is a significant visual feature seen from the town and coastal margins. Most outward views north from Holyhead capture something of the Breakwater as it extends north eastwards across Holyhead Bay. In low level views from the coastline and Newry Beach, the Breakwater forms a low, uniform middle-distance horizon. The raised leeward Breakwater wall screens views to open sea beyond the bay, creating a clean divide between a vast sky above and expansive sea below. The eastern end is punctuated by the lighthouse, seen against a backdrop of low hills and the Anglesey coastline.

Landed views to the seaward-facing Breakwater walls are restricted to distant, elevated vantage points on Holyhead Mountain and coastal margins located immediately to the west of the Breakwater; notably the relatively close-range views from Ynys Wellt headland and the Isle of Anglesey Coastal Path. In elevated views, the Breakwater is seen clearly extending out across the bay; its distinct serpentine form draws the eye and is a key feature in the panoramic view. The seaward north-facing wall often appears dark and shadowed, contrasting with the sunlit south facing wall to the leeward side.

14.6 Prediction of Potential Effects During Construction

Access to the Breakwater would be prevented during construction. Predicted visual effects are therefore related to landside views from the coastline and landscape areas included within the ZTV envelope.

14.6.1 Potential visual effects on landside views should Salt Island be used as a delivery facility and concrete-batching centre

The use of Salt Island as a delivery facility and / or concrete batching plant is considered to incur the least potential adverse visual effects. Salt Island is the hub of ferry and freight activity and there are existing tall silo structures and other buildings located within the busy port. Numerous large ship movements and industrial portside features are integral to existing visual character. Proposed storage, fabrication and associated activity would be seen in context of the busy port and infrastructure and would not significantly contrast or conflict with existing visual character. Predicted visual effects would be of **minor significance**.

14.6.2 Potential visual effects on landside views from Soldier's Point and Anglesey Coastal Path should Soldier's Point be used as a delivery facility

The use of Soldier's Point as a delivery facility would incur more significant visual effects. Although the quayside and adjoining area includes existing visual detractors (e.g. dilapidated walling to Soldier's Point House, large warehouse, general waste, material stockpiles, etc.), there is a perceived tranquillity to the relatively secluded location. The coastline to the west is rugged and attractive, and there are views across the bay to hills on Anglesey. To the east, Orthios Jetty, the port and the town have an urbanising influence on the visual character; however, overall view quality is moderate, with attractive features in the distance countered by visually intrusive features in the foreground.

Proposed storage areas, site compounds and other associated facilities on the quayside would adversely affect close-range visual receptors, in particular high sensitivity recreational receptors using the Isle of Anglesey Coastal Path, those accessing the coastal margins and the pebble beach area to the west of the quay. There would be adverse effects to users of the moorings in the marina to the east. Tall structures and crane activity would be seen in close proximity and high in the skyline. General background noise, vehicular and plant movement would further disrupt local visual and perceptual character.

Activity on the quayside would be seen in conjunction with construction activity along the Breakwater, including movements of delivery barges and tall marine plant with lifting cranes placing the concrete armour units. Visual effects to receptors accessing coastal margins in close proximity to the quayside would be of **moderate adverse significance**, although they would be temporary and short term (limited to the construction phase).

14.6.3 Temporary visual effects on landside views from Newry Beach should Soldier's Point be used as a delivery facility

In more distant views from the east at Newry Beach, predicted effects during construction would be minor and would not present a significant change or contrast in the view. Similarly, minor visual effects would be experienced from receptors in elevated areas of land within the AONB coastal margins and Holyhead Mountain to the west. The existing expansive panoramic scene encompasses attractive landscape / seascape and contrasting elements including Holyhead Town, port and former aluminium works. In context of the range of varied features and activity within the view, effects of relatively distant proposed construction works would be of **minor or negligible significance**.

14.6.4 Potential effects on views from Holyhead Beach Conservation Area

The western boundary of Holyhead Beach Conservation Area includes part of Soldier's Point. Close range views to construction activity and views to tall plant and structures on the quayside would present a notable source of local visual intrusion, partially obstructing views to the attractive distant horizon. The potential

impact would be temporary and limited in extent to the Conservation Area in immediate proximity to the quayside, and is therefore considered to be of **minor adverse** significance.

14.7 Prediction of Potential Effects During Operation

14.7.1 Potential long-term visual effects on receptors along the Anglesey Coastal Path on the seaward side of the Breakwater

Potential impacts to landside and coastal margin receptors that obtain views to the proposed scheme on the leeward side of the Breakwater, including those from Holyhead Beach Conservation Area would be **negligible**. In low level views from the east, at Newry Beach, there would be **negligible** visual effects due to the overall distance and limited visibility of the proposed scheme along the easternmost section of the Breakwater. There would be **no impact** to views of the leeward side from Soldier's Point since proposed features would be screened by the quay and the Breakwater.

Predicted significant adverse visual effects are therefore limited to close-range landside receptors that obtain views to the proposed scheme on the seaward side of the Breakwater, and in views from the Breakwater itself.

Views to the seaward side of the Breakwater are limited to areas immediately west and south west of the landward section of the Breakwater. The ZTV analysis indicated patchy or intermittent visibility to proposed structures from lower lying, gently undulating coastal margins and more uniform visibility from elevated, open landscape areas on the eastern flank of Holyhead Mountain.

The closest landside views are obtained from the small rocky headland of Ynys Wellt to the west of Soldier's Point. The slightly elevated vantage point allows a clear view towards the Breakwater where it extends away from the quay. At very low tide, the full width of the proposed concrete armour would be visible and highly prominent in the middle distant view. Tetrapods would be seen high above the waterline and would obstruct views to the lower Breakwater wall (see Photomontage View 5 in **Appendix 14-1**). In the context of the wider panoramic scene, there would be limited change in existing view character; however, proposed features would be prominent, incurring effects of **moderate / minor adverse significance** on the view and in the overall appearance of the Breakwater. Views from the pebble beach to the east of Ynys Wellt would be of **minor adverse significance** due to the lower elevation of the view, limited extent of visible Breakwater and subsequent reduced prominence of proposed features.

Significant adverse visual effects are predicted to views experienced by recreational users of the Breakwater, with the view from the roundhead being most affected. The vantage point allows a clear view along most of the seaward side of the Breakwater, extending approximately 1.8km into the distance. The full width of the proposed concrete armour would be visible at very low tides, extending into the distance but also sweeping around the roundhead, thereby affecting all outward views. In views from close to the parapet wall, the concrete armour would dominate the foreground scene, with the upper section of the Tetrapods in relatively close proximity to the viewer (Photomontage View 3 in **Appendix 14-1**). The scale, mass and regimented lines of the Tetrapods would contrast notably with the shadowed Breakwater wall. Most of the lower section of the wall would be screened and its existing visual character, seen to rise up from a rocky base, would be significantly altered.

Views from the upper landing along the length of the Breakwater would also be subject to significant visual effects. Views from alongside the parapet wall would allow a distant vista along the length of the Breakwater, with upper sections of the Tetrapods highly prominent. In outward views, the concrete Z-shaped blocks would be screened by the higher level of the Tetrapods. The full width of the concrete armament, including

the Z-shaped blocks, would be seen in longitudinal views down the Breakwater (Photomontage View 4 of **Appendix 14-1**).

14.7.2 Potential long-term visual effects on views from the Breakwater

The predicted 'worst case' effects in views from the Breakwater are of **moderate adverse significance**, with effects being permanent; however, the contrasting and stark appearance of new concrete units would reduce slightly due to the effects of weathering, sea action and general patination of the units. Displacement may also provide some visual relief to the initially regimented appearance. The Z-shaped units and the ACBM would be less visually prominent than the Tetrapods, discolouring and patinating more rapidly due to the greater sea exposure. Tetrapods on the seaward side would also discolour more rapidly and there would be a transition in appearance across the width of the concrete armament.

Predicted visual effects experienced by users of the Breakwater assumes a worst-case scenario. At higher tides, and with increased sea action, the visual effects would be reduced. The existing perceptual characteristics experienced by receptors – a sense of exhilaration and exposure with a vast sky above and expansive seascape – would remain. Views to attractive hills, mountains and other features on the horizon would also be unaffected.

Views from the upper landing would be most affected when the viewer is in close proximity, looking directly over the parapet wall. In outward views from the *central* landing area the parapet wall would effectively screen foreground views down onto the concrete armour (although would remain visible in distant, longitudinal views where the Breakwater sweeps across the line of view). Views across New Harbour from the sheltered lower landing area would remain largely unaffected, with the exception of the final section of Breakwater and views across the leeward section of concrete armour.

14.7.3 Potential long-term visual effects on views from the AONB

There would be no significant effects to views or the character of views from within the AONB. There would be no effect to distant coastal margins within the AONB on the leeward side of the Breakwater. In more elevated views from Holyhead Mountain and the coastline to the west (Photomontage View 6 of **Appendix 14-1**), the effects of the proposed scheme would be reduced due to the overall distance, expansive nature of the panoramic view and the numerous, varied features within the scene and is therefore considered to be of **minor adverse** significance..

14.7.4 Potential long-term visual effects on views from Listed Buildings (Lighthouse and Breakwater)

There would be significant adverse effects upon seaward views from the upper landing of the Breakwater, specifically when the view receptor is close to the parapet wall. The roundhead and base area of the lighthouse also allow a clear and uninterrupted view along both the seaward and leeward sides of the Breakwater. Proposed Tetrapods would dominate the foreground scene, screening the lower half of the Breakwater. This, combined with the substantial width of overall concrete armour relative to the modest height of the wall, would result in **moderate adverse significant** effects on views from the lighthouse and the Breakwater and diminish both the visual presence and character of the listed structures.

14.8 Summary

The Visual Appraisal identifies visual effects associated with the proposed scheme. There are a number of high sensitivity visual receptors within the study area, including users of the Isle of Anglesey Coastal Path and the Breakwater and a designated AONB.

The potential visual effects arising from the proposed scheme are summarised in **Table 14-2**.

Table 14-2 Summary of potential impacts

Description of impact	Significance
Construction phase	
Potential visual effects on landside views should Salt Island be used as a delivery facility and concrete-batching centre	Minor adverse
Potential visual effects on landside views from Soldier's Point and Anglesey Coastal Path should Soldier's Point be used as a delivery facility	Moderate adverse
Potential visual effects on landside views from Newry Beach should Soldier's Point be used as a delivery facility and concrete-batching centre	Minor adverse / negligible
Potential Effects on views from Holyhead Beach Conservation Area	Minor adverse
Operational phase	
Potential long-term visual effects on receptors along the Anglesey Coastal Path on the seaward side of the Breakwater	Moderate or minor adverse
Potential long-term visual effects on views from the Breakwater	Moderate adverse
Potential long-term visual effects on views from the AONB	Minor adverse
Potential long term visual effects on views from Listed Buildings	Moderate adverse

15 Cultural Heritage

15.1 Introduction

This section of the EIA Report summarises the outcomes of a desk-based assessment (DBA) and settings assessment, which are included in full in **Appendix 15-1**, and details the potential impacts to archaeology and heritage from the proposed scheme. This section also draws upon the outcomes of the visual appraisal presented in **Chapter 14** Visual Setting in assessing the impacts to the setting of historic assets and **Chapter 7** Coastal Processes in assessing the potential for indirect (physical) impacts to occur as a result in changes to sedimentary processes.

15.2 Legislation, Policy and Guidance

15.2.1 Primary Legislation relating to the Historic Environment in Wales

15.2.1.1 Historic Environment (Wales) Act 2016

The Historic Environment (Wales) Act became law on the 21st March 2016. The Act forms part of an integrated suite of policy, advice and guidance that makes improvements to the existing systems for the protection and sustainable management of the Welsh historic environment in a manner that is in step with the modern conservation philosophy set out in the Conservation Principles for the Sustainable Management of the Historic Environment in Wales. To summarise, the Act was introduced with the intention of:

- Giving more effective protection to listed buildings and scheduled monuments;
- Enhancing existing mechanisms for the sustainable management of the historic environment; and,
- Introducing greater transparency and accountability into decisions taken on the historic environment.

15.2.1.2 Ancient Monuments and Archaeological Areas Act 1979 (as amended)

Under the terms of the Act, an archaeological site or historic building of national importance can be designated as a Scheduled Monument and is registered with the Department of Culture, Media and Sport (DCMS). Any development that might physically affect a Scheduled Monument is subject to the granting of Scheduled Monument Consent. Cadw advises the government on individual cases for consent and offers advice on the management of Scheduled Monuments.

15.2.1.3 Protection of Wrecks Act 1973

Under Section One of the Protection of Wrecks Act, wrecks and wreckage of historical, archaeological or artistic importance can be protected by way of designation. It is an offence to carry out certain activities in a defined area surrounding a wreck that has been designated, unless a licence for those activities has been obtained. Section Two of the Act provides protection for wrecks that are designated as dangerous due to their contents and is administered by the Maritime and Coastguard Agency through the Receiver of Wreck.

15.2.1.4 Protection of Military Remains Act 1986

Under the Protection of Military Remains Act (1986), all aircraft that have crashed in military service are automatically protected. Maritime vessels lost during military service are not automatically protected although the Ministry of Defence has powers to protect any vessel that was in military service when lost. The Ministry of Defence can designate 'controlled sites' around wrecks whose position is known and can

designate named vessels as 'protected places' even if the position of the wreck is not known. It is not necessary to demonstrate the presence of human remains at either 'controlled sites' or 'protected places'.

15.2.1.5 Merchant Shipping Act 1995

This Act sets out the procedures for determining the ownership of underwater finds that turn out to be 'wreck', defined as any flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ship, aircraft, hovercraft, parts of these, their cargo or equipment. If any such finds are brought ashore, the salvor is required to give notice to the Receiver of Wreck that he / she has found or taken possession of them and, as directed by the Receiver, either hold them pending the Receiver's order or deliver them to the Receiver. The act is administered by the Maritime and Coastguard Agency.

15.2.2 Planning Policy

15.2.2.1 UK Marine Policy Statement

Section 2.6.6. of the MPS outlines the approach to be taken with regards to the Historic Environment which recognises that:

The historic environment includes all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged

15.2.2.2 Welsh National Marine Plan

The Site is located within the inshore region of the WNMP Area and heritage is addressed through policy SOC_05 (Historic Assets) which states that:

Proposals should demonstrate how potential impacts on historic assets and their settings have been taken into consideration and should, in order of preference:

- a. avoid adverse impacts on historic assets and their settings; and/or*
- b. minimise impacts where they cannot be avoided; and/or*
- c. mitigate impacts where they cannot be minimised.*

If significant adverse impacts cannot be avoided, minimised or mitigated, proposals must present a clear and convincing case for proceeding.

Opportunities to enhance historic assets are encouraged.

15.2.2.3 Planning Policy Wales

Section 6.1: *The Historic Environment* sets out the principal national guidance on the importance, management and safeguarding of heritage assets within the planning process and recognises that:

The historic environment comprises all the surviving physical elements of previous human activity and illustrates how past generations have shaped the world around us. It is central to Wales's culture and its character, whilst contributing to our sense of place and identity. It enhances our quality of life, adds to regional and local distinctiveness and is an important economic and social asset

As set out in PPW, the Welsh Government's specific objectives for the historic environment seek to:

- protect the Outstanding Universal Value of the World Heritage Sites;
- conserve archaeological remains, both for their own sake and for their role in education, leisure and the economy;
- safeguard the character of historic buildings and manage change so that their special architectural and historic interest is preserved;
- preserve or enhance the character or appearance of Conservation Areas, whilst the same time helping them remain vibrant and prosperous; and,
- preserve the special interest of sites on the register of historic parks and gardens; and • protect areas on the register of historic landscapes in Wales.

To this end, PPW states that any decisions made through the planning system must fully consider the impact on the historic environment the significance and heritage values of individual historic assets and their contribution to the character of place.

With specific respect to Listed Buildings;

Applicants for listed building consent must be able to justify their proposals, show why the alteration or demolition of a listed building is desirable or necessary and consider the impact of any change upon its significance. This must be included in a heritage impact statement, which will be proportionate both to the significance of the building and to the degree of change proposed.

A heritage impact statement to support the LBC application is included in Section 7 of **Appendix 15-1**.

PPW is also supplemented by a series of Technical Advice Notes (TANs). TAN 24: The Historic Environment provides planning advice relevant to the historic environment on how the planning system considers the historic environment during development plan preparation and decision making on planning and listed building applications.

15.2.3 Guidance

Cadw have prepared and published a series of best-practice guidance documents intended to enhance the provisions of the Historic Environment (Wales) Act 2016 and recent planning policy and advice. The best-practice guides drawn upon as relevant to the EIA and Heritage Statement for the proposed Breakwater refurbishment are:

- Setting of Historic Assets in Wales (Cadw, 2017a);
- Heritage Impact Assessment in Wales (Cadw, 2017b);
- Managing Change to Listed Buildings in Wales (Cadw, 2017c);
- Managing Conservation Areas in Wales (Cadw, 2017d);
- Managing Historic Character in Wales (Cadw, 2017e); and,
- Managing the Marine Historic Environment of Wales (Cadw, 2020).

15.3 Consultation

Consultation undertaken throughout the pre-application phase informed the approach and the information provided in this EIA Report (see **Chapter 6** Consultation).

15.4 Assessment Methodology

15.4.1 Approach to assessment

This chapter has been informed by the results of a DBA and settings assessment (see **Appendix 15-1**) undertaken specifically to support this EIA. **Appendix 15-1** also includes, a separate, heritage impact statement for the Holyhead Breakwater and Lighthouse to support the LBC application for the proposed works. In 2017, a Level 4 Building Record of the Breakwater was completed by GAT in accordance with the descriptions of recording levels set out in *Understanding Historic Buildings: A guide to good recording practice* (Historic England, 2016). The Level 4 Building Record is included in full in Appendix A1 of **Appendix 15-1**.

The study area for the DBA comprises the maximum working area for the planned works to the Breakwater plus a 1km buffer. With regard to potential impacts upon the setting of designated historic assets, the study area is expanded to include a 3km buffer. This area is considered sufficient to encapsulate historic assets that may subject to impact, either directly (physically) or indirectly (physically and non-physically), as a result of the proposed scheme. The study area is illustrated on **Figure 15-1**.

In order to effectively assess impacts to archaeology and heritage from the proposed scheme, the presence of both known receptors (offshore and onshore) and the potential for previously undiscovered receptors to be present has been considered. Known receptors comprise both designated and non-designated historic assets.

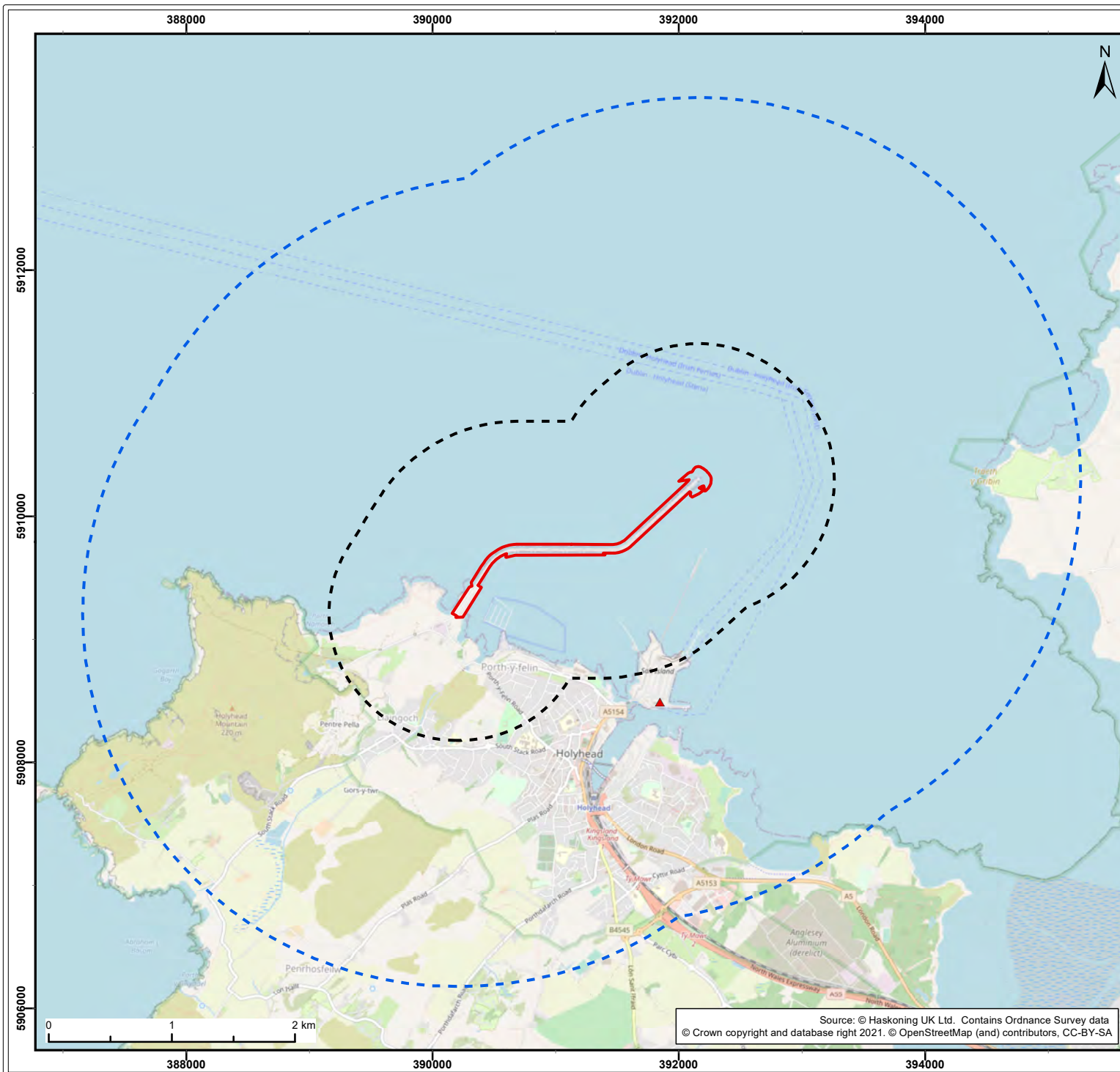
The primary sources used for the DBA and settings assessment are as follows:

- Records of designated historic assets from Cadw (Cof Cymru National Historic Assets of Wales¹²) including GIS datasets downloaded from the Welsh Government's Lle GeoPortal;
- Records of non-designated (onshore) historic assets from GAT Historic Environment Record (HER);
- Records of non-designated (offshore) historic assets from RCAHMW National Monuments Record of Wales (NMRW);
- Holyhead Breakwater Level 4 Building Record (GAT, 2017) (see Appendix A1 of **Appendix 15-1**);
- Holyhead Breakwater Refurbishment Scheme Visual Appraisal (see **Appendix 14-1**); and,
- Sources relevant to the character of the study area including:
 - Holyhead: Understanding Urban Character (Cadw, 2019);
 - Holyhead Beach Conservation Area Character Appraisal (IoACC, 2005); and,
 - Holyhead Mountain Village Conservation Area Character Appraisal (IoACC, 2003).

15.4.2 Impact assessment methodology

The impact assessment methodology defines the historic assets, and their settings, likely to be impacted by the proposed scheme and assesses the level of any resulting benefit, harm or loss to their significance. The assessment is not limited to direct (physical) impacts, but also assesses possible indirect (physical) impacts upon heritage assets which may arise as a result of changes to hydrodynamic and sedimentary processes and indirect (non-physical) impacts upon the setting of heritage assets, whether visually, or in the form of noise, dust and vibration, spatial associations and a consideration of historic relationships between places and the historic seascape character.

¹² Available at: <https://cadw.gov.wales/advice-support/cof-cymru/search-cadw-records>. Designated Historic Asset Descriptive Information, The Welsh Historic Environment Service (Cadw), 2020, licensed under the Open Government Licence <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>



- Legend:
- Holyhead Breakwater
 - Potential Salt Island Batching Plant
 - Study Area for Desk-Based Assessment
 - Study Area for Settings Assessment

Client:	Project:
Isle of Anglesey County Council	Holyhead Breakwater Refurbishment Scheme

Title:
Study Area

Figure: 15.1		Drawing No: PB9014-200-004			
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	20/01/2021	FC	VC	A4	1:45,000

Co-ordinate system: WGS 1984 UTM Zone 30N



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The approach to the assessment of heritage impacts differs slightly to the general methodology as set out in **Section 5.3** above which considers the:

- the magnitude of the effect;
- the sensitivity of a receptor to the effect;
- the probability that an effect-receptor interaction will occur;
- the determination and (where possible) qualification of the level of impact on a receptor, considering the probability that the effect-receptor interaction will occur, the spatial and temporal extents of the interaction and the significance of the resulting impact; and,
- the level of certainty at all stages.

With regard to the magnitude of effect, this can be broadly defined as the degree to which heritage significance is positively or negatively changed. Heritage significance is the sum of the heritage values or interests that we, as a society, recognise in a heritage asset and seek to protect or enhance for future generations.

Direct (physical) impacts, indirect (physical) impacts and impacts from a change in setting on the significance of heritage assets are considered relevant. Impacts may be adverse or beneficial. Depending on the nature of the impact and the duration of development, impacts can also be temporary and / or reversible or permanent and / or irreversible. The finite nature of archaeological remains means that physical impacts are almost always adverse, permanent and irreversible; the 'fabric' of the asset and, hence, its potential to inform our historical understanding, will be removed. By contrast, impacts resulting from the change in the setting of heritage assets will depend upon the longevity of the effect, and may be temporary and revisable.

The magnitude of beneficial impact directly relates to the level of public value associated with an individual impact. Benefits may correspond directly to the project itself where a project will enhance the historic environment (e.g. through measures which will improve the setting of a heritage asset or public access to it). The indicative criteria used for assessing the magnitude of effect with regard to cultural heritage are presented in **Table 15-1**.

Table 15-1 Indicative criteria for assessing magnitude of effect

Magnitude	Definition
High Adverse	Key elements of the asset's fabric and/or setting are lost or fundamentally altered, such that the asset's heritage significance is lost or severely compromised.
Medium Adverse	Elements of the asset's fabric and/or setting which contribute to its significance are affected, but to a more limited extent, resulting in an appreciable but partial loss of the asset's heritage significance.
Low Adverse	Elements of the asset's fabric and/or setting which contribute to its heritage significance are affected, resulting in a slight loss of heritage significance.
Negligible	The asset's fabric and/or setting is changed in ways which do not materially affect its heritage significance.
Low Beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to a slight loss of cultural significance, are preserved <i>in situ</i> ; or Elements of the asset's setting are improved, slightly enhancing its cultural significance; or Research and recording leads to a slight enhancement to the archaeological or historical interest of the asset. This only applies in situations where the asset would not be otherwise harmed i.e. it is not recording in advance of loss.
Medium Beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to an appreciable but partial loss of cultural significance, are preserved <i>in situ</i> ; or Elements of the asset's setting are considerably improved, appreciably enhancing its cultural significance; or

Magnitude	Definition
	Research and recording leads to a considerable enhancement to the archaeological or historical interest of the asset. This only applies in situations where the asset would not be otherwise harmed i.e. it is not recording in advance of loss.
High Beneficial	Elements of the asset's physical fabric which would otherwise be lost, severely compromising its cultural significance, are preserved <i>in situ</i> ; or Elements of the asset's setting, which were previously lost or unintelligible, are restored, greatly enhancing its cultural significance.
No impact	No change to the assets fabric or setting which affects its heritage significance.

The sensitivity of a receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected; however, while impacts to a heritage asset's setting or character can be temporary, impacts which result in damage or destruction of the assets themselves, or their relationship with their wider environment and context, are permanent. Once destroyed an asset cannot recover. On this basis, the assessment of the significance of any identified impact is largely a product of the heritage importance of an asset (rather than its sensitivity) and the perceived magnitude of the effect on it, assessed and qualified by professional judgement.

The criteria for determining the heritage importance (and hence sensitivity) of heritage assets are described in **Table 15-2**. These criteria include historic assets of uncertain heritage importance i.e. where the importance, existence and / or level of survival of an asset has not been ascertained (or fully understood) from available evidence. Although a definition for assets of uncertain heritage importance is provided, where uncertainty occurs, the precautionary approach is to assign the highest likely level of importance. This precautionary approach represents good practice in archaeological impact assessment and reduces the potential for impacts to be under-estimated. It is also important to note that the heritage importance and heritage significance of an asset can be amended or revised as more information comes to light.

Table 15-2 Indicative criteria for determining heritage importance

Sensitivity	Definition
High (perceived International / National Importance)	World Heritage Sites Scheduled Monuments Grade I and II* Listed Buildings or structures Protected wrecks Designated historic landscapes of outstanding interest Conservation Areas containing buildings or structures with high heritage importance, or high concentrations of listed buildings Assets of acknowledged international / national importance Assets that can contribute significantly to acknowledged international / national research objectives
Medium (perceived Regional Importance)	Grade II Listed Buildings or structures Designated special historic landscapes Other types and character of Conservation Areas Assets that contribute to regional research objectives Assets with regional value, educational interest or cultural appreciation
Low (perceived Local importance)	'Locally Listed' buildings or structures Assets that contribute to local research objectives Assets with local value, educational interest or cultural appreciation Assets compromised by poor preservation and / or poor contextual associations
Negligible	Assets with no significant value or archaeological / historical interest

Sensitivity	Definition
Uncertain/ Unknown	The importance / existence / level of survival of the asset has not been ascertained (or fully ascertained / understood) from available evidence

For the heritage assessment, the significance of the impact is determined by combining the predicted magnitude of change to heritage significance, with the importance (sensitivity) of the historic asset, for example, as defined in **Table 15-3**.

Table 15-3 Impact significance matrix

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Heritage	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Impact statements carry a degree of subjectivity, as they are based on expert judgement regarding the effect-receptor interaction that occurs and on available data. As such, impact statements should be qualified appropriately. In the context of EIA, 'significant impacts' are taken to be those of moderate or major significance (as defined above) albeit that appropriate mitigation, where available, should be sought for all impacts.

15.5 Baseline Environment

15.5.1 Designated historic assets

Records of designated heritage assets within the 3km study area are listed in full in Appendix A4 in **Appendix 15-1** and illustrated on **Figure 15-2**. There are no World Heritage Sites, Protected Wrecks nor Registered Historic Landscapes within the 3km study area.

There are seven Scheduled Monuments within the 3km study area:

- AN019 Caer y Twr;
- AN147 Gogarth Bay round cairn;
- AN133 Enclosed Hut Circle Settlement at Capel Llochwydd;
- AN016 Holyhead Mountain Hut Circles;
- AN033 Plas Meilw Hut Circles;
- AN017 Penrhos Feilw Standing Stones; and,
- AN031 Roman Wall Surrounding St Cybi's Churchyard.

None of these are located within the footprint of the proposed refurbishment works, nor the batching plant and storage yard locations, and none are within the 1km DBA study area.

There are 64 Listed Buildings within the 3km study area:

- Two Grade I:
 - 5413 St Cybi's Churchyard; and
 - 5415 Walls of upper churchyard.
- Four Grade II*:
 - 5743 Holyhead Breakwater;
 - 5762 Kingsland Windmill; and,
 - 5772 Harbour Office and 5773 George IV Arch on Salt Island.
- 58 Grade II:
 - 5744 Lighthouse on Holyhead Breakwater;
 - Seven within Porth-y-felin and at Soldier's Point:
 - 14729 Zodiac Restaurant;
 - 14730 Trinity House Office;
 - 14731 Trinity Yard Large Workshop;
 - 14732 Trinity Yard Small Workshop;
 - 14760 Soldier's Point House;
 - 14761 Screen Wall to Soldier's Point House; and,
 - 14759 Porthyfelin House;
 - 14755 Gunpowder Magazine and 20076 Former powder magazine within the Breakwater County Park;
 - 14756 Cottage on corner of Pentre Pella (Including Foregarden Wall);
 - 20077 Ffynnon y Wrach and 20081 Tan-y-Cytiau along South Stack Road;
 - 5771 Customs House, 14757 Admiralty Pier (including Sea Wall between Salt Island Bridge and George IV Arch and 14758 Lighthouse on Admiralty Pier on Salt Island);
 - 14742 South Pier (to the south of Admiralty Pier and Salt Island);
 - 5770 The Battery on the headland of the Penrhos Coastal Park; and,

40 within, or to the South of Holyhead itself. Eight of the Listed Buildings are located within the 1km DBA study area but beyond the footprint of the proposed refurbishment works, batching plant and storage yard locations:

- 14729 Zodiac Restaurant;
- 14730 Trinity House Office;
- 14731 Trinity Yard Large Workshop;
- 14732 Trinity Yard Small Workshop;
- 14755 Gunpowder Magazine;
- 14759 Porthyfelin House;
- 14760 Soldier's Point House; and,
- 14761 Screen Wall to Soldier's Point House.

The Breakwater (5743) and Lighthouse (5744) form the focus of the refurbishment works, and as such are within the footprint of the proposed scheme.

There are also three Conservation Areas within the study area: Holyhead Mountain Village, Holyhead Central and Holyhead Beach, none of which overlap with the footprint of the proposed scheme.

15.5.2 Non-designated historic assets (onshore)

The GAT HER records 48 non-designated historic assets above mean low water within the 1km DBA study area, comprising:

- 10 'character areas' relating to the Holyhead urban characterisation study (Cadw, 2019);
- 14 documentary references to former historic assets referenced in documentary sources, shown on aerial photographs or recorded on historic maps;
- 5 earthworks or modified surfaces;
- 1 record concerned with the settlement of Holyhead; and,
- 18 non-designated buildings or structures.

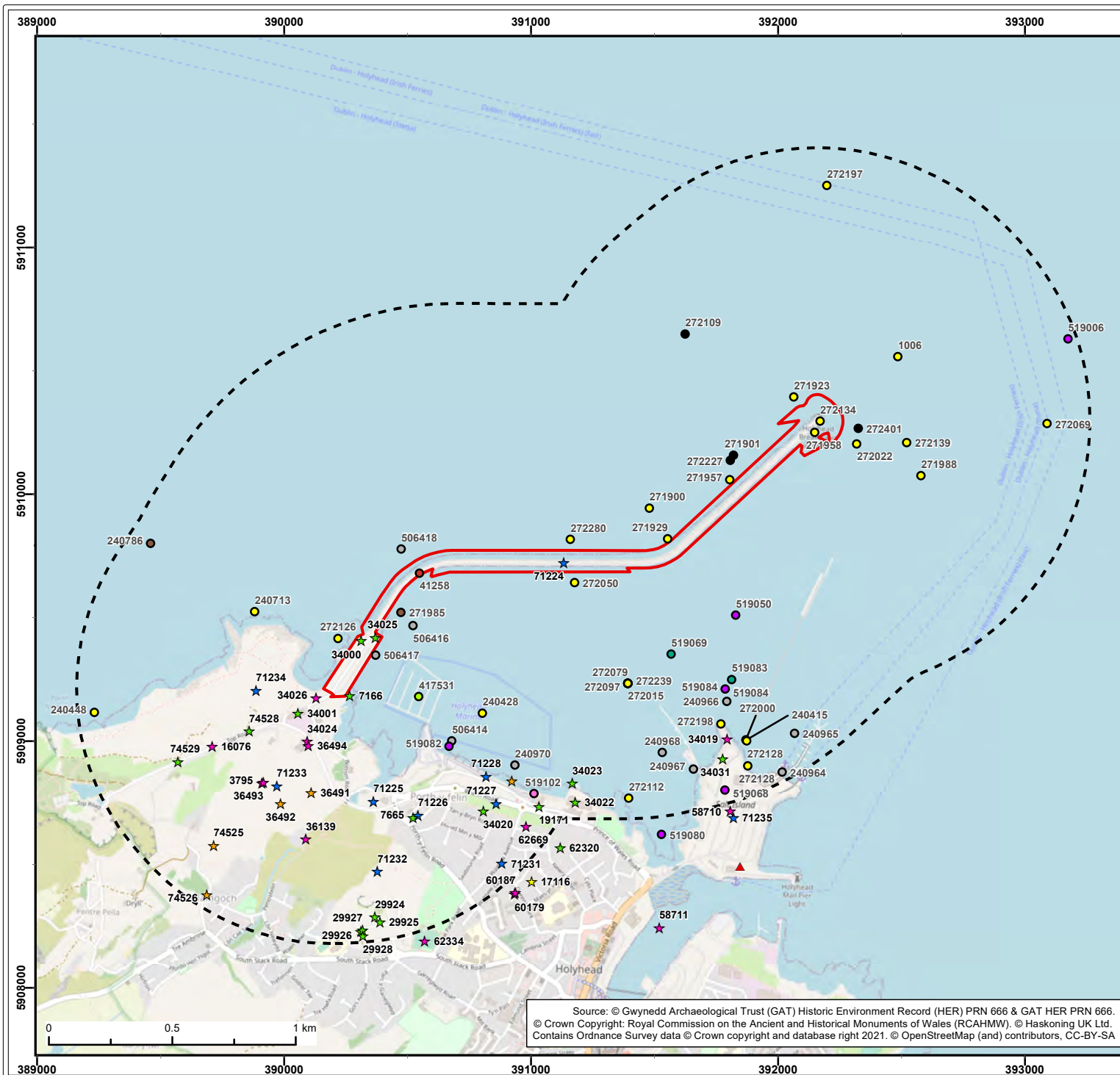
There are no non-designated historic assets recorded within the proposed location of the concrete batching plant on Salt Island. The locations of these historic assets are illustrated on **Figure 15-3** and a gazetteer is included in Appendix A5 in **Appendix 15-1**. Only four of these historic assets are located within (or in close proximity to) the footprint of the proposed refurbishment works, all of which are located within or in close proximity to the proposed Soldier's Point storage area:

- Quay, Holyhead Breakwater (PRN 34000) relating to the first stage of the construction of the Holyhead Breakwater in 1847 (see Plate 01, Plate 02 and Plate 29 in Appendix A1 of **Appendix 15-1**);
- Structure, Breakwater Landing Stage (PRN 34025), a late 19th century small stone building located at the end of the quay (see Plate 01, Plate 02 and Plate 29 in Appendix A1 of **Appendix 15-1**);
- Folly, Soldier's Point (PRN 7166), a ruined stone folly with a castellated roof, arched windows and a tiled floor, the northern corner eroding onto the beach below; and,
- Battery, Soldier's Point (PRN 34026), marked on the OS 1887 map, survives as a stone front with a low opening and a mound behind.

15.5.3 Non-designated historic assets (offshore)

There are 60 maritime records from the NMRW provided by the RCAHMW within the 1km DBA study area. The locations of these historic assets are illustrated on **Figure 15-3** and a gazetteer is included in Appendix A6 in **Appendix 15-1**. The 60 records can be summarised as follows:

- New Harbour Marina;
- Holyhead Breakwater;
- A Beaching Ground at Newry beach shown on a historic chart;
- Two reefs (Outer Platters and Skinners Rock) which historically acted as navigational hazards;
- Six records of former navigation aids marked on historic charts;
- A documentary record of an aircraft (NPRN 506968) a Saro London II (K6927), lost in 1940;
- 41 documentary records of vessels including:
 - 31 named vessels from the post-medieval and modern periods recorded as lost in the vicinity of Holyhead. The remains of these vessels have not been found, but may be located in the vicinity; and,
 - 10 unidentified wrecks which were not subsequently found to be present at the reported locations ('DEAD' wrecks).
- The Holyhead New Harbour Named Location (the function of which is for information retrieval purposes only, representing the centre of a diffuse geographical area which has the potential to include a great many wrecks and downed aircraft as suggested by repeated references to the area within documentary sources);



- Legend:**
- Holyhead Breakwater
 - ▲ Potential Salt Island Batching Plant
 - Study Area for Desk-Based Assessment
 - ★ Character Areas
 - ★ Documentary References
 - ★ Earthworks or Modified Surfaces
 - ★ Settlement
 - ★ Building or Structure
 - Breakwater
 - Dead Wreck
 - Documented Loss
 - Documented Loss (Aircraft)
 - Documented Navigational Aid
 - Named Location
 - Navigational Hazard
 - New Harbour Marina
 - Wreck (Finds)
 - Wreck (Structure)
 - Beaching Ground
- GAT HER**
- RCAHMW**

Client: Isle of Anglesey County Council

Project: Holyhead Breakwater Refurbishment Scheme

Title: Non-Designated Heritage Assets

Figure: 15.3 Drawing No: PB9014-200-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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- Two wrecks represented by remnants of cargo, *Morning Star* (NPRN 240786) lost in 1804 and *Star of the Sea* (NPRN 271985) which ran aground at Soldier's Point in 1873; and,

Four, known wrecks, *Kirkmichael* (NPRN 271901) and *Osseo* (NPRN 272227) both lost in December 1894, HMS *Campina* (NPRN 272401) lost after detonating a mine on 22 July 1940, a few yards from the Holyhead New Harbour Lighthouse, and *Oria* (NPRN 272109) an iron-hulled steamship lost 7 January 1905 after a collision. Eighteen of the above records (including the Breakwater) are located within the maximum working area defined for the refurbishment works. Ten of these are documented losses of vessels, three correspond to 'DEAD' wrecks (i.e. locations at which remains have previously been reported, but which have not subsequently been located by survey) and three to known wrecks, *Kirkmichael* (NPRN 271901) *Osseo* (NPRN 272227) and HMS *Campina* (NPRN 272401). The record relating to the remnants of cargo from the *Star of the Sea* (NPRN 271985) is also located within the working area.

In terms of the survival and importance of these recorded historic assets, documented losses represent approximate locations of loss and do not (except by chance) correspond to actual remains on the seabed. These are, however, indicative of the high potential for further remains, which have not previously been recorded, to be present within the working area, potential associated with these documented losses and the Holyhead New Harbour Named Location.

Equally, the unnamed 'DEAD' wrecks may also represent the remains of one of these documented losses. One of the DEAD wrecks within the working area is a recent loss of a concrete tank barge (NPRN 506417) and not of archaeological importance. Although remains have previously been reported by local sports divers at the locations of the other two (NPRN 506416 and NPRN 506418), although these have not subsequently been found during further surveys, remains may still exist in the vicinity of these locations, possibly buried. The survival of any archaeological material at these locations is, therefore, uncertain.

Similarly, it is noted in the NMRW description that the full character and extent of archaeological remains is presently unknown at the recorded locations of *Kirkmichael* (NPRN 271901) and *Osseo* (NPRN 272227) and, although HMS *Campina* (NPRN 272401) is represented by 'a considerable amount of steel wreckage' and *Star of the Sea* (NPRN 271985) is represented by 'blue and white crockery scattered across the seabed' the precise location and extent of these remains are also unknown.

However, both the survival of archaeological material associated with these recorded wrecks, and the potential for encountering remains during the refurbishment works, is anticipated to be limited.

A video transect survey of the leeward and seaward sides of the Breakwater, undertaken for the purposes of a marine ecology survey (see **Section 11** Marine Ecology), revealed no evidence for archaeological material, although modern rubbish and debris was seen on the leeward side of the Breakwater, including a modern boat near the roundhead head (see Plate 3 in **Appendix 15-1**). This is supported by sidescan sonar and multibeam data acquired by Shoreline Surveys in 2018 and 2020, on behalf of Stena, following the destruction of Holyhead Marina in March 2018 by gale force winds. These surveys show a large amount of debris, including sunken vessels, pontoon structures, mooring blocks and other associated wreckage in the area of the marina and the nearshore area adjacent to the Breakwater.

In addition, the potential for the survival of remains is limited by the relatively shallow depths of sediment, with the seabed within the harbour comprising bedrock overlain by veneer of shallow, finer sediments (see **Chapter 7** Coastal Processes) and the dominance of coarse sediments and rock on the seabed surface closer to the Breakwater. This suggests that the potential for coherent, intact wreck structure to be preserved within the harbour is limited, with greater potential for the presence of isolated finds or fragmented and dispersed wreckage.

Furthermore, as works impacting the seabed, beyond the footprint of the Breakwater, are limited to the placement of anchors or jack-up spud legs, the potential for encountering chance finds of wreck material is relatively low.

15.6 Prediction of Potential Effects During Construction

15.6.1 Direct (physical) impacts to historic assets

15.6.1.1 Designated historic assets

With the exception of the Breakwater and Lighthouse, all designated historic assets are located beyond the working area for the proposed scheme and there is no pathway for a direct impact to occur. Similarly, the Lighthouse, located at the end of the Breakwater, would not be subject to direct impact from the proposed works.

The Breakwater is a Grade II* Listed Building of national, and potentially international, interest, and is a historic asset of high importance.

Direct impacts to the Breakwater would be limited to the regrading of the rubble mound, where required, and the placement of rock and armour units which would be undertaken from marine plant. The process of maintenance has been continuous since the Breakwater was completed in 1873, with replenishment of the rubble mound undertaken regularly up to 1985 when financial constraints resulted in long term rock replenishment becoming unfeasible. Since 1985, there has been ongoing maintenance of the superstructure only. The implementation of the proposed scheme, therefore, would not result in an adverse change to the significance of the Breakwater.

Rather, without maintenance the loss of the rubble mound would eventually result in the superstructure being undermined and breaches in the Breakwater forming, which would expand along the length of the Breakwater culminating in total failure. Whilst the current maintenance regime provides a temporary solution to the problem, the likelihood of a failure of the Breakwater during more frequent and severe storm events increases with time. The failure of the Breakwater itself would be a major adverse impact, effectively resulting in the total loss of the Breakwater and access to the Lighthouse.

With consideration of this potential risk, the works will provide a permanent solution to the constant erosion of the foundations of the Breakwater and damage of the blockwork-walled superstructure. As such the works will prevent the potential loss of the physical fabric which would severely compromise its cultural significance, representing a high beneficial magnitude of change. Direct (physical) impacts to the Breakwater are, therefore, assessed to be of **major beneficial significance**.

15.6.1.2 Non-designated historic assets (onshore)

With regard to direct (physical) impacts upon non-designated heritage assets (onshore) there are no proposed physical changes to onshore historic assets although four heritage assets are located within, or in close proximity to the proposed storage yard on Soldier's Point. Therefore, there is potential for direct (physical) impact during offloading and movement of materials and concrete units during the construction phase.

The Breakwater Quay (PRN 34000) represents the first stage of construction of this Grade II* listed structure; however, the area at Soldier's Point is already an existing industrial quay, owned by Stena within the confines of Holyhead Port and with permitted development rights as the harbour authority. Much of the area is covered by scrub vegetation and concrete, and overall, the quay is assessed as being of medium

heritage importance. The small, late 19th century stone building on the quay (PRN 34025) is suggested to be a guard or watchman's hut in the HER description. Its association with the operation of the Breakwater, however, adds to its heritage significance and, as such, this asset is considered to be of low to medium heritage importance. Should they occur, accidental impacts could damage to the quay structure or building although this is unlikely to be sufficient to result in the loss of key elements of the asset's fabric, such that the asset's heritage significance is lost or severely compromised. The magnitude of potential impacts is therefore considered to be of low adverse, resulting only a slight loss of heritage significance. Overall, potential accidental impacts during the movement of materials is expected to result in a **minor adverse** impact. Nonetheless, it is recommended that high visibility fencing is placed around the stone structure to reduce further the likelihood of accidental impacts occurring.

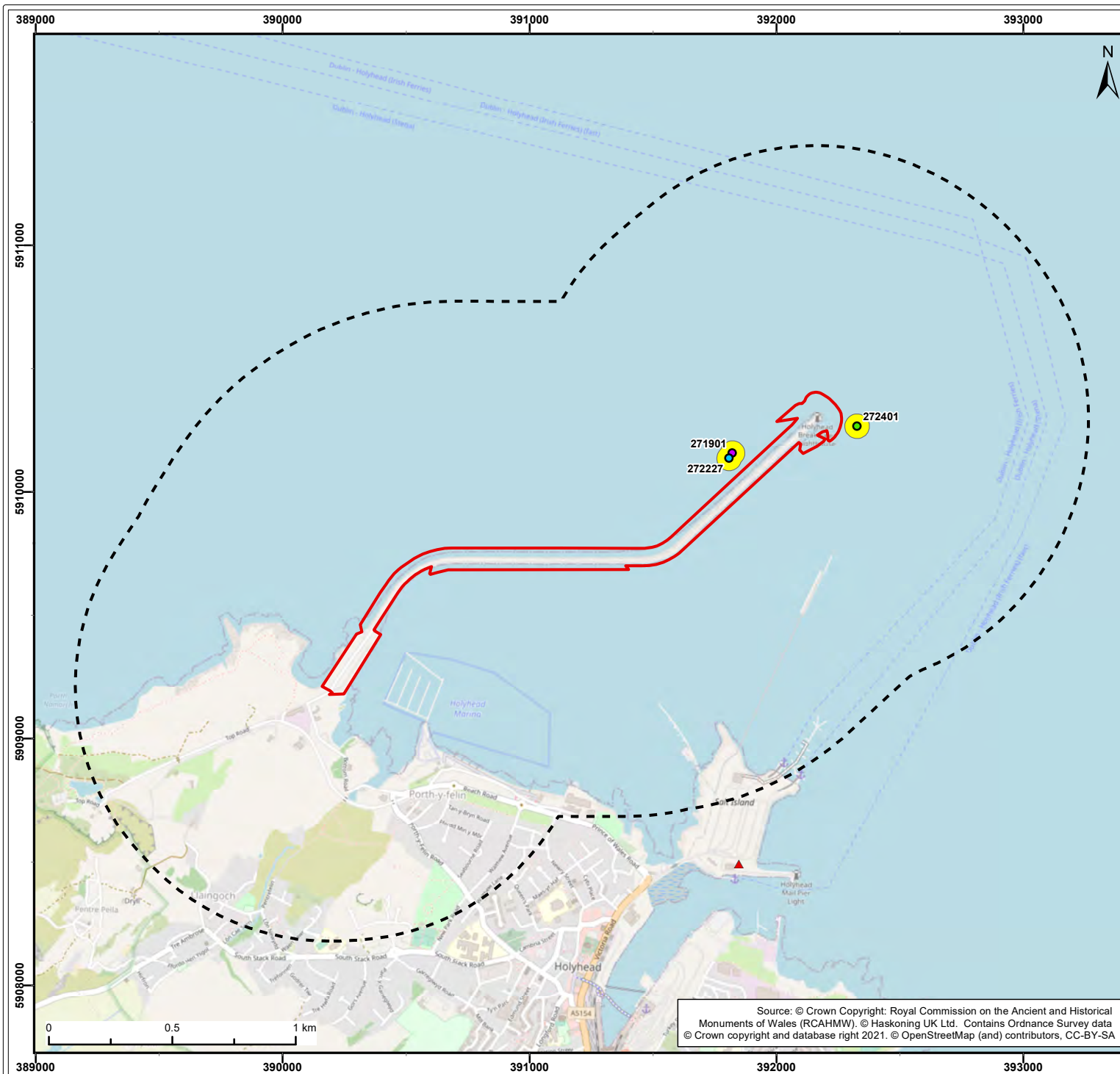
The ruined folly (PRN 7166), recorded as eroding onto the beach below, and the disused battery (PRN 34026), later adapted in WWII into a pillbox are considered to be assets of local interest and low heritage importance. In addition, the landward location of these two assets, beyond the area of the storage yard, mean that accidental impacts during offloading and the movement of materials (all of which will take place from marine based plant) are less likely to occur. Should they occur, impacts are anticipated to be of negligible magnitude without materially affecting their significance. This would result in a potential impact of **negligible** significance and no material change to heritage significance is expected to occur.

15.6.1.3 Non-designated historic assets (offshore)

As described in **Section 15.5.3** above, the precise nature and extent of surviving archaeological remains at the recorded location of the two DEAD wrecks (NPRN 506416 and NPRN 506418) and three named wrecks, *Kirkmichael* (NPRN 271901), *Osseo* (NPRN 272227) and *HMS Campina* (NPRN 272401) is currently unclear. The potential for the survival of intact, coherent wreck remains within the working area is anticipated to be limited by the dominance of coarse sediments and rocks, and the overall shallow depth of sea bed sediments overlying the bedrock which limits the potential for substantial burial. There is high potential for the presence of isolated finds or fragmented and dispersed wreckage, although a significant amount of recent debris is also known to be present. Furthermore, as works impacting the seabed are limited to the placement of anchors or jack-up spud legs, the potential for encountering chance finds of wreck material is relatively low. As the level of survival of these wrecks cannot be ascertained (or fully ascertained/understood) from available evidence, and as any previously undiscovered remains cannot be assessed until they are encountered, then the precautionary approach is to assume high importance.

Direct (physical) impacts to any surviving material associated with wrecks are possible from the placement of the jack-up or spud legs of barges, or an alternative form of anchoring system, where contact is made with the seabed. If archaeological material associated with these wrecks is present within the footprint of the jack-up or spud legs then physical damage to, or destruction of, this material could occur. Given the limited potential for survival, however, and that the potential for encountering chance finds of wreck material is relatively low, the potential magnitude of effect is assessed to be low adverse. While elements of the asset's fabric which contribute to its heritage significance could be affected, this is likely to result in only a slight loss of heritage significance. With a precautionary approach, therefore, direct (physical) impacts to these wrecks are potentially of **moderate adverse significance**.

Where possible, the recorded locations should be avoided. It is recommended that Archaeological Exclusion Zones (AEZs) comprising a 50m buffer around the recorded point location be placed around the three named wrecks *Kirkmichael* (NPRN 271901), *Osseo* (NPRN 272227) and *HMS Campina* (NPRN 272401) and that no activities which make contact with the seabed (i.e. placement of jack-ups or anchors) are undertaken within these boundaries. The locations of these AEZs are illustrated on **Figure 15-4**.



Legend:

- Holyhead Breakwater
- ▲ Potential Salt Island Batching Plant
- Study Area for Desk-Based Assessment
- Archaeological Exclusion Zone (AEZ)

RCAHMW - Wrecks (Structure)

- HMS Campina
- Kirkmichael
- Osseo

Client:	Project:
Isle of Anglesey County Council	Holyhead Breakwater Refurbishment Scheme

Title:
Archaeological Exclusion Zones

Figure: 15.4		Drawing No: PB9014-200-007			
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	20/01/2021	FC	VC	A4	1:22,500

Co-ordinate system: WGS 1984 UTM Zone 30N

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If it is not possible to avoid these AEZs then further investigation (e.g. geophysical or diver survey) may be required to establish the full nature and extent of any surviving remains so that the AEZs can be revised or potentially removed. It should be noted that whilst no anthropogenic debris was seen on the video transects undertaken for the marine ecology survey, remains may still be present beyond the visual range of the video footage within these AEZs.

AEZs are not recommended for the two unnamed DEAD wrecks, which have not been found during survey following the report of a wreck at these locations by sports divers in 1976, nor for the scattered crockery though to represent the *Star of the Sea* (NPRN 271985). Equally, as the locations of previously unidentified wrecks or aircraft remains are currently unknown it is not possible to avoid potential impacts. If such remains are encountered during the proposed refurbishment works, these could be of potentially high heritage significance (as a precautionary approach); however, as above, due to the limited potential of encountering such finds during the planned activities which make contact with the seabed (i.e. placement of jack-ups or anchors) impacts are assessed to be low adverse. With a precautionary approach, therefore, direct (physical) impacts to these wrecks are potentially of **moderate adverse significance**.

It is recommended that an archaeological reporting protocol be adopted to mitigate the potential impact on any as yet unidentified marine archaeological remains arising from construction activities. Ensuring that any new discoveries are quickly and efficiently reported and addressed through the protocol would result in a reduced residual impact, predicted to be of **minor adverse significance**. It is proposed that this protocol would be formalised in a Written Scheme of Investigation (WSI) which would be produced by a suitably qualified marine archaeological specialist.

The recorded locations of wrecks beyond the working area, *Oria* (NPRN 272109) and finds from the *Morning Star* (NPRN 240786), and the 'DEAD' wrecks (NPRNs 240964, 240965, 240966, 240967, 240968, 240970, and 506414), are not anticipated to be subject to potential impact as activities are not planned to take place beyond the immediate working area.

15.6.2 Indirect (physical) impacts to historic assets from changes in coastal processes

The assessment of the potential impacts during the construction phase of the proposed scheme from changes to coastal processes are set out in **Section 7.7** of this report. For construction, the design parameters with the potential to influence coastal processes are:

- Short term increases in suspended sediment concentrations during placement of the concrete armour units on the seaward side and roundhead of the Breakwater and during placement of the concrete mattresses/thin rock revetment on its lee side; and,
- Changes in sea-bed level due to deposition of the additional suspended sediment after placement of the materials.

During construction, given the small footprint of the refurbishment works (a maximum of 15m wide on the leeward side of the Breakwater and up to 50m on the seaward side), the short period of activity during construction at any location along the Breakwater, and that all works will be almost totally restricted to the footprint of the existing rubble mound, the disturbance would cause only minor and temporary enhancements in suspended sediment concentration. Any change would be negligible in magnitude and, therefore, insufficient to result in any indirect impact to historic assets.

Similarly, given the low volumes of sediment predicted to be released during construction, the deposition on the sea bed will be extremely small in thickness, as sediments would be transported away (and continually

re-suspended) by waves and tidal currents. Any change would be negligible in magnitude and, therefore, insufficient to result in any indirect impact to historic assets.

Therefore, there would be **no impact** to historic assets from changes to coastal processes during construction.

15.6.3 Potential impacts to the setting of historic assets

An assessment of potential impacts to the setting of designated heritage assets, supported by a site visit in March 2020, was undertaken for the proposed scheme and the results are presented in full in Section 6 of **Appendix 15-1**.

As described in **Section 15.3** above, on the basis of the information presented during consultation Cadw agreed that the impacts on the designated historical assets will be limited to the Breakwater and Lighthouse. From a visual impact perspective, this conclusion is supported by the results of the Visual Appraisal presented in **Chapter 14** Visual Setting. In summary:

- During construction, the most adverse visual effects would be experienced by users of the coastal path and margins that are in close proximity to the proposed storage facilities located on Soldier's Point; however, distant construction activity alongside the Breakwater would not incur significant visual effects, seen in context of the existing harbour and regular movements of vessels and other related activity.

Following initial screening, five groups of designated historic assets were taken forward for further assessment:

- Holyhead Beach Conservation Area, including:
 - 14759 Porthyfelin House (Grade II);
 - 14760 Soldier's Point House (Grade II);
 - 14761 Screen Wall to Soldier's Point House (Grade II);
 - 14729 Zodiac Restaurant (Grade II);
 - 14730 Trinity House Office (Grade II);
 - 14731 Trinity Yard Large Workshop (Grade II); and,
 - 14732 Trinity Yard Small Workshop (Grade II).
- Breakwater County Park, including:
 - AN019 Caer y Twr. Scheduled Monument; and,
 - 14755 Gunpowder Magazine (Grade II).
- Holyhead Mountain Village Conservation Area, including:
 - 14756 Cottage on corner of Pentre Pella (Including Foregarden Wall) (Grade II).
- Salt Island (with regard to proposed batching plant during construction phase only):
 - 5771 Customs House (Grade II);
 - 14757 Admiralty Pier (including Sea Wall between Salt Island Bridge and George IV Arch) (Grade II);
 - 5773 George IV Arch (Grade II*);
 - 5772 Harbour Office (Grade II*); and,
 - 14758 Lighthouse on Admiralty Pier (Grade II).
- The Breakwater and Lighthouse.

The primary conclusions of the settings assessment during construction are described below.

With respect to the Holyhead Beach Conservation Area, from the area of Trinity Yard and the Maritime Museum (Zodiac Restaurant) (see Viewpoint 1 in **Appendix 14-1**), during construction, cranes and barges would be visible but, in the context of the existing busy port activities, including regular movements of large vessels, the construction related activity would not result in a significant change. From the area of Soldier's Point (see Viewpoint 2 in **Appendix 14-1**), during construction, cranes and barges would be visible but again, in the context of the existing busy port activities, including regular movements of large vessels, the construction related activity would not result in a significant change to the setting of the designated historic assets. Consequently, the heritage significance of these designated historic assets would not be affected.

Similarly, the use of Soldier's Point as a storage yard during the construction phase would not affect the setting of designated heritage assets to a significant degree. Although the storage of units would be visually intrusive and will affect the setting of the designated historic assets, this change would be temporary and short-term and, overall, the heritage significance of Soldier's Point House, the screen wall and Porth y Felin House, and the Conservation Area as a whole, would not be affected to a significant degree. Visual links towards the Breakwater would be maintained in the longer term and the primary value of the open spaces with the Conservation Area, and would not be affected by the proposed scheme, with both inward and outward views maintained.

With respect to views from the Breakwater Country Park (Caer y Twr and the gunpowder magazine), Viewpoints 5 and 6 in **Appendix 14-1**, present the potential visual impacts from two locations along the Isle of Anglesey Coastal Path. During construction there would be short term, temporary effects only. Cranes, supply vessels and barges would be clearly visible although in the context of the existing busy port activities, including regular movements of large vessels, the construction related activity would not result in a significant change in the view. Significant, discernible, changes to the setting of Caer y Twr and the gunpowder magazine are not, therefore, anticipated to occur during construction.

Views from the Holyhead Mountain Village Conservation Area are, similarly, not anticipated to be affected to a significant degree and the setting and heritage significance of the cottage on the corner of Pentre Pella would not be subject to change.

On Salt Island, if works are completed in a single construction phase, the refurbishment of the Breakwater would be undertaken over an estimated two-year period. If the works are undertaken in three phases, each phase would take approximately nine months to complete, with an approximate interval between each consecutive phase of two years. On this basis, although changes to the setting of historic assets will occur associated with the presence of the batching plant, any such changes would be temporary and of sufficiently short duration that they would not give rise to material harm. Furthermore, as concluded in the visual appraisal (see **Chapter 14** Visual Setting), Salt Island is the hub of ferry and freight activity and there are existing tall silo structures and other buildings located within the busy port. As such, proposed storage, fabrication and associated activity would not significantly contrast or conflict with existing visual character. On this basis, the setting of the listed structures on Salt Island would not be subject to a change which would be considered to result in material harm to their heritage significance.

In conclusion, material changes, resulting in harm to, or loss of, heritage significance of designated historic assets within the 3km buffer of the study area are not anticipated to occur during the construction phase.

With respect to the Breakwater and Lighthouse themselves, the visual appraisal (see **Chapter 14** Visual Setting) concluded that there would be no impact as there would be no public access along the Breakwater during the construction period; however, with regard to the setting of historic assets, although views to and from a historic asset are often the most obvious factors, other sensory elements can also affect setting (such as noise, or dust created by construction). Setting is also not dependent upon the presence on an individual

to experience that setting, although it does include the surroundings in which it is understood, experienced and appreciated, embracing present and past relationships to the surrounding landscape (Cadw, 2017a).

During construction there would be a potential impact upon the setting of the Breakwater and Lighthouse from the presence of marine plant, the use of Soldier's Point as a storage yard and activities associated with the refurbishment works. The Breakwater and Lighthouse are historic assets of high importance; however, as for the Conservation Areas (Breakwater Country Park and Holyhead Mountain described above) this change would be temporary and short-lived and should be assessed against the baseline of the busy port environment. The magnitude of this impact is, therefore, assessed to be low adverse, resulting in a slight loss of heritage significance for the duration of the construction phase only and resulting in a **moderate adverse** impact. This impact would be similar to the potential impact associated with the presence of the armour units during the operation phase, and mitigation is discussed in **Section 15.7.3** below.

15.7 Prediction of Potential Effects During Operation

15.7.1 Direct (physical) impacts to historic assets

Within the wider study area, any potential direct impacts to archaeology and cultural heritage are expected to occur during the construction phase and no additional direct impacts would occur during operation.

Once the refurbishment of the Breakwater is complete, the structure would continue to be monitored annually and repairs undertaken if damage occurs; however, further maintenance of the rubble mound would be minimal and far less than the current maintenance activities and, as wave overtopping of the superstructure would be reduced by around 90%, any repointing and repair of the superstructure would also be reduced. In comparison to the present maintenance regime, therefore, and in preserving elements of the asset's physical fabric which are at high risk of being lost, the proposed scheme has the potential to represent a high beneficial magnitude of affect, representing a **major beneficial** impact.

15.7.2 Indirect (physical) impacts to historic assets from changes in coastal processes

The assessment of the potential impacts during the operational phase of the proposed scheme from changes to coastal processes are set out in **Section 7.8** of this report. During operation, the design parameters with the potential to influence coastal processes are:

- Changes to the tidal current regime due to the presence of the refurbished Breakwater;
- Changes to the wave regime due to the presence of the refurbished Breakwater; and,
- Changes to sediment distribution and transport due to presence of the refurbished Breakwater.

Given the small change in dimensions of the Breakwater, the general direction of approach of tidal currents would not change and any change in tidal current velocity would be minimal. Regionally, tidal currents would not change from their baseline conditions. Any change would be negligible in magnitude and, therefore, insufficient to result in any indirect impact to historic assets.

The physical modelling of waves predicts that the concrete armour would reduce the wave energy approaching the vertical wall and would reduce the degree of overtopping (by 90%). Also, the model predicts a small reduction in reflected wave energy local to the structure, resulting in marginally calmer conditions further to the west; however, the effect would be so small as to be within the ambient wave conditions along this coast. Any change would be negligible in magnitude and, therefore, insufficient to result in any indirect impact to historic assets.

The local modifications to the tidal current and wave regimes due to the presence of the refurbished Breakwater may affect the sediment regime; however, since it is expected that the changes in waves and tidal current flow would be small and local to the Breakwater, then the changes in sediment transport would be similar in scale. Any change would be negligible in magnitude and, therefore, insufficient to result in any indirect impact to historic assets.

Therefore, there would be **no impact** to historic assets from changes to coastal processes during operation.

15.7.3 Potential impacts to the setting of historic assets

From a visual impact perspective, the Visual Appraisal (see Chapter 14 Visual Setting) concluded that:

- During operation stages adverse visual effects would be limited to close range, landside receptors on the rocky headland and beach immediately to the west of Soldier's Point (that obtain views to the seaward side of the Breakwater) and in views obtained from the Breakwater itself, in particular from the head of the Breakwater looking towards Holyhead Mountain.

With respect to the Holyhead Beach Conservation Area, from the area of Trinity Yard and the Maritime Museum (Zodiac Restaurant) (see Viewpoint 1 in **Appendix 14-1**), once installed the Tetrapod's along the end section on the leeward side would be visible as a uniform, thin sliver at the base of the wall and, whilst the appearance of new concrete would appear in contrast to the existing fabric of the Breakwater, over time this would weather and become even less distinct. This limited visual disturbance would result in only a negligible change to the setting of the Trinity House group of nautical workshops and the former lifeboat station and, therefore, the heritage significance of these designated historic assets would not be affected.

With respect to the Holyhead Beach Conservation Area, from Soldier's Point alongside Soldier's Point House (see Viewpoint 2 in **Appendix 14-1**), -, the existing Breakwater would largely screen views towards the concrete armour features and there would be no change to the setting of the designated historic assets. Consequently, the heritage significance of these designated historic assets would not be affected.

With respect to views from the Breakwater Country Park (Caer y Twr and the gunpowder magazine) Viewpoints 5 and 6 in **Appendix 14-1** present the visual impacts from two locations along the Isle of Anglesey Coastal Path. At low tide and calm seas, the concrete armour structure would be visible with initial disparity in both colour and texture between the two surfaces, with the lighter colour concrete units contrasting with the dark Breakwater wall. These changes would be visible from Caer y Twr and the gunpowder magazine, although longer term weathering, sea action and general patination of the Tetrapods would reduce the disparity over time. Although the localised view of the Breakwater itself would change, this visual change is considered to result in a minor/moderate adverse effect on the view and the overall appearance of the Breakwater from middle distance (Viewpoint 5) and negligible adverse effect from greater distances (Viewpoint 6).

In conclusion, there would be no material change to the heritage significance of Caer y Twr nor the gunpowder magazine themselves as a result of the localised visual changes in setting.

Given the above conclusions, views from the Holyhead Mountain Village Conservation area are, similarly, not anticipated to be affected to a significant degree and the setting and heritage significance of the cottage on the corner of Pentre Pella would not be subject to change.

With regard to the setting and character of the Breakwater itself, on the leeward side, the ACBMs would be mostly located below the water surface and consequently, are not anticipated to result in any change to the visual appearance or setting; however, on the seaward side of the Breakwater and the roundhead, the

concrete armour units would be visible, introducing a change to the visual appearance of the Breakwater. Although every effort has been made to minimise the height of the proposed Tetrapod's, they would stand approximately 5.2m above the existing rubble mound and therefore hide some of the existing seaward masonry superstructure from view.

The Breakwater is a significant visual feature seen from the town and coastal margins with most outward views north from Holyhead capturing something of the Breakwater as it extends north eastwards across Holyhead Bay. The extent to which this experience would be affected by the proposed scheme will depend upon the height of the tide and the sea state. It should be noted however that the Tetrapods would remain visible at all states of the tide.

The setting of the Breakwater and Lighthouse themselves would change and, as identified in the visual appraisal (see **Chapter 14** Visual Setting), the greatest changes would be associated with views experienced by recreational users of the Breakwater, with the view from the head of the Breakwater being the most affected. The scale, mass and regimented lines of the Tetrapods would contrast notably with the shadowed Breakwater wall. Most of the lower section of the wall would be screened and its existing visual character, seen to rise up from a rocky base, would be significantly altered. This change would be most measurable in close proximity, with views from the Breakwater and across the harbour, and towards the hills and mountain and other features on the horizon largely unaffected.

These views are assessed in detail in the visual appraisal (see **Chapter 14** Visual Setting) with a specific focus on the Breakwater itself in Viewpoints 3 and 4 (in **Appendix 14-1**). Drawings 05 and 06 (in **Appendix 14-1**) provide photomontages illustrating how the armour units would appear looking south west from the head of the Breakwater towards Holyhead Mountain and looking north east from Holyhead Breakwater, approximately 800m from shore, respectively.

In the long term, the visual prominence of Tetrapods would be reduced due to the effects of weathering, algal growth and general patination. Storms and exceptional sea conditions would also cause a limited amount of displacement to some of the Tetrapods which would provide minor visual relief to the otherwise highly regimented, linear arrangement of the units. Without these works, if the Holyhead Breakwater is breached, then the cost of repair is likely to be prohibitively expensive ultimately leading to the closure of Holyhead Port. In such an event, any redevelopment plans for Holyhead including reestablishment of a marina in Holyhead would be unviable due to the increased wave climate within the existing harbour and the increased flood risk to low lying areas.

In conclusion, whilst the ACBM solution on the leeward side would have **no impact** upon heritage significance, the introduction of Tetrapods along the seaward side would adversely affect the visual character of the historic assets, and result in an adverse effect upon the setting and, consequently, the heritage significance of the Breakwater and Lighthouse. The magnitude of this impact is assessed to be medium adverse. Although elements of the asset's setting which contribute to its significance would be affected, the variable visual effect, dependent on the tide and sea state, and the weathering of the units over time, means that this is not anticipated to result in significance being lost or severely compromised, but only a partial loss of heritage significance, with the fabric of the structures themselves (the primary contributor to the asset's heritage significance, set out in detail in Section 7.3 of **Appendix 15-1**) being preserved. In accordance with the impact assessment methodology presented in **Section 5.3**, this has the potential to result in an impact of **major adverse significance**.

In terms of mitigation, the Level 4 building record (see Appendix A1 of **Appendix 15-1**) provides a detailed account of the Breakwater and its significance and, as such, in itself represents a primary form of mitigation for the Breakwater and Lighthouse. It may also be possible to consider additional mitigation, such as colour matching or the use of textured finishes to the armour units, to minimise the visual impact as far as possible.

With the primary mitigation of the Level 4 building record, the adverse impact is reduced to **minor adverse** and, therefore, acceptable in EIA terms.

15.8 Summary

A summary of impacts to historic assets and their settings are listed in **Table 15-4**.

Table 15-4 Summary of potential impacts

Potential Impact	Receptor	Significance	Mitigation	Residual Impact
Construction				
Direct (physical) impacts to historic assets	Designated historic assets (Breakwater 5743 and Lighthouse 5744)	Major Beneficial	None Proposed	Major Beneficial
	All other designated historic assets	No Impact	None Proposed	No Impact
	Non-designated historic assets (onshore) (Breakwater Quay PRN 34000 and Structure PRN 34025)	Minor Adverse	Fencing/demarcation to protect structure	Minor Adverse
	Non-designated historic assets (onshore) (Folly PRN 7166 and Battery PRN 34026)	Negligible	None Proposed	Negligible
	All other non-designated historic assets (onshore)	No Impact	None Proposed	No Impact
	Non-designated historic assets (offshore) within working area: <ul style="list-style-type: none"> • Unnamed 'DEAD' Wrecks (NPRN 506416 and NPRN 506418) • Named wrecks <i>Kirkmichael</i> (NPRN 271901), <i>Osseo</i> (NPRN 272227) and <i>HMS Campina</i> (NPRN 272401) • Previously undiscovered wrecks and isolated finds, including finds associated with <i>Star of the Sea</i> (NPRN 271985) 	Moderate Adverse	AEZs for named wrecks/ Archaeological Reporting Protocol	Minor Adverse
	All other non-designated historic assets (offshore)	No Impact	None Proposed	No Impact
Indirect (physical) impacts to historic assets from changes in coastal processes	Known and potential non-designated historic assets (offshore)	No Impact	None Proposed	No Impact
Impacts to the setting of historic assets	Designated heritage assets within 3km of the proposed scheme	No Impact	None Proposed	No Impact
	Holyhead Breakwater and Lighthouse	Moderate adverse	None Proposed	Moderate adverse
Operation				
Direct (physical) impacts to historic assets	Known and potential designated and non-designated historic assets (offshore)	No Impact	None Proposed	No Impact
	Holyhead Breakwater and Lighthouse	Major beneficial	None Proposed	Major beneficial
Indirect (physical) impacts to historic assets from changes in coastal processes	Known and potential non-designated historic assets (offshore)	No Impact	None Proposed	No Impact
Impacts to the setting of historic assets	Designated heritage assets within 3km of the proposed scheme	No Impact	None Proposed	No Impact
	Holyhead Breakwater and Lighthouse	Major adverse	Level 4 Building Record	Minor Adverse

16 Climate Change

16.1 Introduction

This chapter considers the potential impacts of proposed scheme on climate change. The chapter comprises two sub-assessments, a greenhouse gas (GHG) assessment to predict the contribution of the proposed scheme to national GHG emissions and Carbon Budgets. In addition, a Climate Change Resilience (CCR) assessment was carried out to consider the resilience of the design and infrastructure of the proposed scheme to the projected effects of climate change over its operational lifespan.

16.2 Legislation, Policy and Guidance

16.2.1.1 United Nations Framework Convention on Climate Change and the Kyoto Protocol

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty addressing climate change which entered into force on 21st March 1994. Its main objective is '*to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system*'. In its early years it facilitated intergovernmental climate change negotiations and now provides technical expertise. Its supreme decision-making body, the Conference of the Parties (COP) meets annually to discuss and assess progress in addressing climate change.

The first agreement was the Kyoto Protocol which was signed in 1997 and entered into force in 2005. which committed industrialised countries to limit and reduce GHG emissions in accordance with individual targets to reduce the rate and extent of global warming. It applies to six GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). The Kyoto Protocol recognises that the economic development of a country is an important determinant in the country's ability to combat, and adapt to, climate change. Therefore, developed countries have an obligation to reduce their current emissions particularly due to their historic responsibility for the current concentrations of atmospheric GHGs.

Subsequently, the meetings of COP have resulted in several important and binding agreements, including the Copenhagen Accord (2009), the Doha Amendment (2012) and the Paris Agreement (2015).

The Copenhagen Accord raised climate change policy to the highest political level and expressed a clear political intent to constrain carbon and respond to climate change in the short and long term. It introduced the potential commitment to limiting global average temperature increase to no more than 2°C above pre-industrial levels.

The Doha Amendment to the Kyoto Protocol in 2012 included a commitment by parties to reduce GHG emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020. The UK Climate Change Act 2008 has an interim 34% reduction target for 2020, which would allow the UK to meet and exceed its Kyoto agreement target.

The United Nations Climate Change Conference in Paris in 2015 (known as 'COP21') led to the following key areas of agreement:

- Limit global temperature increases to below 2°C, while pursuing efforts to limit the increase to 1.5°C above the pre-industrial average temperature;
- Parties to aim to reach a global peak of GHG emissions as soon as possible alongside making commitments to prepare, communicate and maintain a Nationally Determined Contribution;

- Contribute to the mitigation of GHG emissions and support sustainable development whilst enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change;
- Commitment to transparent reporting of information on mitigation, adaptation and support which undergoes international review; and,
- In 2023 and every five years thereafter, a global stocktake will assess collective progress toward meeting the purpose of the Agreement.

At the 22nd Climate Change Conference of the Parties (COP22) in November 2016, the UK ratified the Paris Agreement to enable the UK to *“help to accelerate global action on climate change and deliver on our commitments to create a safer, more prosperous future”* (Department for Business, Energy and Industrial Strategy (BEIS), 2016). At the COP24 meeting, held in Katowice, Poland in December 2018, a set of rules for the Paris climate process were agreed.

16.2.2 Legislation

16.2.2.1 The Climate Change Act 2008

The Climate Change Act 2008 provides a framework for the UK to meet its long-term goals of reducing GHG emissions to ‘net-zero’ (i.e., at least a 100% reduction) by 2050 (“climate mitigation”). This target was introduced by the Climate Change Act 2008 (2050 Target Amendment) Order 2019, which amended the previous 2050 GHG target of an 80% reduction compared to 1990 levels.

The Climate Change Act 2008 was enacted as part of the UK’s responsibility and obligations as a signatory of the Kyoto Protocol 1997 (which did not become binding until 2005). The UK target covers the six main GHGs referenced in the Kyoto Protocol.

The Climate Change Act 2008 requires the Government to set ‘Carbon Budgets’ to provide a constraint of GHG emissions in a given time period. The Carbon Budgets are set by the Committee for Climate Change and provide a legally binding five-year limit for GHG emissions in the UK. The six Carbon Budgets that have been placed into legislation and will run up to 2037 and are identified in **Table 16-1**.

Table 16-1 The six UK Carbon Budgets

Budget	Carbon Budget Level (MtCO ₂ e)	Reduction Below 1990 Levels
1st Carbon Budget (2008 to 2012)	3,018	25%
2nd Carbon Budget (2013 to 2017)	2,782	31%
3rd Carbon Budget (2018 to 2022)	2,544	37% by 2020
4th Carbon Budget (2023 to 2027)	1,950	51% by 2025
5th Carbon Budget (2028 to 2032)	1,725	57% by 2030
6th Carbon Budget (2033 to 2037)	965	78% by 2035

The first Carbon Budget was met, and the UK is set to outperform on the second and third budgets. However, current projections suggest that the fourth carbon budget will not be met (Committee for Climate Change (CCC), 2018).

The sixth Carbon Budget was published by the CCC in December 2020, which set out the level of GHG emissions that the UK can release from 2033 to 2037 (CCC, 2020). It was the first carbon budget to set out the path to the net-zero carbon emissions target.

The Climate Change Act 2008 also requires the UK Government to produce a Climate Change Risk Assessment (CCRA) every five years. The CCRA assesses current and future risks to, and opportunities

for, the UK from climate change (to inform “climate adaptation” actions). In response to the CCRA, the Climate Change Act 2008 also requires Government to produce a National Adaptation Programme (NAP) (both discussed further below).

16.2.2.2 Climate Change Risk Assessment 2017

The Government produced its latest CCRA in 2017, the second assessment to be produced for the UK following the first release in 2012. The report concluded that among the most urgent risks for the UK are flooding and coastal change risks to communities, businesses and infrastructure. It identifies suggestions for reducing these risks, including the consideration of climate change in developing new infrastructure.

16.2.2.3 National Adaptation Programme

The National Adaptation Programme (NAP) sets the actions that the UK government will undertake to adapt to the challenges of climate change in the UK as identified in the CCRA. The NAP details the range of climate risks which may affect the natural environment, infrastructure, communities, buildings and services. Key actions are set out in the NAP which aim to address the identified high-risk areas, which include:

- flooding risks to communities, businesses and infrastructure;
- risks to health, well-being and productivity from high temperatures;
- risks in shortages in the public water supply for agriculture, energy generation and industry;
- risks to natural capital; and,
- risks to domestic and international food production and trade.

16.2.3 National Planning Policy

16.2.3.1 National Planning Policy Framework (NPPF)

The revised NPPF (Ministry of Housing, Communities and Local Government (MHCLG), 2019) was adopted in February 2019, which advises that the planning system should support the transition to a low carbon future. With respect to planning for climate change, the NPPF states:

“Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures”

The NPPF also states:

“New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and,

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government’s policy for national technical standards.”

16.2.4 Local Planning Policy

The Isle of Anglesey County Council (IoACC) and Gwynedd Council have adopted a Joint Local Development Plan (LDP) for the area. The LDP was adopted on 31st July 2017 (IoACC & Gwynedd Council, 2017). The LDP is a land use development strategy which concentrates on sustainable development in Anglesey (and Gwynedd) up to 2026.

One of the key 'visions' of the LDP is to ensure the area *'adapts and responds positively to the challenges of climate change'*. The Joint LDP was reviewed for policies of relevance to climate change. The following relevant policies were identified:

"Strategic Policy PS 5: Sustainable Development

Development will be supported where it is demonstrated that they are consistent with the principles of sustainable development. All proposals should:

1. *Alleviate the causes of climate change and adapting to those impacts that are unavoidable in accordance with Strategic Policy PS 6*

[...]

7. *Reduce the effect on local resources, avoiding pollution and incorporating sustainable building principles in order to contribute to energy conservation and efficiency; using renewable energy; reducing / recycling waste; using materials from sustainable sources; and protecting soil quality*

Strategic Policy PS 6: Alleviating and Adapting to the Effects of Climate Change

In order to alleviate the effects of climate change, proposals will only be permitted where it is demonstrated that they have fully taken account of and responded to the following:

2. *Reducing greenhouse gas emissions, help to reduce waste and encourage travel other than by car*

16.2.5 Guidance

IEMA has published guidance to inform the consideration of GHG emissions within an EIA in its document 'Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017). The guidance sets out the areas for consideration at all stages of the assessment, and provides guidelines for, and requirements of, an assessment.

In addition, IEMA has also published a framework for the consideration of climate change resilience and adaptation in the EIA process. The guidance advises that the future climate at the development site should be identified, and how adaptation and resilience measures have been built into the design of a development (IEMA, 2020).

16.3 Consultation

Consultation undertaken throughout the pre-application phase informed the approach and the information provided in this chapter (see **Chapter 6** Consultation).

16.4 Assessment Methodology

The GHG assessment predicted emissions arising from construction phase activities associated with the proposed scheme. Once the proposed scheme has been constructed, further maintenance would be minimal and far less than current maintenance activities. Therefore, a GHG assessment of operational phase activities was not carried out.

A CCR assessment was also undertaken to evaluate the resilience and vulnerability of the design and infrastructure associated with the proposed scheme to the projected effects of climate change during its operation. The proposed scheme could be undertaken over the course of a single construction phase of around two years, or over three phases, each lasting approximately nine months with two-year intervals. Under each programme option, completion of the refurbishment works is expected to have taken place by 2027.

Effects of climate change, as distinct from weather, are not considered to be significant during construction and are therefore excluded from consideration in the CCR assessment.

The methodologies for both assessments are set out below.

16.4.1 Construction phase GHG assessment

The GHG assessment was undertaken in accordance with the methodology defined in the GHG Protocol, developed by the World Resources Institute and World Business Council on Sustainable Development (2015).

The term 'GHG' in this assessment encompasses three gases, namely CO₂, CH₄ and N₂O. Emissions of other 'Kyoto' gases are not considered significant in the context of the proposed scheme and they are excluded from consideration. Where practicable, the results in this assessment were expressed in carbon dioxide equivalent (CO₂eq) which recognises that different gases have notably different global warming potential (GWP)¹³.

The emission factors used in the assessment are considered to be representative of GHGs released from present day activities. It is anticipated that many sectors, including shipping, will decarbonise in response to regulations and improvements in technology, thus future emission factors are anticipated to be less carbon intensive. For the purposes of the assessment, emission factors were assumed to remain at present day values to present conservative scenarios.

The assessment quantified GHG emissions, considered to be net contributions to the global system, from the following sources:

- embodied GHG emissions within materials used during construction, particularly concrete and rock;
- the use of construction plant and equipment on site, including the movement of material to the Breakwater via barge and tug;
- marine vessel movements associated with delivery of rock material to the site; and,
- construction road vehicle movements.

The approach to determine GHG emissions from the sources considered in the assessment is provided below.

¹³ GWP of a GHG is a measure of how much heat is trapped by a certain amount of gas in the atmosphere relative to carbon dioxide.

16.4.1.1 Embodied emissions in materials

Embodied GHGs are the total emissions generated to produce a built asset. Emissions of “cradle to (factory) gate” a term which includes: the extraction, manufacture and production of materials to the point at which they leave the factory gate of the final processing location, were calculated for the proposed scheme. Embodied GHG emissions were calculated from expected quantities of concrete and rock, which are the main materials to be used for the proposed scheme.

There are three options being considered for the fabrication of concrete armour units. Two of these options would require a temporary concrete batching plant to be established near to the site, with a third of utilising an existing facility elsewhere. Specific details for the concrete batching plant or the existing precast concrete yard were not available at the time of assessment. Therefore, emission factors for the production of concrete were sourced from the Inventory of Carbon and Energy (ICE) database (Jones & Hammond, 2019).

Rock materials will be delivered to the site from the UK and Norway. At the time of assessment, the exact sources of the rock were not known. Therefore, emission factors for rock were also obtained from the ICE database (Jones & Hammond, 2019). The emission factors from the ICE database are ‘cradle-to-gate’ and, therefore, do not include the transportation of materials to site. Therefore, GHG emissions associated with the delivery of the rock material to the site were considered as part of the assessment in accordance with the methodology detailed in **Section 16.4.1.3**.

Quantities of concrete and rock that will be used in the proposed scheme, and emission factors used to determine embodied GHG emissions are provided in **Table 16-2**.

Table 16-2 Construction materials and embodied GHG emission factors

Material	Quantity Required (Tonnes)	Cradle to Gate Emission Factor (kg CO ₂ e / kg)
Concrete (Tetrapod)	524,750	0.192
Concrete (Chevron)	89,280	0.192
Articulated Concrete Block Mattress	5,625	0.155
Rock	322,192	0.078

16.4.1.2 Construction plant and equipment

Emissions associated with fuel consumption from the main equipment to be used onsite during construction, which at the time of assessment was assumed to be:

- Crane barge;
- Backhoe dredger;
- Jack-up;
- Motor vessel barges (to deliver Tetrapod's and Z-blocks from the concrete batching plant to the Breakwater); and,
- Tug (to manoeuvre the barge into and out of position).

It was assumed that the Tetrapod's and Z-block units produced in the concrete batching plant would be delivered to the Breakwater by a motor vessel barge. In addition, a tug would also be used to assist the barge during transit.

The current best estimates of the number of vessel trips generated by the proposed scheme are detailed in **Table 16-3**. It was assumed that each barge movement would require one hour to transit from the location of the concrete batching plant to the Breakwater.

Table 16-3 Vessel movements for delivery and placement of Tetrapods and Z-blocks

Parameter	Tetrapod unit delivery/placement	Z-block unit delivery/placement
Total number of barges	3	3
Units per trip	30	11
Total number of units	11,592	744
Number of return trips per barge	129	23
Total trips for delivery and placement	774	138

GHG emissions from barge and tug movements during construction were calculated using guidance provided by the GloMEEP Project Coordination Unit and the International Association of Ports and Harbors (GloMEEP & IAPH, 2018). Emissions were calculated from propulsion and auxiliary engines whilst the vessels were cruising, in a Reduced Speed Zone (RSZ) on approach to the Breakwater and manoeuvring into the berth. Engine sizes from the vessels were obtained from vessel manufacturers' specifications. The parameters used to calculate GHG emissions from barge and tug movements are provided in **Table 16-4**. Emission factors were obtained from GloMEEP guidance. The fuel used by the barges and tugs was assumed to be Heavy Fuel Oil (HFO), therefore presenting a conservative scenario.

Table 16-4 Emission parameters for barge and tug movements

Parameter	Barge	Tug
Propulsion Engine Size (kW)	200	5050
Auxiliary Engine Size (kW)	50	85
Operating Hours	1,824	1,824
CO ₂ Emission Factor – Propulsion Engine (g/kWh)	683	683
CO ₂ Emission Factor – Auxiliary Engine (g/kWh)	722	722
CH ₄ Emission Factor – Propulsion and Auxiliary Engines (g/kWh)	0.03	0.03
N ₂ O Emission Factor – Propulsion and Auxiliary Engines (g/kWh)	0.01	0.01

The operating hours for the crane barge, backhoe dredger and the jack-up were unknown at the time of assessment, therefore generic assumptions were adopted to calculate GHG emissions from the use of this equipment, including:

- Construction would take place over a 27-month period (worst case construction programme), and there were assumed to be six working days per week (Monday – Saturday);
- The working day was assumed to be 10 hours per day;
- Emission factors of CO_{2e} for the use of gas oil were obtained from the Department for Business, Energy and Industry Strategy (BEIS) and utilised in the assessment (0.257 kg CO_{2e} / kWh);
- The engines for each of the vehicles were assumed to operate at an average of 80% load across the working day;
- Engine sizes were obtained from example manufacturer specifications, including
 - Crane barge (678 kW);
 - Backhoe dredger (624 kW); and,
 - Jack-up (280kW).

16.4.1.3 Rock deliveries

The rock material required for construction of the proposed scheme is likely to be delivered to the site by marine vessels with a capacity of 21,500 tonnes. The sources of rock within the UK and Norway were unknown at the time of assessment, therefore the following assumptions were adopted:

- Rock material from Norway travelled from Oslo Port to the site, an assumed distance of 2,100 km;
- Rock materials from the UK travelled from a port within 300 km from the site;
- Engine sizes for a general cargo ship greater than 10,000 dwt were obtained from GloMEEP guidance;
- An average cruising speed of 14.6 knots was assumed for each of the vessel movements, which was obtained from GloMEEP guidance; and,
- Emission factors for propulsion and auxiliary engines were obtained from GloMEEP guidance, as detailed in **Table 16-4**.

Further details for the calculation of GHG emissions from the delivery of rock to the site are provided in **Table 16-5**.

Table 16-5 Parameters used to calculate GHG emissions from rock deliveries

Source	Quantity of Material (Tonnes)	Number of Trips	Distance per Trip (km)	Average Cruising Speed (km / hr)	Hours per Trip
Norway	52,416	3	2,100	27.0	78
UK	269,776	13	3,100	27.0	11

16.4.1.4 Construction road vehicle movements

A worst-case scenario could see Heavy Goods Vehicles (HGVs) being used to import concrete from an off-site concrete plant. Therefore, GHG emissions were calculated assuming that these movements take place. It was assumed that concrete would be delivered from the nearby Hanson Ready-mix plant, located at the Caer Glaw Quarry, Gwalchimai, approximately 10 miles (16 km) from Holyhead Port. In addition, GHG emissions from road vehicle movements associated with construction staff travelling to and from the site were calculated. An average trip length of 10 km (each way) was assumed in the assessment, which was considered to be reasonable for the location of the workforce near to the proposed scheme.

The anticipated changes to the fleet make up of light vehicles (in terms of fuel type) for the earliest year of construction, likely to be 2022, was incorporated into the assessment. The forecasted change in the light vehicle fleet was obtained from the Department for Transport (DfT 2019) WebTAG data. Emission factors for HGVs and light vehicles were obtained from BEIS (BEIS, 2020a).

Traffic movements during construction of the proposed scheme were obtained from the Transport Consultants for the project. Assumptions made for this assessment correspond to those made for the transport and air quality assessments undertaken in **Chapter 8** Traffic and Transport. The construction phase traffic movements used to calculate GHG emissions are provided in **Table 16-6**.

Table 16-6 Construction phase road vehicle movements

Source	Quantity of Material (Tonnes)	Number of Trips	Distance per Trip (km)
HGVs	82,368	16	1,317,888
Light vehicles	31,600	10	316,000

16.4.1.5 GHG assessment significance criteria

There is no single preferred method to evaluate the significance of GHG emissions arising from a 'project'. IEMA guidance advises that all releases of GHGs might be considered to be significant, but professional judgement should be used to contextualise a project's GHG budget (IEMA, 2017). The rationale for this approach is that any additional GHG release to the atmosphere contributes to the global greenhouse effect and could compromise the UK's ability to meet its future Carbon Budgets and reduction targets as part of the UK Climate Change Act (2008).

In the absence of sector-based or local emission budgets, the UK national Carbon Budgets, as detailed in **Table 16-1** were used to contextualise emissions arising from the proposed scheme. Construction of the proposed scheme will primarily take place within the period of the 4th UK carbon budget (2023 – 2027), where the five-year budget is 1,950 MtCO_{2e}.

It is recognised that this Carbon Budget was set before the 'Net Zero' 2019 Amendment Order to the 2008 UK Climate Change Act. The 6th Carbon Budget, published in December 2020, was the first Carbon Budget to be released following the adoption of the 2050 Net Zero target by the UK Government, which sets a limit on GHG emissions released in the period 2033 - 2037. However, construction activities associated with the proposed scheme will not take place within the period of the 6th Budget

Emissions from construction activities were considered to be significant if they contributed more than 1% of the UK Carbon Budget in which they arise. This 1% threshold figure was derived from the PAS 2050 Specification (British Standards Institution, 2011), which advises that minor emission sources can be excluded from emission inventories if they contribute less than 1% of the total inventory.

The threshold for determining the magnitude and significance of GHG emissions arising from the proposed scheme is detailed in **Table 16-7**. There are only two categories to describe the magnitude, as the sensitivity of the receptor (the global atmosphere) to increases in GHG emissions is considered to be high.

Table 16-7 Magnitude and significance criteria for the GHG assessment

Magnitude of Change	Criteria Description	Receptor Sensitivity	Impact Significance
Low	GHGs represent less than 1% of the relevant 5-year Carbon Budget in which they arise	High	Minor Adverse
High	GHGs represent more than 1% of the relevant 5-year Carbon Budget in which they arise		Major Adverse

16.4.2 Operational phase CCR assessment

An assessment of the resilience and vulnerability of the design and infrastructure to the projected effects of climate change was undertaken over the operational lifespan of the proposed scheme. This assessment identified the likelihood of climate hazards occurring at the site, and the consequences of identified impacts as a result of the climate hazard.

A four-step methodology was applied for the CCR assessment. The initial stages of the assessment aim to identify the climate variables to which the proposed scheme could be vulnerable to during its lifetime. A more detailed risk assessment was then undertaken following the identification of influencing climate variables, to assess the level of risk associated with the hazards posed by the predicted changes in climate variables.

The approach carried out for each step of the CCR assessment is provided below.

16.4.2.1 Step 1: identifying receptors, climate variables and potential impacts

The first step of the CCR assessment was to identify the climate receptors, climate variables and potential impacts as a result of climate change at the site. Those receptors identified included both known receptors (such as receptors reported / known to have already experienced a climate-related event (i.e., flooding)) and unknown receptors which are yet to be impacted according to available data and literature.

The climate variables likely to change as a result of climate change were identified from data provided in the UKCP18 database (Met Office, 2018) and previous project experience.

16.4.2.2 Step 2: climate vulnerability assessment

Stage 2 consisted of a qualitative assessment (informed by professional judgement and supporting literature) of the proposed scheme to changes in the climate variables. Vulnerability is considered to be a function of:

- The sensitivity of the proposed scheme and any associated infrastructure to climate variables; and,
- The exposure (both spatially and temporally) of the proposed scheme and its associated infrastructure to climate variables.

Both the sensitivity and the exposure of the proposed scheme and its associated infrastructure to climate variables were considered in the vulnerability assessment. This approach attributes either a high, moderate or low sensitivity / exposure categorisation to each vulnerability.

Overall vulnerability is determined by considering the interrelationship between the exposure and the receptor sensitivity, as set out in **Table 16-8**.

Table 16-8 Sensitivity / exposure matrix for determining vulnerability rating

Sensitivity	Exposure		
	Low	Moderate	High
Low	Low vulnerability	Low vulnerability	Low vulnerability
Moderate	Low vulnerability	Medium vulnerability	Medium vulnerability
High	Low vulnerability	Medium vulnerability	High vulnerability

Climate change projection data was obtained from the UKCP18 database, which was used to identify the climate variables within the Study Area for three Representative Concentration Pathways (RCP) (RCP 2.6, RCP 6.0 and RCP 8.5). Data were obtained for the 10th, 50th and 90th percentiles for each RCP.

For those vulnerabilities categorised as medium or high, the risk of climate change to the design and infrastructure of the Facility, and consequently to its operation was then determined through Steps 3-4 of the assessment process.

16.4.2.3 Stage 3: risk assessment

For those vulnerabilities categorised as medium or high, climate-related hazards were identified through professional judgement and previous project experience. The risks of the proposed scheme and its associated infrastructure to the occurrence of a hazard event were qualitatively identified through a hazard likelihood and consequence matrix, as detailed in **Table 16-9**.

Table 16-9 Likelihood / consequence matrix for determining risk rating

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Low	Medium	High	Extreme	Extreme
Likely	Low	Medium	Medium	High	Extreme
Moderate	Low	Low	Medium	High	Extreme
Unlikely	Low	Low	Medium	Medium	High
Very unlikely	Low	Low	Low	Medium	Medium

The descriptors of likelihood and consequence are provided in **Table 16-10** and **Table 16-11**.

Table 16-10 Descriptors of likelihood for climate hazards

Likelihood Rating	Description
Almost certain	The climate hazard is likely to occur numerous times during the anticipated operational lifespan of the proposed scheme
Likely	The climate hazard is likely to occur on several occasions during the anticipated operational lifespan of the proposed scheme
Moderate	The climate hazard will occur on limited occasions during the anticipated operational lifespan of the proposed scheme
Unlikely	The climate hazard will occur infrequently during the anticipated operational lifespan of the proposed scheme
Very unlikely	The climate hazard may occur once during the anticipated operational lifespan of the proposed scheme

Table 16-11 Descriptors of consequence as a result of the climate hazards

Consequence	Description
Insignificant	No damage to infrastructure or the ability of the proposed scheme to function. No adverse effect to the surrounding environs
Minor	Small and localised damage to infrastructure and a minor effect to the proposed scheme to function. Potential for slight adverse effect to the surrounding environs
Moderate	Limited damage to infrastructure requiring maintenance or minor repair, resulting in a potential effect to the proposed scheme to function. Adverse effect to the surrounding environs
Major	Extensive damage to infrastructure requiring major repairs and maintenance, resulting in a severe effect to the proposed scheme to function. Significant adverse effect to the surrounding environs
Catastrophic	Permanent damage to infrastructure, resulting in a severe lasting effect to the proposed scheme to function. Very significant adverse effect to the surrounding environs requiring remediation and restoration

16.4.2.4 Stage 4: mitigation and resilience rating

For climate risks to the proposed scheme or its associated infrastructure identified as ‘medium’ or higher, further mitigation measures were identified by professional judgement. With the proposed mitigation measures taken into consideration, a residual risk rating was assessed. For each hazard, a resilience rating is identified as one of the following:

- High – strong degree of climate resilience. Remedial action or adaptation may be required but is not a priority.

- Moderate – a moderate degree of climate resilience. Remedial action or adaptation is recommended.
- Low – a low level of climate resilience. Remedial action or adaptation is required as a priority.

16.4.2.5 CCR assessment significance criteria

The significance of the CCR assessment was determined through consideration of the residual risk (identified in Step 3) and resilience rating (identified in Step 4) applied to each hazard identified. **Table 16-12** presents the matrix used to identify the overall significance of climate change resilience.

Table 16-12 Significance criteria

Risk Rating	Resilience Rating		
	High	Moderate	Low
Extreme	Significant	Significant	Significant
High	Not significant	Significant	Significant
Medium	Not significant	Not significant	Significant
Low	Not significant	Not significant	Not significant

16.5 Baseline Environment

16.5.1.1 Regional GHG emissions

The BEIS '*Emissions of carbon dioxide for Local Authority areas*' online database discloses the UK's CO₂ net emissions, which in 2018 were estimated at 344,824 kt CO₂ (BEIS, 2020b). CO₂ emissions from the Isle of Anglesey region were 404 kt, which contributed less than 0.1% towards the UK's total. **Table 16-13** presents annual CO₂ emissions in the Isle of Anglesey region from 2005 to 2018.

Table 16-13 Isle of Anglesey Region CO₂ emission estimates 2005-2018 (kt CO₂) (BEIS, 2020b)

Year	Industry and Commercial	Domestic	Transport	Total
2005	423	210	136	808
2006	426	213	137	813
2007	418	206	139	797
2008	375	205	136	749
2009	310	191	132	663
2010	194	206	131	561
2011	179	179	128	513
2012	181	188	125	521
2013	177	180	123	506
2014	157	155	126	462
2015	143	147	129	443
2016	131	137	132	422
2017	125	131	135	411
2018	121	128	136	404

There were 404 kt CO₂ released within the Isle of Anglesey region in 2018, with a relatively even contribution from the industry and commercial, domestic and transport sectors. The data shows that annual CO₂ emissions within the region have decreased by 50% from 2005 to 2018, with reductions in industrial and domestic emissions largely driving this change. Over the same time period, emissions from the transport sector have fluctuated but largely remained at the same level, and in 2018 were 136 kt CO₂.

16.5.1.2 Existing climate

The proposed scheme is situated in the Isle of Anglesey, and currently experiences a 'maritime' climate, which is typical of the UK. Existing climate data for the period 1981 – 2000 were obtained from the Valley meteorological station, which is the most representative station closest to the site, and are provided in **Table 16-14**.

Table 16-14 Existing climate at the Valley Meteorological Station for the period 1981 - 2000 (Met Office, 2021)

Climate Variable	Units	Valley Annual Average	UK Average
Maximum Temperature (average over 12 months)	°C	13.2	12.4
Minimum Temperature (average over 12 months)	°C	7.7	5.3
Days of Air Frost	Days	20.3	54.6
Rainfall	mm	841.1	1,154.0
Days of Rainfall ≥ 1 mm	Days	143	156.0

The climate data in **Table 16-14** shows that temperatures at the site are higher than the UK average, showing the maritime influence of the climate. Annual rainfall at the site is less than the UK average.

16.5.1.3 Projected climate change

Climate change projections were used to identify future risk to existing climatic variability at the site. It is anticipated that the proposed scheme will have a design life of 50 years. As such, climate change projections for 2070 (average weather from 2060 to 2079) in the 25 km² grid square (212500, 237500) where the proposed scheme is located were obtained from the UKCP18 database (Met Office, 2018). Data were obtained for three RCPs scenarios, which are defined in **Table 16-15**. For each of these RCPs, three probabilities were considered, 10% (unlikely), 50% (central estimate of projections) and 90% (projections unlikely to be less than).

Table 16-15 Summary of the RCP emission scenarios

RCP	Atmospheric CO ₂ eq (parts per million) in 2100	Parameters
2.6	421	GHG emissions stay at present levels until 2020, and then start to decline
6.0	670	Decline of global GHG emissions begins around 2080
8.5	936	Increasing global GHG emissions throughout 21 st century

Changes in climate variables for these RCP scenarios in the 2070s were compared to a baseline period of 1981 to 2000, and are displayed in **Table 16-16**.

Table 16-16 Projected climate change at the site in 2070 (from the 1981-2000 baseline), at the 10th, 50th and 90th percentile for three climate scenarios (Met Office, 2018)

Climate Variable	Climate Scenario								
	RCP 2.6			RCP 6.0			RCP 8.5		
	10%	50%	90%	10%	50%	90%	10%	50%	90%
Change in precipitation (%)	-3.7	2.2	8.7	-3.7	2.2	8.8	-3.6	2.3	8.9
Change in mean daily maximum temperature (°C)	0.1	1.1	2.2	0.4	1.6	2.8	0.9	2.4	3.9
Change in mean daily minimum temperature (°C)	0.1	1.0	2.0	0.5	1.6	2.8	1.0	2.3	3.7
Change in mean temperature (°C)	0.1	1.0	2.0	0.4	1.5	2.7	0.9	2.3	3.7

The data contained within **Table 16-16** demonstrate that, under all scenarios, the maximum, minimum and mean daily temperatures are projected to increase at the site. Mean daily maximum temperatures are anticipated to rise between 0.1 °C to 3.7 °C at the site over the lifespan of the project, dependent on the RCP and probability scenario. Changes in precipitation are predicted to be the same for each RCP but vary according to each probability scenario showing the potential for increased or decreased annual precipitation levels.

The projected Sea Level Anomaly (SLA) data, defined as the difference between actual and average sea levels, off the Anglesey coastline were obtained from the UKCP18 database (compared to a 1981 to 2000 baseline), and displayed in **Table 16-17** (Met Office, 2018).

Table 16-17 UKCP18 sea level anomaly data at the application site for 2070

RCP	Sea Level Anomaly (m)		
	10% Probability Scenario	50% Probability Scenario	90% Probability Scenario
2.6	0.16	0.24	0.35
4.5	0.20	0.28	0.41
8.5	0.27	0.38	0.51

16.6 Prediction of Potential Effects During Construction

16.6.1 Construction phase GHG assessment

Construction phase GHG emissions from the activities considered in the assessment are provided in **Table 16-18**.

Table 16-18 Predicted GHG emissions during construction of the proposed scheme

GHG Emission Source	Annual CO ₂ e Emissions (Tonnes)
Embedded Emissions in Materials	140,047
Construction Plant and Equipment	4,768
Rock Deliveries	1,448
Construction Road Vehicle Movements	1,193
Total for Construction	147,456

There was estimated to be 147,456 tonnes of CO₂e released from the activities considered in the construction phase GHG assessment. The largest source of emissions (95%) was predicted to be embedded emissions associated with the extraction and manufacturing emissions associated with materials to be used during construction, including the production of concrete at the batching plant.

Emissions from construction of the proposed scheme contribute approximately 0.008% of the limit set out in the UK 4th Carbon Budget (2023 – 2027). The release of GHGs during construction was therefore considered to be **minor adverse** in accordance with the significance criteria set out in **Table 16-7**.

16.7 Prediction of Potential Effects During Operation

16.7.1.1 Step 1: identifying receptors, climate variables and impacts

This section provides a summary of the climate change variables and the associated potential impacts which could affect the proposed scheme during its operational phase. The main 'receptors' associated with the proposed scheme included the Breakwater itself, and access to the site.

A review of UKCP18 data in **Table 16-16** and **Table 16-17** identified that the likely change in climate variables over the operational lifespan of the proposed scheme are:

- Increased temperatures;
- Surface water flooding through extreme precipitation events;
- Sea level rise; and,
- Storm surges.

The potential impacts associated with changes to the identified climate variables to the key receptors associated with the proposed scheme are provided in **Table 16-19**.

Table 16-19 Potential impacts associated with the identified climate variables

Receptors	Climate Variable	Impacts
Breakwater	Temperature	Deterioration of materials and condition of infrastructure
	Flood risk (surface)	Damage to Breakwater through water erosion from infiltration into materials
	Sea level rise	Overtopping of the breakwater causing disruption at Holyhead Port Stability of the rubble mound surrounding the Breakwater
	Storm surges	Overtopping of the breakwater causing disruption at Holyhead Port Stability of the rubble mound surrounding the Breakwater
Access	Flood risk (surface)	Prevention of access to the proposed scheme
	Sea level rise	
	Storm surges	

The vulnerability, and by extension the resilience, of the proposed scheme to these climate parameters were considered at Step 2 of the CCR assessment.

16.7.1.2 Step 2: climate vulnerability assessment

The vulnerability of the receptors associated with the proposed scheme to the climate variables was identified in accordance with the criteria set out in **Table 16-8** and is provided in **Table 16-20**.

An increase in air temperature and surface flood risk (through an increase in heavy precipitation events) is considered to be unlikely to affect the infrastructure and components associated with the proposed scheme or result in loss of functionality. The proposed scheme was therefore considered to have a low exposure and sensitivity to these climate variables. In accordance with the criteria detailed in Table 16-8, the vulnerability of the proposed scheme to increases in the air temperature and surface water flood risk was considered to be **low**.

The Breakwater is a fundamental component of Holyhead Port, offering protection to a number of buildings and refuge within Holyhead Harbour. The exposure, sensitivity and therefore vulnerability of the proposed scheme to changes in the sea level rise and storm surge climate variables was therefore considered to be **high**.

Table 16-20 Climate vulnerability assessment

Climate Variable	Impacts	Exposure	Sensitivity	Vulnerability
Temperature	Deterioration of materials and condition of infrastructure	Low	Low	Low
Flood risk (surface)	Damage to Breakwater through water erosion from infiltration into materials	Low	Low	Low
	Prevention of access to the proposed scheme			
Sea level rise	Overtopping of the Breakwater causing disruption at Holyhead Port	High	High	High
	Stability of the rubble mound surrounding the Breakwater			
	Prevention of access to the proposed scheme			
Storm surges	Overtopping of the breakwater causing disruption at Holyhead Port	High	High	High
	Stability of the rubble mound surrounding the Breakwater			
	Prevention of access to the proposed scheme			

The assessment identified that the proposed scheme was potentially vulnerable to sea level rise and storm surges. Therefore, an assessment of the impacts and associated risks of an increase in these climate variables was considered in Step 3 of the CCR assessment. The proposed scheme was considered to have low vulnerability to an increase in temperature and surface water flooding, therefore these climate variables were not considered further in the assessment.

16.7.1.3 Step 3: risk assessment

The risks of the proposed scheme to sea level rise and storm surges were qualitatively identified in **Table 16-21** through the hazard likelihood and consequence matrix detailed in **Table 16-9**. The proposed scheme has a design life of 50 years and has been designed to resist a 100-year extreme event, taking into account a 1 in 100-year wave height, combined with a 1 in 100-year storm surge and 50 years of sea level rise. It is therefore considered to be **very unlikely** that impacts to the proposed scheme associated with sea level rise and storm surges would occur.

The consequence of overtopping of the Breakwater was derived to be **moderate**, as there is the potential for an adverse effect to operations of Holyhead port. The consequence of the stability of the rubble mound around the Breakwater was also considered to be **moderate**, as this is likely to result in repair or maintenance works being required. The consequence of prevention of access to the proposed scheme was considered to be **insignificant**.

Table 16-21 CCR risk assessment

Climate Variable	Impacts	Likelihood	Consequence	Risk Rating
Sea level rise	Overtopping of the Breakwater causing disruption at Holyhead Port	Very unlikely	Moderate	Low
	Stability of the rubble mound surrounding the Breakwater	Very unlikely	Moderate	Low
	Prevention of access to the proposed scheme	Very unlikely	Insignificant	Low
Storm surges	Overtopping of the Breakwater causing disruption at Holyhead Port	Very unlikely	Moderate	Low
	Stability of the rubble mound surrounding the Breakwater	Very unlikely	Moderate	Low
	Prevention of access to the proposed scheme	Very unlikely	Insignificant	Low

Due to the adopted design criteria, the risk rating of the proposed scheme from sea level rise and storm surges was considered to be **low** in accordance with the matrix detailed in **Table 16-9**.

16.7.1.4 Step 4: mitigation and resilience rating

As the risk rating for proposed scheme from sea level rise and storm surges was determined to be **low**, not further mitigation was recommenced. The climate resilience rating was determined to be **high**, where the proposed scheme has a strong degree of climate resilience.

Therefore, in accordance with the significance criteria detailed in **Table 16-12**, the projected effects of climate change to the proposed scheme are considered to be **not significant**.

16.8 Summary

A GHG assessment was undertaken to consider GHG emissions during the construction phase of the proposed scheme. The construction phase assessment considered emissions from embedded emissions in construction materials, use of plant and equipment and delivery of rock to the site.

The results of the GHG assessment highlighted that construction phase and emissions would have a minor adverse impact and would not have a material effect on the UK's ability to meet its Carbon Budgets or the requirements of the Climate Change Act 2008.

A CCR assessment was carried out to determine the vulnerability of the proposed scheme to projected climate change over the lifespan of the proposed scheme. The assessment determined that, with the adoption of the design criteria for the proposed scheme, the impact of future climate changes would be not significant.

17 Cumulative Impact Assessment

17.1 Introduction

In addition to the determination of the potential impacts from the proposed scheme in isolation, the EIA Regulations require that an assessment must be made of the potential for cumulative effects, which considers the impacts from the proposed scheme cumulatively with other proposed projects.

A useful ground rule in EIA is that the environmental effects of any other development that is already built and operational is effectively included within the baseline conditions, so such effects are already taken account of in the EIA process and can be excluded from the Cumulative Impact Assessment (CIA); however, projects that are in the planning process need to be considered. Any that are ahead of the development being assessed (i.e. likely to be submitted or receive consent before the development being assessed or are currently being built) must be taken into account during a CIA. Any that are substantially further back in the planning process and are unlikely to be submitted or get consent until after the development being assessed, can be disregarded because the developer of that project should be taking the effects of the current development into account in their own EIA.

The key aspects for consideration when undertaking CIA are:

- The temporal and geographic (spatial) boundaries of the effects of activities;
- Interactions between the activities and the environment;
- The environmental effects of the project (including future projects and activities); and,
- Thresholds of sensitivity of the existing environment.

CIA is limited to those plans and projects for which sufficient information exists to allow consideration of the potential for such an effect to arise. In the absence of such publicly available data, it is not possible to undertake a detailed cumulative assessment, but it is possible to make judgements on the likely potential impacts on the basis of the characteristics of the other projects being considered and whether there is the potential for the impacts of the various projects to interact spatially or temporally.

The potential in-combination effects on NSN sites (as required under the Habitats Regulations) are addressed separately in **Chapter 20** Shadow Habitats Regulations Assessment.

17.2 Planned Developments

The following projects are either at the proposal or planning stage, as identified through consultation with NRW and the IoACC (see **Chapter 6** Consultation):

- Holyhead Waterfront Regeneration Scheme;
- Holyhead Marina Re-build;
- Holyhead Port Expansion;
- Maintenance Dredging at Holyhead Port;
- Morlais (West Anglesey) Demonstration Zone;
- Penrhos Leisure Village;
- Anglesey Eco Park and Biomass Energy Centre;
- Parc Cybi Stage 2;
- Wyfla Newydd Nuclear Power Plant;
- Holyhead Deep Tidal Array;



- Penrhos Business units;
- Anwyl Homes - Residential development at South Stack Road (Phase 1);
- Anwyl Homes - Residential development at South Stack Road (Phase 2); and,
- Huws Gray - Builders Merchant Yard.

To assess potential for cumulative effects, a 'screening' assessment has been carried out to determine whether any of the above projects have the potential to give rise to cumulative impacts with the proposed scheme and, therefore, whether further assessment is required.

When screening those projects which merit further consideration in the CIA, the following questions were asked:

- Does the project benefit from planning permission / any other form of consent?
- Has a planning application been submitted, or is there any readily available and accessible environmental information specific to the project?
- When considering the nature of the project, is there a reasonable prospect that the project is likely to be constructed in a similar timeframe to the Proposed Development? and,
- Is the project located within a reasonable spatial extent such that cumulative environmental impacts are possible?

The findings of the screening assessment are presented in **Table 17-1**.

Project related

Table 17-1 Screening assessment undertaken to identify the scope of the CIA

Project	Distance to project	Brief Description	Current Situation	Comment
Holyhead Waterfront Regeneration Scheme	Adjacent	A joint venture between Stena Line and Conygar Investment Company PLC (Conygar), who are proposing a mixed-use marina development on Newry Beach, Holyhead. This development will include 326 dwellings, a 250-berth marina and marine related retail, leisure, restaurants hotel and office space. Outline planning permission for this development was granted in 2014; however, no development works have begun.	An Environmental Scoping Report was submitted in 2020 for a revised scheme to that consented in 2014. Applications for a Marine Licence and Planning Permission are expected to be submitted in Q2 2021.	As it is currently unknown when the project will commence, it is assumed that any activity undertaken as part of the Holyhead Waterfront Regeneration Scheme may occur during construction of the proposed scheme. Consequently, this project has been screened in for further assessment.
Holyhead Marina Re-build	Adjacent	Following its destruction during Storm Emma there are plans to provide new marina facilities in the same location, possibly protected by hard breakwater structures.	This project is currently in the pre-application phase. Scoping response was issued in 2020 referring the project to EIA	No information is currently available on this project and no consent applications have been made. It is considered that any cumulative effects would be assessed by the EIA that supports the consent applications for this development and therefore this project has been screened out of further assessment.
Anwyl Homes - Residential development at South Stack Road (Phase 2)	0.85km	Construction of 46 dwellings together with the creation of a new vehicular site access on land adjacent to Parc Tyddyn Bach, Holyhead.	Development started on 11/02/2020. An application to discharge condition (04) (Remediation measures) from the planning permission was submitted on 17/03/2021.	It is considered highly likely that this development will be completed prior to works on the proposed scheme commencing. Furthermore, given the small scale of this development and limited potential environmental impacts from the proposed scheme, cumulative impacts are considered unlikely. As such, this project has been screened out of further assessment.
Holyhead Port Expansion	1.1km	Stena Line is proposing to expand the Port through the reclamation of two areas to provide new berths and associated landside areas for port-related use.	Applications for a Marine Licence and a Harbour Revision Order were submitted in 2020. At the time of writing, the consents were being determined.	It is considered that the timing of the construction of this project could overlap with the construction of the Holyhead Port Expansion project. Therefore, there is the potential for cumulative impact during the construction phase. Consequently, this project has been screened in for further assessment. It should be noted however that the Holyhead Port Expansion also proposes to have a concrete batching plant located on Salt Island. Given there would not be enough room for two concrete batching plants on Salt Island, if the construction phase of two projects overlap, the concrete armour units would be sourced off site.
Maintenance Dredging at Holyhead Port	1.1km	Stena Line Ports holds a Marine Licence under Part 4 of the Marine and Coastal Access Act	The current licence DML1935 is valid from 23 December	As maintenance dredging at Holyhead Port is an ongoing activity required for the operation of the port the impacts are

Project related

Project	Distance to project	Brief Description	Current Situation	Comment
		2009, to undertake Maintenance Dredging at Holyhead Port.	2019 to 22 December 2022 for up to 99,000 tonnes per year.	considered as part of the baseline conditions of the area. Therefore, this activity has been screened out of further assessment.
Anwyl Homes - Residential development at South Stack Road (Phase 1)	1.2km	Construction of 123 detached and semi-detached homes at Parc Tyddyn Bach, Holyhead. Development on an 11 acre site.	Development completed.	As the development has been completed, it has been considered as part of the baseline and this project has been screened out of further assessment.
Morlais (West Anglesey) Demonstration Zone	2.4km (onshore works)	Menter Mon Cyf are proposing a tidal demonstration array to the south of the former Holyhead Deep disposal site. The proposals also incorporate offshore electrical infrastructure, offshore inter-array cables, landfall and onshore cable route and an onshore substation. The landfall for the export cable from the WADZ is expected to be at Penrhos Beach on the west of the island. (Royal HaskoningDHV, 2015).	The project is currently under examination.	<p>The onshore works are currently estimated to overlap with the construction schedule of the proposed scheme; however, given the distance the works are to the proposed scheme, no cumulative impacts are considered possible and as such the onshore works have been screened out of further assessment.</p> <p>Due to the distance of the offshore works to the proposed scheme it has been considered that there is no potential for cumulative impacts and the offshore works have been screened out of further assessment.</p>
Penrhos Business units	3.2km	Redeveloping a former heliport into business units, includes a total floor space of 982m ² . The development will provide a service yard, 24 car parking spaces, bike stands and bin stores.	An application for planning permission was submitted in December 2020; however, the application has subsequently been withdrawn.	As the application has been withdrawn, this project is considered to no longer be going ahead and no cumulative impacts are possible. As such the onshore works have been screened out of further assessment.
Huws Gray - Builders Merchant Yard.	3.3km	Developing a new outlet at Holyhead's Parc Cybi estate, including a warehouse and a sales floor area. Construction of a new vehicular site access, storage yard, and loading areas.	Gained a planning permission 22/11/2018. Applied to discharge condition (programme of archaeological work); the condition was partially discharged. Not known if construction has commenced.	Due to the distance of this project in relation to the proposed scheme, no cumulative impacts are considered possible and as such the onshore works have been screened out of further assessment.
Penrhos Leisure Village (Land and Lakes)	3.5km	Land and Lakes and Bluestone Development have planning permission to construct a luxury holiday destination on the Penrhos Estate, including 500 lodges, restaurants, a spa and water park. Planning permission granted in 2016.	Reserved matters application granted for boardwalk walkways, walkways construction expected to start late 2021. Later development	Due to the distance of this project in relation to the proposed scheme and limited onshore works associated with it, no cumulative impacts are considered possible and as such the onshore works have been screened out of further assessment.

Project related

Project	Distance to project	Brief Description	Current Situation	Comment
			phases expected to start from 2022, but dependent on further application processes.	
Anglesey Eco Park and Biomass Centre	4.6km	Orthios Group is proposing a 299MW Energy Centre and Eco Park in Penhros, Holyhead, which would comprise: a 299MW biomass power station with aquaculture and hydroponic facilities, a compostable food packaging facility and a deep-water jetty for bulk import. Currently two proposals are being put forward for the project, a Polymer Processing Centre and a Biomass Processing Centre. There is also a proposal for a Modular Air Compression Centre.	In January 2021, the project received a Coronavirus Business Interruption Loan to enable the development of a Plastics-2-Oil facility. Facilities have been built on site, but there is ongoing maintenance and construction for new facilities.	Due to the distance of this project in relation to the proposed scheme, no cumulative impacts are considered possible and as such the onshore works have been screened out of further assessment.
Wylfa Newydd Nuclear Power Station	15km	Horizon Nuclear Power are proposing the construction of a new nuclear power station. The site is on land beside the former Magnox Wylfa Power Station, which is now being decommissioned.	The Development Consent Order (DCO) was submitted in June 2018, however in January 2019; however, the application was withdrawn on 21 January 2021.	As the DCO application has been withdrawn, this project is considered to no longer be going ahead and no cumulative impacts are possible. As such the onshore works have been screened out of further assessment.
Holyhead Deep Tidal Array	16km	In 2014, Minesto was awarded a lease from the Crown Estate for a 10MW installation for low-flow tidal stream energy production. In May 2018 a 0.5MW device was installed. Following successful deployment and testing of the device Minesto plan to install further devices to expand the site to its 10MW capacity. In 2017, Minesto submitted a Scoping Report for an 80MW extension to the Holyhead Deep tidal array which would occur in three phases. Construction of Phase 2 was planned to start in 2021 and will be 10MW (20 devices).	An apparent halt in applications beyond Phase 1 means that there is no estimated timeline for the continuation of the works and it is unknown if the proposed scheme will overlap temporally or spatially.	Given the halt in applications, this project has been scoped out of further assessment. Future applications associated with the project would be expected to consider cumulative effects with the proposed scheme.

17.3 Assessment of Cumulative Effects

Based on the screening process in **Section 17.2**, the projects taken forward for further assessment are:

- Holyhead Waterfront Regeneration; and,
- Holyhead Port Expansion.

The next stage of the CIA process comprises an assessment of the potential impacts that could occur cumulatively with the projects identified above. This assessment is presented in **Table 17-2** for those topics where significant cumulative impacts have the potential to arise.

Table 17-2 Cumulative Impact Assessment

Topic	Cumulative Impact Assessment
Holyhead Waterfront Regeneration Scheme	
Traffic and Transport	<p>The conclusions of the submitted Holyhead Waterfront Regeneration Scheme ES (2020) and associated Transport Assessment indicated that no significant impacts would be observed on shared links (Link 1 and 2) within the proposed scheme traffic and transport study area.</p> <p>The Scoping Report submitted on a revised Holyhead Waterfront Regeneration Scheme considered a reduced scale of development, in transport terms. Thus, the revised Holyhead Waterfront Regeneration Scheme is not considered to create significant cumulative traffic and transport impacts.</p>
Noise and Vibration	<p>Predicted noise levels from construction works associated with the proposed scheme would be below the BS 5228 criteria at all NSRs.</p> <p>Given this, it is considered that there is no potential for significant cumulative noise impacts to arise from the proposed scheme's construction works and those associated with the Holyhead Waterfront Generation Scheme.</p>
Marine Ecology	<p>Given that no INNS, in particular <i>D. vexillum</i>, were recorded during the marine ecology surveys undertaken to inform this EIA and the mitigation measures that have been recommended, no cumulative impacts on the spread of INNS would arise.</p> <p>The proposed scheme would result in a relatively short loss of intertidal and subtidal habitats, whilst the concrete armour becomes colonised. Given the impact would be temporary, no significant cumulative impacts with the Holyhead Waterfront Regeneration Scheme on marine ecology would arise.</p>
Ornithology	<p>Minor potential impacts have been predicted on nesting and foraging breeding waterbirds using the coastline to the west of Soldier's Point (including the coastal component of Chwarel Morglawdd Caergybi LWS, which would be managed through best practice measures. Given this, and the fact that the impacts would be temporary, no significant cumulative impacts with the Holyhead Waterfront Regeneration Scheme on ornithology would arise.</p>
Terrestrial Ecology	<p>Potential impacts to terrestrial ecology as a result of the proposed scheme are considered to be limited and managed through best practice measures. Given this, and the fact that the impacts would be temporary, no significant cumulative impacts with the Holyhead Waterfront Regeneration Scheme on terrestrial ecology would arise.</p>
Cultural Heritage	<p>Given the Holyhead Waterfront Regeneration Scheme is directly adjacent to the proposed scheme, there may be heritage assets coincident to both schemes which could be subject to cumulative direct impact; however, with the application of appropriate mitigation for both schemes including avoidance (AEZs) and the implementation of an Archaeological Reporting Protocol to address unexpected discoveries, significant cumulative direct impacts are not anticipated to occur.</p> <p>Should the construction phases of the two schemes overlap, there is potential for cumulative impacts to the setting of the Breakwater and Lighthouse, and other designated heritage assets; however, this disturbance would be temporary and short lived and, when considered against the baseline of the busy port environment, is considered to not be significant.</p> <p>During operation, an assessment of potential impacts to the setting of the Breakwater and Lighthouse, and other coastal heritage assets (including the Conservation Areas) has been undertaken for the Holyhead Waterfront Regeneration Scheme. The assessment concluded that, with design sympathetic to the existing character of the surrounding principal buildings and historic landscapes, particularly within the Holyhead Beach Conservation Area, and the proposed renovation and redevelopment of Soldier's Point House, the Screen Wall to Soldier's Point House and Porth-y-Felin House, potential impacts would overall be beneficial. As such, adverse cumulative impacts upon the setting of the Breakwater and Lighthouse are not anticipated.</p>

Topic	Cumulative Impact Assessment
Holyhead Port Expansion	
Traffic and Transport	<p>The Traffic and Transport Chapter of the Holyhead Port Expansion ES (Royal HaskoningDHV, 2019) considered that the residual impact for all shared highway links (Links 1 to 4) to be not significant for both the construction and operational phases of the project.</p> <p>The maximum increase in total traffic of 5.5% on Link 4 (A55, north of the A55/A5 junction) is well below the 10% increase in flows set out in the GEART screening thresholds for a low sensitive link and would be considered negligible.</p> <p>Thus, potential cumulative impacts on the identified links shared between the proposed scheme and the Holyhead Port Expansion project are not considered to be significant.</p>
Air Quality	<p>The most conservative traffic flows from both the Holyhead Port Expansion project and the proposed scheme have been included in the traffic flows used in this air quality assessment (see Appendix 9-2 for traffic data), where the same links are used by construction traffic. Furthermore, the maximum predicted vessel contributions from the Holyhead Port Expansion project have been included in the future year (2022) scenarios used in the Air Quality assessment. The impact assessment is therefore inherently cumulative and potential impacts are not significant.</p>
Noise and Vibration	<p>Predicted noise levels from construction works associated with the proposed scheme would be below the BS 5228 criteria at all NSRs.</p> <p>Given this, it is considered that there is no potential for significant cumulative noise impacts to arise from the proposed scheme's construction works and those associated with the Holyhead Port Expansion Project.</p>
Marine Ecology	<p>Given that no INNS, in particular <i>D. vexillum</i>, were recorded during the marine ecology surveys undertaken to inform this EIA and the mitigation measures that have been recommended, no cumulative impacts on the spread of INNS would arise.</p> <p>The proposed scheme would result in a relatively short loss of intertidal and subtidal habitats, whilst the concrete armour becomes colonised. Given the impact would be temporary, no significant cumulative impacts with the Holyhead Port Expansion Project on marine ecology would arise.</p>
Ornithology	<p>The minor visual / acoustic disturbance impacts to ornithology identified for the proposed scheme are geographically different, i.e. to the west of the Breakwater, to those identified for the Holyhead Port Expansion Project. As such cumulative impacts to ornithology during construction would not arise.</p>
Cultural Heritage	<p>As there is no geographical overlap between the footprint of the proposed Holyhead Port Expansion with the currently proposed scheme, there is no pathway for cumulative direct impacts to archaeological and cultural heritage during construction. Cumulative impacts upon the setting on heritage assets are not considered likely to occur given the siting of the two developments.</p>

18 Summary of Potential Impacts and Mitigation Measures

18.1 Introduction

Table 18-1 and **Table 18-2** provide an overall summary of the findings of the EIA Report for the receptors where further assessment work has been undertaken, including:

- Coastal Processes;
- Traffic and Transport;
- Air Quality;
- Noise and Vibration;
- Marine Ecology;
- Ornithology;
- Terrestrial Ecology;
- Visual Setting;
- Cultural Heritage; and,
- Climate Change.

Table 18-1 and **Table 18-2** list the potential environmental impacts that are predicted to arise during the construction and operational phases of the proposed scheme, respectively. The significance of each of the potential impacts is stated, along with any recommended mitigation measures to avoid or reduce adverse impacts. The residual impact (i.e. the significance of the potential impact remaining following mitigation) is also stated.

Table 18-1 Summary of the significance of potential environmental impacts, mitigation, and residual impacts during the construction phase of the proposed scheme

Potential Impacts	Significance	Mitigation	Residual Impacts
Coastal Processes			
Potential increase in suspended sediment due to armour placement.	Negligible	None Proposed	Negligible
Potential deposition of suspended sediment due to armour placement.	Negligible	None Proposed	Negligible
Traffic and Transport			
Construction phase effects on all highway links through severance, pedestrian, and cycle amenity, road safety and driver delay.	Not significant	None Proposed	Not significant
Air Quality			
Construction phase dust and particulate matter.	N/A	Best practice dust minimisation and suppression techniques	Not significant
Construction phase road traffic emissions.	Not significant	N/A	Not significant
Construction phase vessel emissions.	Not significant	N/A	Not significant
Noise and Vibration			
Daytime	Negligible	None	Not significant
Evening	Negligible	None	Not significant
Night-time	Negligible	None	Not significant
Marine Ecology			
Direct loss of species and habitats within the footprint of the Proposed Scheme	Minor adverse	None	Minor adverse
Spread of invasive species, i.e. <i>D. vexillum</i>	Minor adverse	Project specific Biosecurity Plan	Minor adverse
Ornithology			
Nonbreeding birds	N/A	N/A	N/A
Breeding Terns	N/A	N/A	N/A

Potential Impacts		Significance	Mitigation	Residual Impacts
Disturbance and displacement	Breeding Chough	N/A	N/A	N/A
	Water birds	Minor adverse	None	Minor adverse
	Black Guillemot	Minor adverse	None	Minor adverse
Terrestrial Ecology				
Holy Island Coast / Glannau Ynys Gybi SSSI	None	No change	NA	No change
Holyhead Breakwater Quarry / Chwarel Morglawdd LWS	Direct impacts of potential land take causing damage to ecological interest features.	Moderate adverse	A fenced off buffer zone should be established and maintained between the LWS and the proposed storage area at Soldier's Point.	Negligible
	Indirect impacts of increased light levels causing disturbance to species.	Minor adverse	Locating and directing lighting away from LWS.	Minor adverse
Terrestrial habitats	Direct impacts of land use causing habitat damage and loss.	Minor adverse	None required.	Minor adverse
	Indirect impacts of changes in air quality causing damage to habitats.	Negligible	None required.	Negligible
Badger	Direct impacts of construction work causing injury and/or death of protected species.	Negligible	Ecological site walk-over to confirm absence.	Negligible
	Indirect impacts of increased light levels and human activity causing disturbance to species.	Negligible	None required.	Negligible
Bats	Direct impacts of construction work causing injury and/or death of protected species.	No change	None required.	No change
	Indirect impacts of lighting and human activity on foraging and commuting.	Minor adverse	Following accepted good practice guidance (Bat Conservation Trust (BCT) and Institute of Lighting Professionals (ILE), 2018).	Minor Adverse
Common lizard/slow worm	Direct impacts of construction work causing injury and/or death of protected species.	Minor adverse	Vegetation clearance to 5cm and dismantling any potential refugia 48-hours before commencing works. Ecological site walk-over to confirm absence.	Negligible

Potential Impacts		Significance	Mitigation	Residual Impacts
	Indirect impacts of habitat loss at causing reduced foraging and basking opportunity.	Negligible	None required.	Negligible
Japanese knotweed	Potential to spread Schedule 9 species.	Moderate adverse	Invasive species management plan, toolbox talks and biosecurity measures to reduce the risk of spread.	Minor Adverse
Visual Setting				
	Temporary visual effects on landside views should Salt Island be used as a delivery facility and concrete-batching centre	Minor adverse	Good site management, measures proposed for noise and air quality	Minor Adverse
	Temporary visual effects on landside views from Soldier's Point and Anglesey Coastal Path should Soldier's Point be used as a delivery facility and concrete-batching centre	Moderate adverse	Good site management, measures proposed for noise and air quality	Minor Adverse
	Temporary visual effects on landside views from Newry Beach should Soldier's Point be used as a delivery facility and concrete-batching centre	Minor adverse or less	Good site management, measures proposed for noise and air quality	Minor Adverse
Cultural Heritage				
Direct (physical) impacts to historic assets	Designated historic assets (Breakwater 5743 and Lighthouse 5744)	Major Beneficial	None Proposed	Major Beneficial
	All other designated historic assets	No Impact	None Proposed	No Impact
	Non-designated historic assets (onshore) (Breakwater Quay PRN 34000 and Structure PRN 34025)	Minor Adverse	Fencing/demarcation to protect structure	Minor Adverse
	Non-designated historic assets (onshore) (Folly PRN 7166 and Battery PRN 34026)	Negligible	None Proposed	Negligible
	All other non-designated historic assets (onshore)	No Impact	None Proposed	No Impact
	Non-designated historic assets (offshore) within working area: <ul style="list-style-type: none"> Unnamed 'DEAD' Wrecks (NPRN 506416 and NPRN 506418) Named wrecks <i>Kirkmichael</i> (NPRN 271901), <i>Osseo</i> (NPRN 272227) and <i>HMS Campina</i> (NPRN 272401) Previously undiscovered wrecks and isolated finds, including finds associated with <i>Star of the Sea</i> (NPRN 271985)	Moderate Adverse	AEZs for named wrecks/ Archaeological Reporting Protocol	Minor Adverse
	All other non-designated historic assets (offshore)	No Impact	None Proposed	No Impact

Potential Impacts		Significance	Mitigation	Residual Impacts
Indirect (physical) impacts to historic assets from changes in coastal processes	Known and potential non-designated historic assets (offshore)	No Impact	None Proposed	No Impact
Impacts to the setting of historic assets	Designated heritage assets within 3km of the proposed scheme	No Impact (no change to heritage significance)	None Proposed	No Impact
	Holyhead Breakwater and Lighthouse	Moderate adverse	None Proposed	Moderate adverse
Climate Change				
Sea level rise	Overtopping of the Breakwater causing disruption at Holyhead Port	Very unlikely	Moderate	Low
	Stability of the rubble mound surrounding the Breakwater	Very unlikely	Moderate	Low
	Prevention of access to the proposed scheme	Very unlikely	Insignificant	Low
Storm surges	Overtopping of the Breakwater causing disruption at Holyhead Port	Very unlikely	Moderate	Low
	Stability of the rubble mound surrounding the Breakwater	Very unlikely	Moderate	Low
	Prevention of access to the proposed scheme	Very unlikely	Insignificant	Low

Table 18-2 Summary of the significance of potential environmental impacts, mitigation, and residual impacts during the operational phase of the proposed scheme

Potential Impacts		Significance	Mitigation	Residual Impacts
Coastal Processes				
Potential changes to tidal currents due to the presence of the refurbished Breakwater		Negligible	None Proposed	Negligible
Potential changes to waves due to the presence of the refurbished Breakwater		Negligible	None Proposed	Negligible
Potential changes to sediment distribution and transport due to the presence of the refurbished Breakwater		Negligible	None Proposed	Negligible
Visual Setting				
Long-term visual effects on receptors along the Anglesey Coastal Path on the seaward side of the Breakwater		Moderate or minor adverse	None	Moderate or minor adverse
Long-term visual effects on views from the Breakwater		Moderate adverse	None	Moderate adverse
Long-term visual effects on views from the AONB		Minor adverse or less	None	Minor adverse or less
Long term visual effects on views from Listed Buildings		Moderate adverse	None	Moderate adverse
Cultural Heritage				
Direct (physical) impacts to historic assets	Known and potential designated and non-designated historic assets (offshore)	No Impact	None Proposed	No Impact
	Holyhead Breakwater and Lighthouse	Major beneficial	None Proposed	Major beneficial
Indirect (physical) impacts to historic assets from changes in coastal processes	Known and potential non-designated historic assets (offshore)	No Impact	None Proposed	No Impact
Impacts to the setting of historic assets	Designated heritage assets within 3km of the proposed scheme	No Impact (no change to heritage significance)	None Proposed	No Impact
	Holyhead Breakwater and Lighthouse	Major adverse	Level 4 Building Record	Minor Adverse

19 Water Framework Directive Compliance Assessment

19.1 Introduction

The WFD is transposed into national law by means of the Water Environment (WFD) (England and Wales) Regulations 2017, as amended by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019. These Regulations provide for the implementation of the WFD, from designation of all surface waters (rivers, lakes, transitional (estuarine) and coastal waters and ground waters) as water bodies to the requirement for achievement of good ecological status or good ecological potential by 2021.

The WFD applies to all water bodies, including those that are man-made. The consideration of the proposed scheme under the WFD will, therefore, apply to all water bodies that have the potential to be impacted by the proposed works.

Classification schemes for both estuarine and coastal waters from Mean High Water Springs (MHWS) out to one nautical mile (nm) have been developed in response to the WFD. The scheme classifies the status of Transitional and Coastal Waters (TRaC) using information on the ecological, chemical and hydromorphological quality of a body of water. For TRaC water bodies that have been designated as heavily modified (HMWB), NRW classifies according to ecological potential rather than status.

Additional information to support the WFD assessment is provided separately in the following appendix:

- Appendix 19-1: WFD Stage 3 Scoping Tables.

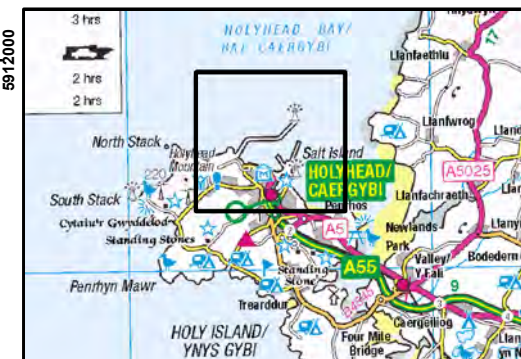
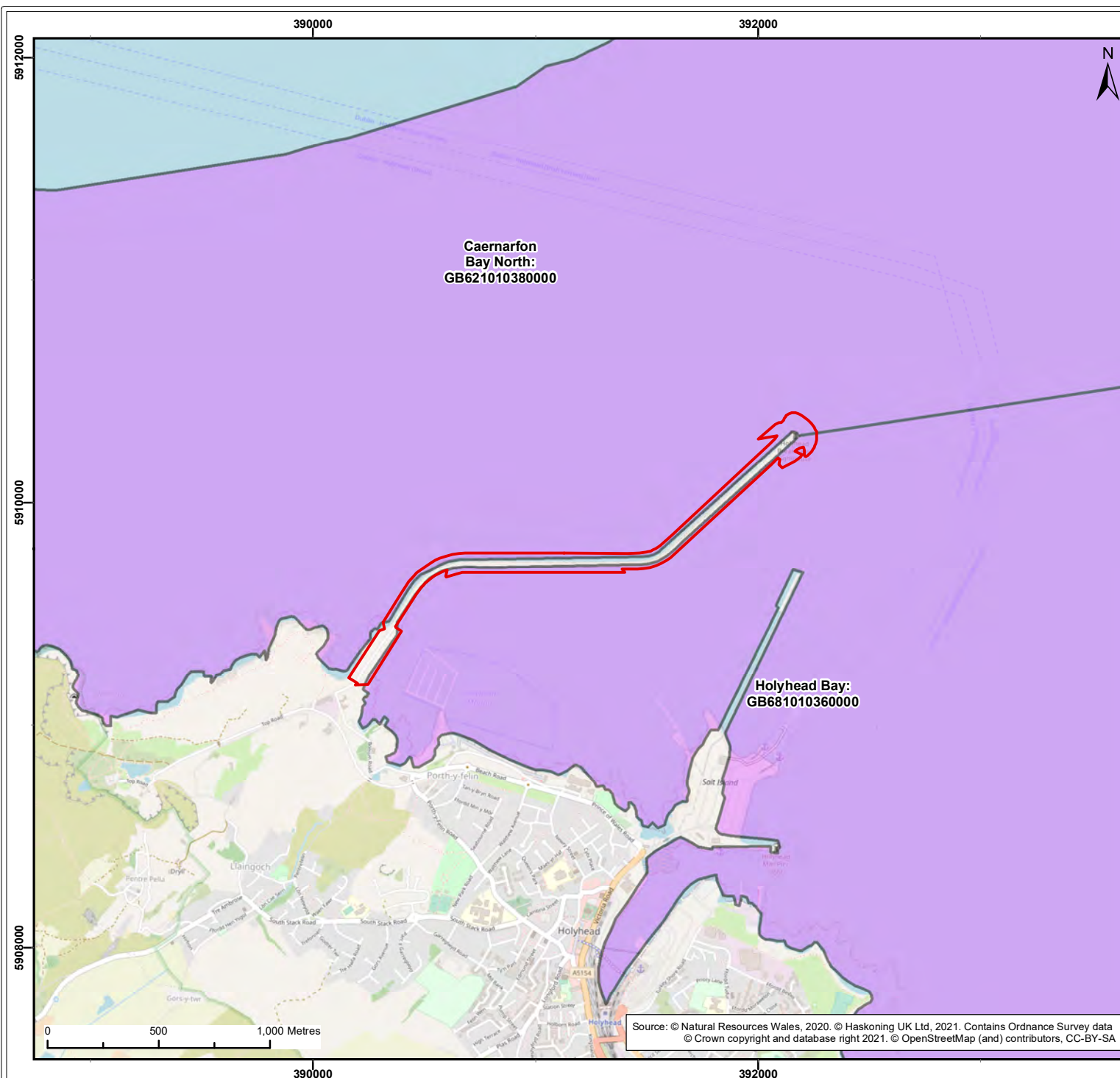
19.2 The WFD Compliance Assessment Process

This assessment has been carried out in line with the internal NRW guidance '*OGN 72 Guidance for assessing activities and projects for Compliance with the Water Framework Directive*' (Natural Resources Wales, 2018) which replaces the Environment Agency's guidance '*Clearing the Waters on dredging and disposal activity in coastal and estuarine environments*' (Environment Agency, 2010). It has also been supplemented by the Environment Agency's guidance '*Clearing the Waters For All*' (Environment Agency, 2017) to ensure consistency of process. The OGN 72 guidance details a three-step process as follows:

- Screening: excludes any activities that do not need to go through the scoping and impact assessment stages;
- Scoping: identifies the receptors that are potentially at risk from the activity and need impact assessment; and,
- Detailed assessment: considers the potential impacts of the activity on surface and ground water bodies, identifies ways to avoid or minimise impacts, and identifies if the activity may jeopardise the water body achieving good status.

19.3 Screening

According to the guidance, activities are considered low risk (in terms of jeopardising a water body achieving good status) if they fall under set criteria. Comparison against these criteria indicates that the proposed scheme should be carried forward to the scoping stage, as it does not fit into the definition of 'minor construction and repairs' (Appendix 2 of OGN 72). The footprint of the proposed scheme is shown with reference to the WFD water bodies in **Figure 19-1**.



Legend:

- Holyhead Breakwater Refurbishment Scheme
- WFD Coastal Water Body

Client:	Project:
Isle of Anglesey County Council	Holyhead Breakwater Refurbishment Scheme

Title:

Refurbishment RLB and water bodies

Figure: 19.1 Drawing No: PB9014-200-020

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The Breakwater forms a divide between Holyhead Bay coastal water body (GB681010360000) on the leeward side and Caernarfon Bay North coastal water body (GB621010380000) on the seaward side. Details of these water bodies are provided in **Table 19-1**.

Table 19-1 Information for the Holyhead Bay and Caernarfon Bay North Coastal Water Bodies

	Holyhead Bay	Caernarfon Bay North
Water body ID	GB681010360000	GB621010380000
River basin district name	Western Wales	Western Wales
Water body type (estuarine or coastal)	Coastal	Coastal
Water body total area (hectares)	1,171	13,520.9
Overall water body status (2015)	Moderate	Good
Ecological status	Moderate - Invertebrates	Good
Chemical status	Fail (Fluoranthene, Benzo(a)pyrene, Mercury and its compounds)	Good
Target water body status	Good Potential by 2027	Remain Good
Hydromorphology status of water body	Information not available	Supports Good
Heavily modified water body and for what use	Yes. Navigation, ports and harbours	No
Higher sensitivity habitats present	Mussel beds and subtidal kelp beds	Saltmarsh, mussel beds and subtidal kelp beds
Lower sensitivity habitats present	Gravel and cobbles, intertidal soft sediment, subtidal soft sediment, intertidal rocky shore,	Gravel and cobbles, intertidal soft sediment, subtidal soft sediment, intertidal rocky shore
Phytoplankton status	High	Information not available
History of harmful algae	Information not available	Information not available
WFD protected areas within 2km	Anglesey Terns/Morwenoliaid Ynys Môn SPA, North Anglesey Marine/Gogledd Môn Forol SAC and Beddmanarch Bay shellfish water	Anglesey Terns/Morwenoliaid Ynys Môn SPA, North Anglesey Marine/Gogledd Môn Forol SAC

Terrestrial areas within the footprint of the proposed scheme are located within the Ynys Môn Secondary ground water body (GB41002G204400). However, given that there will be no invasive works involved, there is no pathway for effect on the groundwater body and as such it is not considered further in this assessment.

19.3.1 Proposed scheme activities for assessment

The proposed scheme has been designed so that the ongoing maintenance requirements would be minimal. Movement of the concrete armour units due to wave action and currents would be minimal and the refreshment works would reduce current levels of overtopping by 90%. As such, the maintenance required would be less than is currently undertaken and as such the maintenance of the Breakwater is not considered further.

Consequently, the proposed scheme has been split into the following activities to take through the WFD compliance assessment:

- Construction of the Breakwater refurbishment; and,
- Presence of the refurbished Breakwater.

The scoping process has been carried out for the water bodies in which the activities will occur (i.e. the Holyhead Bay and Caernarfon Bay North coastal water bodies). If a potential risk is identified within these water bodies, then potential risks to the connecting water bodies (e.g. the Holyhead Strait and The Skerries coastal water bodies) will be considered in Stage 3: Detailed Assessment.

19.3.2 Built-in scheme control measures

Accidental spills or pollution events

During the proposed scheme, there is the potential for spills or leaks of fuel and oil from construction vessels transporting materials and / or placing rock and armour units. The risk of this arising would be managed by adhering to NRW's Guidelines for Pollution Prevention No. 5 (GPP5) (NRW, NIEA and SEPA, 2018) on works in, near and liable to affect watercourses. A CEMP would be put in place by the successful contractor, which will detail the measures to manage spills, leakages and marine pollution.

All construction vessels shall comply with the International Regulations for Preventing Collision at Sea with respect to the display of lights, shapes and signals. Furthermore, a Local Notice to Mariners will be issued prior to the commencement of any marine works activities. In the unlikely event of a spill, Stena Line Ports Ltd has an Oil Spill Contingency Plan in place which will be followed (Stena Line Ports Limited, 2017). Any risks to water quality in terms of accidental spills or leaks will therefore be reduced as far as possible and therefore this issue is not considered further within this assessment.

Regrading activities

Some regrading works may be required to ensure that the concrete armour units are installed within the tolerances of the design, to provide the required protection for the Breakwater; however, the design aims have been to reduce regrading as far as possible and therefore it is envisaged that filling or regrading would only be required on less than 1% of the area of the refurbishment (0.00147km²). Given the very small-scale requirement, is considered that any risk to water quality would not be significant and would not cause a deterioration to water quality within the Holyhead Bay or Caernarfon Bay North water bodies. As such this activity is not considered further.

Invasive species

The International Convention for the Control and Management of Ships Ballast Water and Sediments (BWM Convention) was adopted in 2004 and was implemented in 2017. This introduces global regulations to control the transfer of potentially invasive species. With the treaty now in force ships are required to manage their ballast water.

Stena Line Ports Ltd has a Biosecurity Plan in place for shipping activity within the port, which was produced in consultation with NRW, in order to prevent the ingress or spread of INNS within the Port area. It will be ensured that the contractor(s) will adhere to best practice to reduce the spread of INNS as far as possible. In addition, a project specific Biosecurity Plan would be produced and agreed prior to any works taking place. As such it is considered that the port's biosecurity measures are sufficient to prevent the spread of INNS.

19.4 Scoping

The construction and operation of the Breakwater have been assessed for the potential risk to hydromorphology, biology (habitats and fish), water quality and protected areas, based on the scoping criteria outlined in the 'Clearing the Waters for All' guidance (Environment Agency, 2017). The output of the scoping assessment is provided in **Appendix 19-1** and a summary is provided in **Table 19-2**.

Table 19-2 Summary of Scoping Assessment

Parameter	Holyhead Bay water body	Caernarfon Bay North water body
Hydromorphology	The water body is not at High status, and the changes to bathymetry along the leeward side of the Breakwater would have no significant effects on hydrodynamics or sediment transport (Chapter 7 Coastal Processes); however, the water body is heavily modified for ports and harbours. Mitigation measures scoped in for further assessment.	The water body is not at high status, nor is it a heavily modified water body. Changes to bathymetry along the seaward margin of the Breakwater and at the roundhead of the Breakwater would have no significant effects on hydrodynamics or sediment transport (Chapter 7 Coastal Processes). No requirement for further assessment.
Biology (habitats)	The footprint of the proposed refurbishment is less than 0.5km ² and is less than 1% of the waterbody's area. The footprint also does not impact more than 1% of a lower sensitivity habitat. The refurbishment will directly affect the higher sensitivity subtidal kelp habitat. Potential impacts to higher sensitivity habitat scoped in for further assessment.	The footprint of the proposed scheme is less than 0.5km ² and is less than 1% of the waterbody's area. The footprint also does not impact more than 1% of a lower sensitivity habitat. The refurbishment will directly affect the higher sensitivity subtidal kelp habitat. Potential impacts to higher sensitivity habitat scoped in for further assessment.
Biology (fish)	The majority of the rock, concrete armour and ACBM placement will occur over the existing rubble mound and will therefore not release any sediment into the water column. Only a small proportion of the work will be undertaken directly on the seabed which is sandy mud. As such any sediment released during construction activities will be negligible, and any that is released will be quickly dispersed by wave action and currents (Chapter 7 Coastal Processes). No effect on fish movement or behaviour is anticipated. The activities will not cause the entrainment or impingement of fish. No impacts during operation are anticipated. No requirement for further assessment.	
Water quality	The majority of the refurbishment is within the footprint of the existing rubble mound. 0.0212km ² of subtidal sediment within the water body will be directly affected. Any sediment suspended will be below background levels and rapidly dispersed. Potential impacts through chemical contamination are therefore considered to be negligible. No impacts during operation are anticipated. No requirement for impact assessment.	The majority of the refurbishment is within the footprint of the existing rubble mound. 0.0034km ² of subtidal sediment within the water body will be directly affected. Any sediment suspended will be below background levels and rapidly dispersed. Potential impacts through chemical contamination are therefore considered to be negligible. No impacts during operation are anticipated. No requirement for impact assessment.
Chemical contamination	The installation of the majority refurbishment will take place on top of the existing rubble mound and will not therefore disturb seabed sediments. Any sediment resuspended during the works will be highly localised to vessel movements and small areas of the refurbishment which will be undertaken directly on the seabed and will not be discernible above background levels of suspended sediment. No impacts during operation are anticipated. No impacts during operation are anticipated. No requirement for impact assessment.	
Protected areas	The refurbishment scheme is located within the North Anglesey Marine SAC and Anglesey Terns SPA. European designated sites are considered within the Shadow HRA (Chapter 20) therefore, these protected areas are scoped out of detailed assessment. No other protected areas are located within 2km. No impacts during operation are anticipated. No requirement for impact assessment as considered elsewhere.	
INNS	Due to the international and port-level control measures in place this has been scoped out.	

The output of the Scoping stage has identified the following WFD compliance parameters within the Holyhead Bay and Caernarfon Bay coastal water body which could be at risk from the proposed scheme's activities identified and therefore have been carried through to detailed assessment:

- Hydromorphology – HMWB mitigation measures (Holyhead Bay water body only); and,
- Biology – the removal of higher sensitivity kelp habitats (both water bodies).

19.5 Detailed Assessment

19.5.1 Impacts on biology (habitats)

The placement of rock and concrete armour units on the existing rubble mound would directly impact subtidal kelp habitat along the length of the leeward and seaward sides of the Breakwater.

A Remotely Operated Vehicle (ROV) survey was undertaken of the leeward side of the Breakwater by Carcinus in December 2019 (**Appendix 11-1**), and a ROV and drop-down video (DDV) survey was undertaken of the seaward side and roundhead of the Breakwater in July and November 2020 by Ocean Ecology Ltd (**Appendix 11-2**). All ROV footage and image analysis was undertaken in-line with JNCC guidance given in the Marine Monitoring Handbook (JNCC, 2001; JNCC, 2015), the JNCC guidance on assigning benthic biotopes (Parry, 2015) and the NMBAQC and JNCC epibiota interpretation guidelines (Turner *et al.*, 2016).

Subtidal kelp is abundant along the rocky coastline of north west Wales. Data held on Defra's MAGiC map shows the extent of the kelp habitat along the Breakwater, within Holyhead Bay and along the western coastline of Holy Island and Anglesey (**Figure 19-2**).

The survey dataset has been used to estimate the area of the Breakwater rubble mound which is covered by the subtidal kelp habitat (**Figure 19-3**) and which would be lost as a result of the placement of the concrete armour units and rock. This has been estimated to be 0.014km² along the leeward side, within the Holyhead Bay water body, and 0.039km² along the seaward side, within the Caernarfon Bay water body.

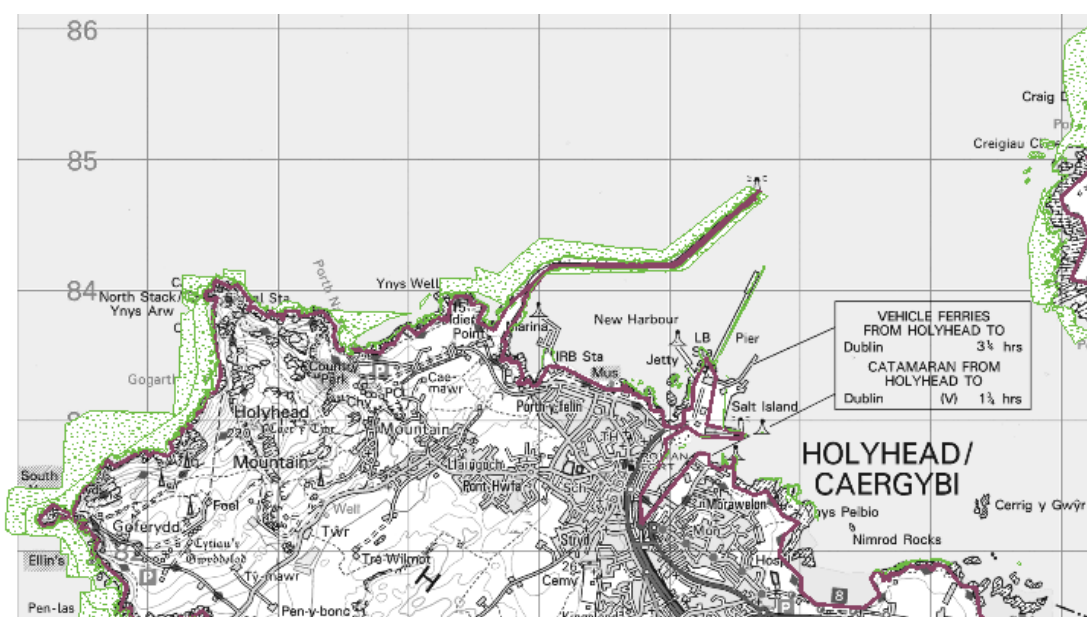
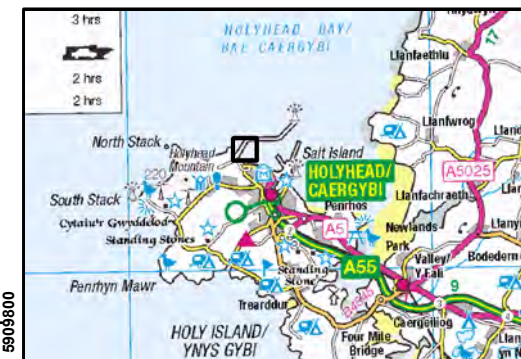
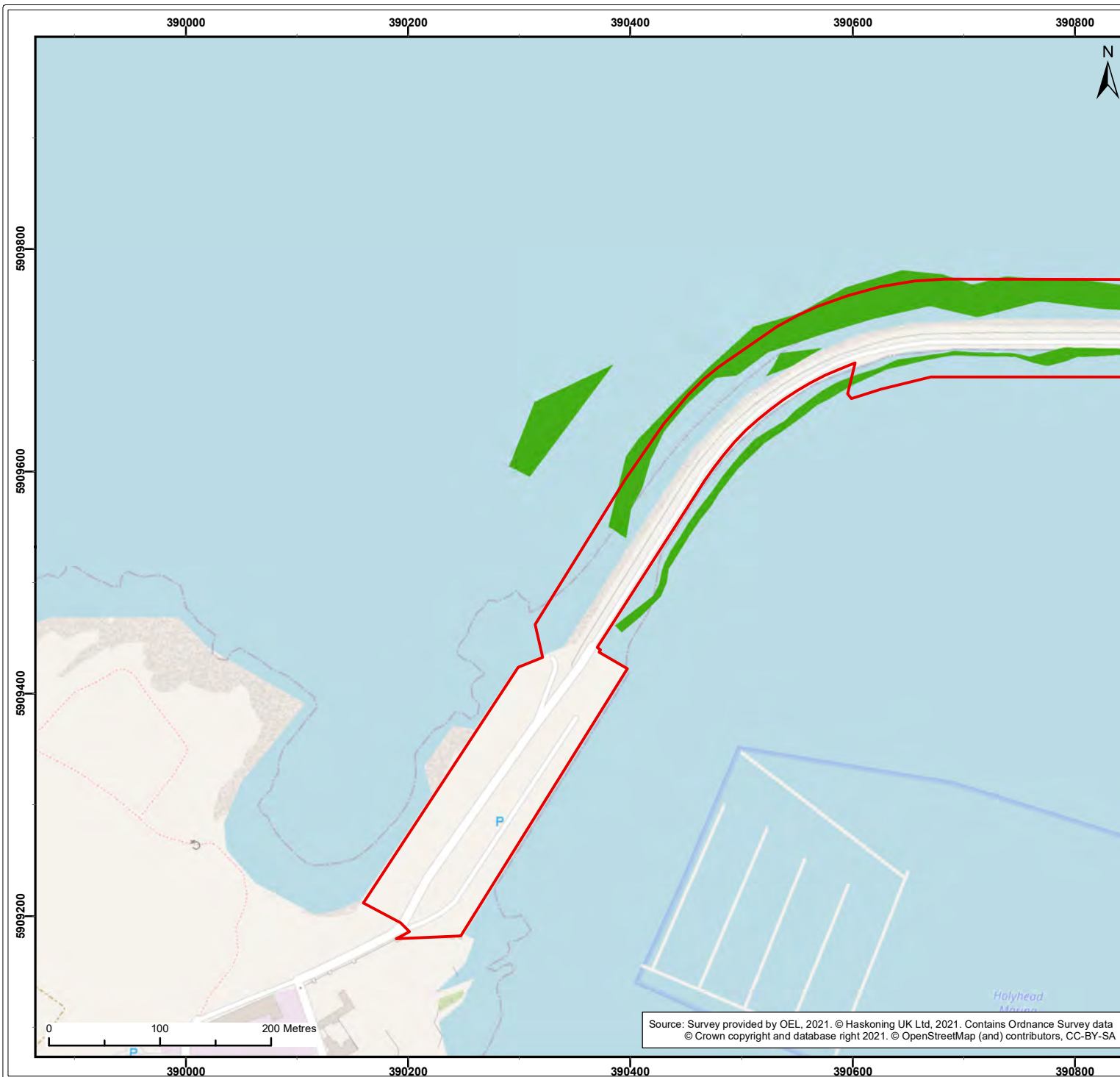


Figure 19-2 Subtidal kelp habitat in the vicinity of Holyhead Breakwater. Kelp habitat is shown as the white green speckled areas. Image from Defra's MAGiC map (Defra, 2021)



Client: Isle of Anglesey County Council

Project: Holyhead Breakwater Refurbishment Scheme

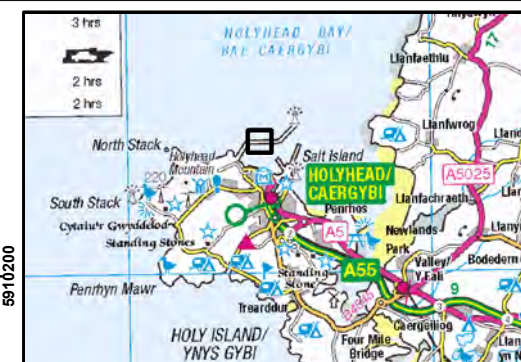
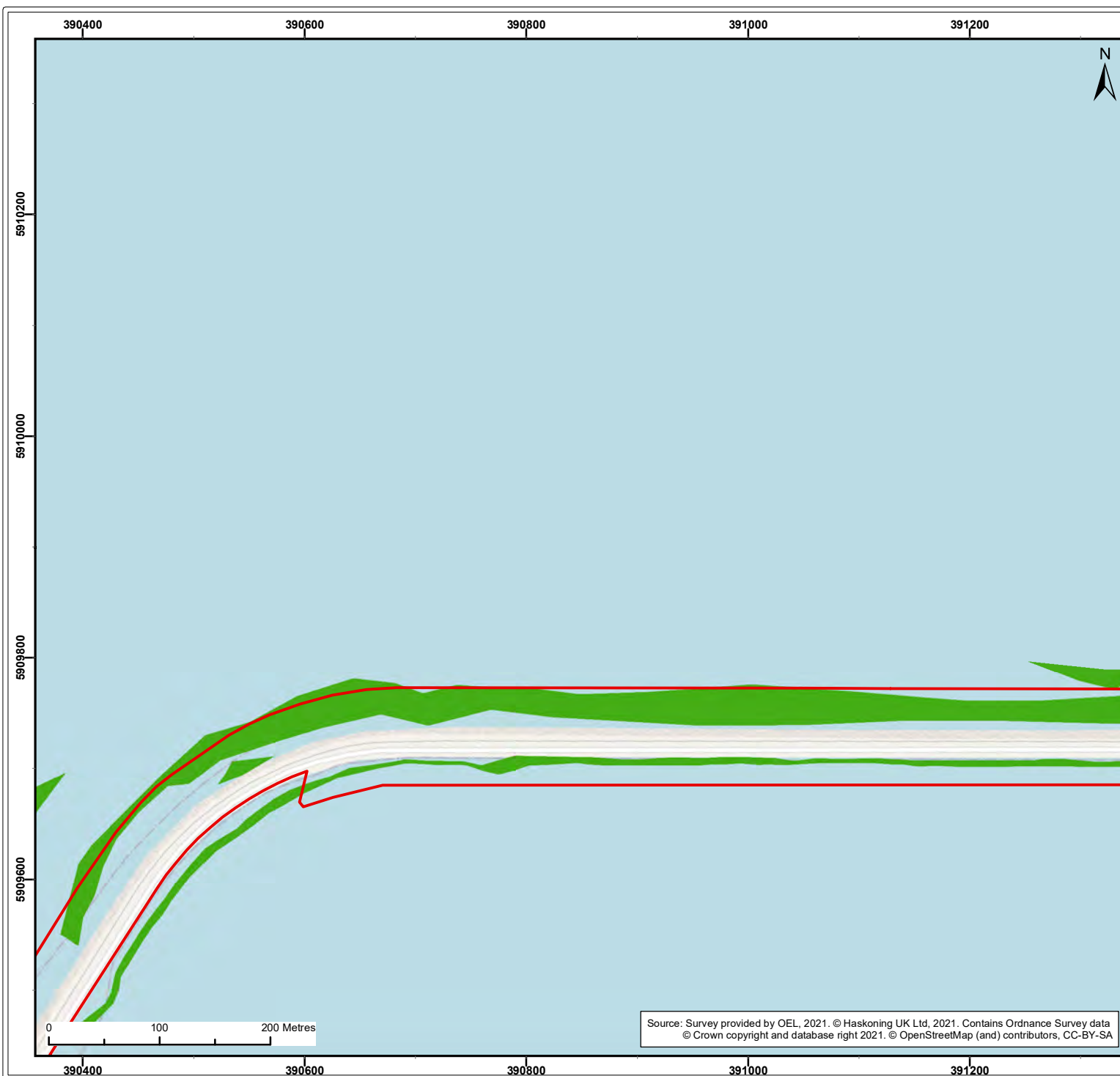
Title: Area of Kelp habitats within the footprint of the scheme

Figure: 19.3a Drawing No: PB9014-200-019

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Legend:

Holyhead Breakwater Refurbishment Scheme

Biotope

Kelp (A3.11, 3.22 (and 3.12))

Client:	Project:
Isle of Anglesey County Council	Holyhead Breakwater Refurbishment Scheme

Title:

Area of Kelp habitats within the footprint of the scheme

Figure: 19.3b Drawing No: PB9014-200-019

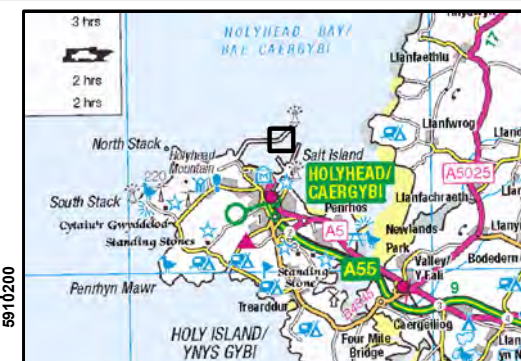
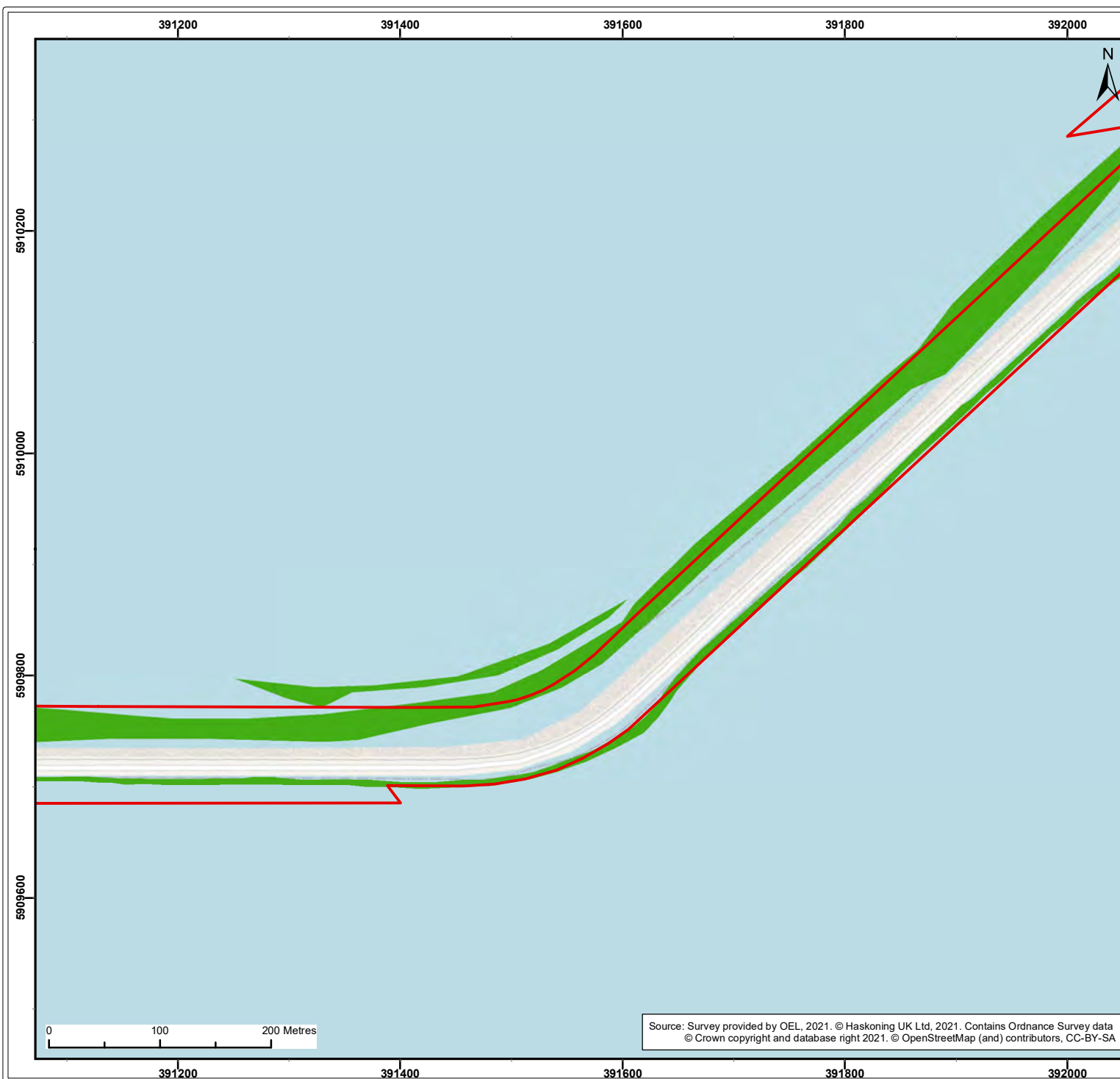
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Legend:

Holyhead Breakwater Refurbishment Scheme

Biotope

Kelp (A3.11, 3.22 (and 3.12))

Client: Isle of Anglesey County Council

Project: Holyhead Breakwater Refurbishment Scheme

Title: Area of Kelp habitats within the footprint of the scheme

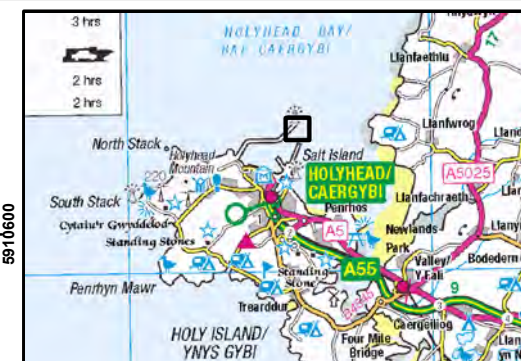
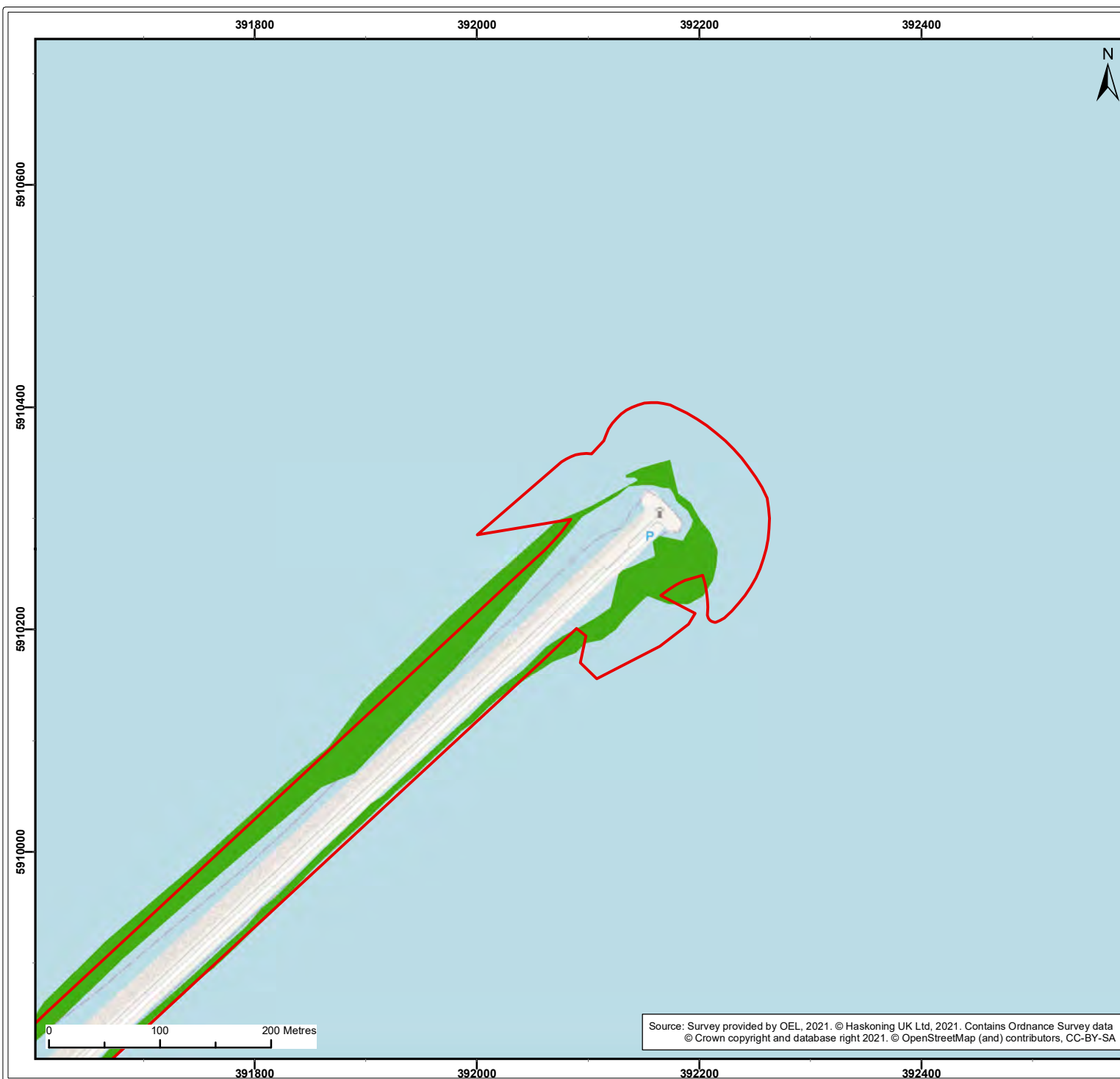
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Legend:

Holyhead Breakwater Refurbishment Scheme

Biotope

Kelp (A3.11, 3.22 (and 3.12))

Client:	Project:
Isle of Anglesey County Council	Holyhead Breakwater Refurbishment Scheme

Title:

Area of Kelp habitats within the footprint of the scheme

Figure: 19.3d Drawing No: PB9014-200-019

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The loss of the subtidal kelp habitat within both the Holyhead Bay and Caernarfon Bay water bodies is considered to be temporary as kelp would relatively quickly re-establish on the refurbished Breakwater, as described below. The prevalence of this habitat in the areas immediately adjacent to the Breakwater would contribute to recovery following completion of the works.

Available evidence indicates that the recovery of kelp biotopes, where kelp has been entirely removed, requires at least two years (Jasper and Hill, 2015) and Chapman (1981) demonstrated that substantial recruitment of *Laminaria digitata* to areas barren of kelp was possible up to 600m away from reproductive plants. Re-colonisation of concrete blocks by *L. digitata* was also investigated by Kain (1975) at Port Erin, Isle of Man. *L. digitata* was considered re-established two years after removal, with the characterising red foliose algae following one year later. Further evidence suggests that complete recovery of *L. digitata* and its associated epibiota occurs 18-24 month after complete removal of *L. digitata* (Engelen *et al.*, 2011). Smith (1985) also suggested 24 months for the recovery of a *L. digitata* bed.

Due to the presence of substantial areas of subtidal kelp in the immediate vicinity of the Holyhead Breakwater, and the rapid recolonisation and recovery of the biotope, it is considered that the temporary loss of the subtidal kelp habitat would not have a significant non-temporary effect on habitats within the Holyhead Bay or Caernarfon Bay water bodies, or other interconnected WFD water bodies.

19.5.2 Holyhead Bay mitigation measures

There are three mitigation measures in place for Holyhead Bay coastal waterbody, namely:

1. to reduce sediment resuspension;
2. to reduce the impact of dredging; and,
3. to prepare a dredging/disposal strategy.

Three further mitigation measures are not in place, namely:

1. modify structure or reclamation;
2. managed realignment of flood defence; and,
3. removal of hard bank reinforcement.

The proposed scheme may cause minor re-suspension of sediment during the placement of rock or concrete armour units, or during any minor regrading works which may be required; however, any sediment suspended would be negligible and quickly dispersed to within background levels. Once completed, the proposed scheme would not cause the resuspension of sediment. There is no requirement for dredging as part of the proposed scheme.

The proposed scheme does involve the modification of a structure, which serves as a flood defence for Holyhead and the port. The modification of this existing structure is required to ensure the ongoing protection of Holyhead and the port from wave action. With the exception of a very small area at the roundhead of the Breakwater, all works would be within the footprint of the existing structure, with negligible effects on hydromorphology predicted, as discussed in **Chapter 7 Coastal Processes**.

As such, the proposed scheme would not prevent the achievement of the mitigation measures in place, nor to those not in place, within Holyhead Bay coastal water body.

19.6 Cumulative effects

19.6.1 Within project cumulative effects

No within project cumulative effects have been identified.

19.6.2 Between project cumulative effects

There is the potential for cumulative effects with the following projects as they are located within the same water bodies as the proposed scheme (identified from the projects listed in **Section 17.2**):

- Holyhead Waterfront Regeneration Scheme;
- Holyhead Port Expansion; and,
- Morlais (West Anglesey) Demonstration Zone.

Potential effects on waterbodies arising from the above projects cumulatively with the proposed scheme are assessed below.

19.6.3 Holyhead Waterfront Regeneration Scheme

The Holyhead Waterfront Regeneration Scheme was awarded Outline Planning Consent in 2014 and involves the construction of a new marina and breakwater as well as two land reclamations, one of which is close to Soldier's Point. A WFD Compliance Assessment was submitted to the IoACC as part of an updated ES for the development in January 2020. The activities associated with this development were identified to result in permanent loss of intertidal and subtidal habitat within Holyhead Bay Coastal water body as well as the resuspension of sediment. The development has recently been scoped under the Marine Works (EIA) Regulations 2007, as amended, (NRW reference SC2006) in which capital dredging was also introduced as a potential construction activity.

Potential impacts on hydromorphology, lower sensitivity habitats, fish and water quality have been scoped out of further assessment for the proposed scheme as impacts to these parameters would be temporary; therefore, there is no pathway for cumulative effects on these parameters as a result of the two projects.

The loss of the higher sensitivity subtidal kelp habitat as a result of the proposed scheme is considered to be temporary (see **Section 19.5.1**). The Holyhead Waterfront Regeneration Scheme

The potential loss of kelp within the footprint of the Holyhead Waterfront Regeneration will also be of a temporary nature as kelp will be able to recolonise the new breakwater structures associated with the new marinas.

No cumulative impacts on the Caernarfon Bay coastal water body have been identified as a result of the two schemes as the Holyhead Waterfront Regeneration Scheme is not located within and would not indirectly effect this water body.

19.6.4 Holyhead Port Expansion

The Holyhead Port Expansion project involves the reclamation of two areas and the capital dredging of an approach channel. The construction of the reclamation areas and the approach channel dredge would cause some sediment resuspension within Holyhead Bay coastal water body; however, this was shown to be short-term and temporary, and would not have a significant impact on water quality. The proposed

scheme is not anticipated to cause significant resuspension of sediment and as such no cumulative impacts on water quality are anticipated. It is also considered that there would be no cumulative impact to hydromorphology as a result of the two projects, as both predict negligible impacts on coastal processes. Therefore, cumulative impacts on the Holyhead Bay water body are not anticipated as a result of the two projects.

No cumulative impacts on the Caernarfon Bay coastal water body have been identified as a result of the two projects as the Holyhead Port Expansion project is not located within and would not indirectly effect this water body.

19.6.5 Morlais (West Anglesey) Demonstration Zone

The Morlais (West Anglesey) Demonstration Zone project would be located within the Caernarfon Bay North water body, off the west coast of Holy Island. The WFD compliance assessment did not identify potential impacts to the higher sensitivity subtidal kelp habitat; therefore, no cumulative impact on this habitat is predicted as a result of the two schemes. No other cumulative effects have been identified; therefore, cumulative impacts on the Holyhead Bay water body are not anticipated as a result of the two projects.

No cumulative impacts on the Holyhead Bay coastal water body have been identified as a result of the two projects as the Morlais (West Anglesey) Demonstration Zone project is not located within and would not indirectly effect this water body.

Overall, given no permanent effects on the water body are identified as a result of the proposed refurbishment of the Breakwater, there is no pathway for cumulative effects with these other schemes.

19.7 Summary

The comparison of the activities against the WFD scoping criteria identified that the following parameters could be at risk:

- Construction:
 - Hydromorphology – HMWB mitigation measures; and,
 - Biology – the removal of habitats.

However, detailed assessment (see **Section 19.5**) concludes that for the parameters scoped in, non-temporary effects are not anticipated. The potential for significant cumulative effects was examined in **Section 19.6** and none are anticipated. As a result, the scheme is considered to be compliant with WFD requirements.

20 Shadow Habitats Regulations Assessment

Regulation 63 of the Habitats Regulations (see **Section 4.3.3**) defines the procedure for the assessment of the implications of plans or projects on protected sites within the NSN. Under Regulation 63(1) of the Habitats Regulations, if a proposed plan or project is likely to have a significant effect on a protected site(s), and is not directly connected with or necessary to the management of the site(s), the competent authorities (i.e. NRW and the IoACC) must undertake an ‘appropriate assessment’ (AA) of the implications of the plan or project for that site(s), in view of its Conservation Objectives, before making consenting decisions.

20.1 Introduction

This chapter presents the findings of a ‘shadow’ HRA that has been undertaken on the proposed scheme, and is designed to provide the necessary information for NRW and the IoACC, as the competent authorities, to undertake their obligations under the Habitats Regulations.

Although not covered within the Habitats Regulations, it is anticipated that the information in this shadow HRA would also provide the required information for NRW to undertake an assessment of the potential impacts of the proposed scheme on the Glannau Ynys Gybi / Holy Island Coast SSSI, that underpins the the Glannau Ynys Gybi / Holy Island Coast SPA and SAC, as required under the Wildlife and Countryside Act 1981 (as amended).

The following information is presented in this chapter:

- An overview of the HRA process and methodology for assessment (**Section 20.2**);
- Information on the protected sites that have been considered in this shadow HRA (**Section 20.3**); and,
- Screening of proposed scheme effects, both alone and in-combination with other plans and projects, to determine the potential for LSE in respect of the qualifying interest features and Conservation Objectives of the protected sites (**Section 20.4**).

20.2 HRA Process and Methodology

The HRA process follows a four-staged approach, which is outlined in the following sections.

20.2.1 Stage 1 – HRA Screening and assessment of LSE

HRA screening, in terms of this shadow HRA, is the process of identifying (i) whether the ZOI of the proposed scheme overlaps with one or more protected site(s) within the NSN (i.e. SPA or SAC) and (ii) whether the plan or project is directly connected with, or necessary for, the management of the affected site(s). This has been followed by an assessment of whether the proposed scheme would have an LSE on the qualifying interest features and overarching Conservation Objectives of the protected site(s), either alone or in-combination with other plans and projects.

The assessment for LSE in this chapter follows the guidance from the National Assembly for Wales (now Senedd Cymru) Research Briefing “*The Planning Series: 16 – Habitats Regulations Assessment*” (2017), which provides information on the determination process and the criteria that can be applied in reaching a decision. Under this guidance, a significant effect is considered likely if it cannot be excluded on the basis of objective information and it might undermine the Conservation Objectives of one or more protected sites within the NSN. In principal, screening for LSE is relatively straightforward: to conclude no LSE, there should be a lack of connectivity between a scheme and a site’s qualifying features or, where there is

connectivity, the scheme clearly would not compromise the Conservation Objectives of the site. A risk or a possibility of such an effect is enough to warrant the need for an AA (the second stage of the HRA process).

Potential impact types that are considered likely to be significant are those that may:

- Cause fragmentation of the NSN;
- Cause loss of habitat area within a protected site;
- Directly or indirectly change the physical quality of the environment or habitat within a protected site (e.g. water quality);
- Cause disturbance to species or habitats for which a protected site is notified;
- Alter community structure (i.e. species composition);
- Directly or indirectly change the size, characteristics and / or reproductive ability of the populations of species for which a protected site is notified;
- Alter the vulnerability of those populations to other impacts;
- Affect the resilience of notified features against external change; and / or,
- Impede the restoration of notified features where this is a Conservation Objective.

Subsequent to the 'Sweetman' ruling¹⁴, it is not appropriate, at the screening stage, to take account of measures intended to avoid or reduce the harmful effects of the plan or project on a protected site(s). Mitigation measures would be considered by an AA if, without them in place, LSE was predicted.

Should the proposed scheme have zero or *de minimis* effects on sites within the NSN, it can be progressed without a need for the subsequent stages of HRA described below, although sufficient justification for this must be provided.

20.2.2 Stage 2 – Appropriate Assessment

In the event that LSE cannot be excluded, the proposed scheme would be subject to AA to determine whether it would have an 'adverse effect on the integrity' of any protected site(s) in the NSN, in view of that site's Conservation Objectives. The 'integrity' of a protected site has been defined as *"the coherence of the site's ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or populations of species for which the site has been designated"*¹⁵. An adverse effect on integrity, therefore, is likely to be one which prevents the site from making the same contribution to favourable conservation status for the relevant feature(s) as it did at the time of designation.

Typically, should the screening process identify LSE (or fail to exclude it), then relevant information on a project and its expected effects would be provided to the competent authority in order to inform the AA.

If it can be concluded, beyond reasonable scientific doubt, that the plan or project would not (either alone or in-combination with other plans and projects) result in adverse effects on the integrity of any protected site within the NSN, the plan or project can be approved by the competent authority. This may include the consideration of mitigation measures to reduce the likelihood of such effects; however, should adverse effects on site integrity be concluded, or if uncertainty remains as to the absence of adverse effects, alternative solutions to the proposals should be considered (Stage 3).

¹⁴ European Court of Justice case of *People Over Wind, Peter Sweetman v Coillte Teoranta* (C-323/17)

¹⁵ Paragraph 20 of ODPM Circular 06/2005 on Biodiversity and Geological Conservation

20.2.3 Stage 3 – Assessment of Alternative Solutions

Stage 3 involves identifying and examining alternative ways of achieving the objectives of the project to establish whether there are solutions that would avoid an adverse effect on site integrity.

20.2.4 Stage 4 – Imperative Reasons of Overriding Public Interest

Where no alternative solutions exist, the next stage of the process is to assess whether the scheme is necessary for ‘imperative reasons of overriding public interest’ (IROPI). If IROPI can be demonstrated, compensatory measures need to be identified to maintain the overall coherence of the designated site network (Regulation 68).

20.3 Information on Sites within the National Site Network and their Conservation Objectives

The footprint of the proposed scheme overlaps with the following NSN sites:

- Anglesey Terns / Morwenoliaid Ynys Môn SPA; and,
- North Anglesey Marine / Gogledd Môn Forol SAC.

The ZOI of the proposed scheme, as set out in **Section 1.4**, overlaps with the following NSN sites:

- Holy Island Coast / Glannau Ynys Gybi SPA and SAC.

All other sites within the NSN are more than 20km from the proposed scheme. An assessment of LSE has therefore been undertaken on the proposed scheme, both alone and in-combination, with regards to those sites listed above. The locations of the sites are presented in **Figure 4-1**.

20.3.1 Anglesey Terns / Morwenoliaid Ynys Môn SPA

The substructure of the Breakwater lies within the Anglesey Terns / Morwenoliaid Ynys Môn SPA. The SPA is classified as it regularly supports significant breeding populations of four Annex I species of tern, as outlined in **Table 20-1**.

Table 20-1 Summary of qualifying ornithological interest in Anglesey Terns / Morwenoliaid Ynys Môn SPA

Species	Performance indicator (5-year mean 1992-96)	% of relevant population	5-year mean 2012-16)	Indicative condition assessment
Common tern	189 pairs	1.5% of GB population	558 pairs	Favourable
Arctic tern	1,290 pairs	2.9% of GB population	4,100 pairs	Favourable
Roseate tern	3 pairs	5% of GB population	0.2 pairs	Unfavourable
Sandwich tern	460 pairs	3.3% of GB population	2,395 pairs	Favourable

The Anglesey Terns / Morwenoliaid Ynys Môn SPA was established in 2017 as an incorporation and extension of three existing SPAs for terns: Ynys Feurig, Cemlyn Bay and The Skerries SPAs. The purpose of combining and extending the sites was to include the surrounding marine area used by foraging terns during the breeding season. Ynys Feurig is made up of a series of small islets that join the west coast of Anglesey at mid to low tide. Cemlyn Bay consists of a saline lagoon separated from the sea by a shingle ridge. The Skerries are formed by a group of sparsely vegetated rock formations off the north-west coast of Anglesey (NRW, 2016). The wider SPA now covers a total area of 1,000km².

The draft Conservation Objectives for the Morwenoliaid Ynys Môn / Anglesey Terns SPA are provided below (NRW, 2015):

- The size of the population [of each tern species] should be stable or increasing, allowing for natural variability, and sustainable in the long term;
- The distribution of the population [of each tern species] should be being maintained, or where appropriate increasing;
- There should be sufficient habitat, of sufficient quality, to support the population [of each tern species] in the long term; and,
- Factors affecting the population [of each tern species] or its habitat should be under appropriate control.

20.3.2 North Anglesey Marine / Gogledd Môn Forol SAC

The proposed scheme is located within the North Anglesey Marine / Gogledd Môn Forol SAC. The SAC includes areas within Welsh territorial waters plus UK waters outside the 12 nautical mile limit and is therefore the responsibility of both the JNCC and NRW. The site is designated for the Annex II species harbour porpoise *Phocoena phocoena*. This is a single feature site, designated solely for the purpose of aiding the management of harbour porpoise populations throughout UK waters, in accordance with EU legislation.

The North Anglesey Marine / Gogledd Môn Forol SAC has been recognised as an area with predicted persistent high densities of harbour porpoise. The area included within the site covers important summer habitat for harbour porpoise, which was identified as part of the top 10% persistent high-density areas for the summer seasons within the UK (JNCC and NRW, 2017). The site covers an area of 3,249km², reaching north-west from the island of Anglesey into the Irish Sea. The water depths within the site range between Mean Low Water (MLW) and c.100m. Away from coastal areas, depths are largely within the range of c.40 to 50m. The site contains a mixture of hard substrate and sediments, including rock, coarse sediment, sand and mud (JNCC and NRW, 2017).

The Conservation Objectives for this SAC are (JNCC *et al.*, 2019a):

To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters.

In the context of natural change, this will be achieved by ensuring that:

- Harbour porpoise is a viable component of the site;
- There is no significant disturbance of the species; and,
- The condition of supporting habitats and processes, and the availability of prey is maintained.

20.3.3 Holy Island Coast / Glannau Ynys Gybi SPA

The Holy Island Coast / Glannau Ynys Gybi SPA site is located approximately 0.1km from the footprint of the proposed scheme and predominantly consists of sea cliffs (rising c.120m above sea level) and coastal grassland. The site is classified to support breeding (22 pairs, 6.4% of the GB population) and non-breeding (48 individuals, 7.0% of the GB population) populations of chough, which are dependent on the diverse habitats of the site and the low levels of agricultural management (JNCC, 2016).

The Conservation Objectives for the SPA are for it to be in favourable conservation status, where all of the following conditions are satisfied (CCW, 2008):

- The breeding population of chough within the SPA is at least 18 pairs, of which at least 12 should be within the Glannau Ynys Gybi / Tre Wilmot SSSI and at least six should be within the Glannau Rhoscolyn SSSI;
- The non-breeding population of chough is at least 18 individuals or 2.5% of the GB wintering population;
- Sufficient suitable habitat (including Atlantic sea cliffs, maritime grassland, maritime heath, wet heath and dry heath) is present and in appropriate condition to support the breeding populations; and,
- All factors affecting the achievement of these conditions are under control.

20.3.4 Holy Island Coast / Glannau Ynys Gybi SAC

The Annex I habitats that are a primary reason for the selection of the Holy Island Coast / Glannau Ynys Gybi SAC are:

- Vegetated sea cliffs of the Atlantic and Baltic Coasts; and,
- European dry heaths.

Northern Atlantic wet heaths with *Erica tetralix* are also present as a qualifying feature, but not a primary reason for selection of this site.

Holy Island has hard rock acidic cliffs and supports important examples of coastal cliff heathland vegetation. In addition to maritime heath with several rare species such as spotted rock-rose *Tuberaria guttata*, there are extensive maritime cliff-crevice and grassland communities (CCW, 2008). The site is approximately 100m from the footprint of the proposed scheme.

The most recent assessment of the condition of the SAC classified the vegetated sea cliffs in 'unfavourable' condition due to the dense grass thatch over many areas and a lack of bare patches due to the absence of grazing animals. The dry heaths within the site were assessed as 'unfavourable declining' due to low or absent grazing pressure on key dry heath areas and, in part, due to over-intensive fires on Holyhead Mountain which led to increased coverage by other vegetation (gorse, heather and fescue grasses). The status of the wet heaths was classified as 'unfavourable declining' due to low or absent grazing pressure on the key wet heath areas, which led to increased prevalence of scrub and a decline in coverage by marsh gentian, pillwort and three-lobed water crowfoot.

The Conservation Objectives for the Glannau Ynys Gybi / Holy Island Coast SAC designated features are presented in **Table 20-2** (CCW, 2008).

Table 20-2 Conservation objectives for Glannau Ynys Gybi / Holy Island Coast SAC (CCW, 2008)

Feature	Conservation Objective
Vegetated sea cliffs of the Atlantic and Baltic coasts	<p>The vision for vegetated sea cliffs (of the Atlantic and Baltic coasts) is for it to be in a favourable conservation status, where all of the following conditions are satisfied:</p> <ul style="list-style-type: none"> • Cliff and crevice vegetation, maritime grassland and maritime heath occurs throughout the site in appropriate areas and their relative extent and zonation are determined by topography, exposure, grazing and natural stochastic events (e.g. storms); • The cliff vegetation is composed of native plants such as sea spurrey <i>Spergularia rupicola</i> sea lavenders (<i>Limonium britannicum</i>, <i>L. procerum</i>, <i>L. binervosum</i>) and sea samphire <i>Crithmum maritimum</i>;

Feature	Conservation Objective
	<ul style="list-style-type: none"> Non-native plants, such as hottentot fig <i>Carpobrotus edulis</i> or purple dew-plant <i>Disphyma crassifolium</i> are preferably absent or at least not spreading from their 2000 extent; Maritime Grassland occupies higher ledges on the coastal cliffs and the cliff-top; The following plants are common in the maritime grassland: red fescue <i>Festuca rubra</i>, thrift <i>Armeria maritima</i>; spring squill <i>Scilla verna</i> and sea plantain <i>Plantago maritima</i>; Maritime Heathland occupies areas inland of the maritime grassland; The following plants are common in the maritime heathland: heather <i>Calluna vulgaris</i>; bell heather <i>Erica cinerea</i> western gorse <i>Ulex gallii</i>, thrift <i>Armeria maritima</i>, sea plantain <i>Plantago maritima</i>, buck's horn plantain <i>Plantago coronopus</i> or spring squill <i>Scilla verna</i>; Competitive species indicative of under-grazing, particularly bracken and gorse <i>Ulex europaeus</i> and grass species indicative of improvement including creeping bent <i>Agrostis stolonifera</i>, cock's foot <i>Dactylus glomerata</i>, perennial rye-grass <i>Lolium perenne</i> and Yorkshire fog <i>Holcus lanatus</i> are largely absent from the heath; Sustainable populations of the plants which make up the Atlantic sea cliff rare plant assemblage will be present, notably, South Stack fleawort <i>Tephrosia integrifolia</i>, sea lavenders (<i>Limonium britannicum</i>, <i>L. procerum</i>, <i>L. binervosum</i>) golden hair lichen <i>Teloschistes flavicans</i> and ciliate strap lichen <i>Heterodermia leucomelos</i>; and, All factors affecting the achievement of these conditions, including grazing intensity and burning will be under control.
European dry heaths	<p>The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:</p> <ul style="list-style-type: none"> Dry heath covers no less than the present mapped extent; The following plants are common in the dry heath: heather; bell heather, western gorse; Competitive species indicative of under-grazing, particularly bracken, purple moor-grass and western gorse are kept in check; 70% of dry heath will be "good condition" dry heath; The dry heath provides abundant and accessible food for breeding chough; The dry heath supports sustainable (flowering) populations of dodder; Spotted rock rose occurs in at least 5 distinct loci (presently South Stack, Porth Dafarch north, Porth y Garan, Pany yr Hyman path, Pant yr Hyman heath) of at least 200 plants each; Juniper occurs in at least 3 locations totalling 50 plants; The dry heath supports a viable population of silver studded blue; and, All factors affecting the achievement of these conditions are under control.
Northern Atlantic wet heaths with <i>Erica tetralix</i>	<p>The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:</p> <ul style="list-style-type: none"> Wet heath covers no less than the present mapped extent; The following plants are common in the wet heath: heather; cross-leaved heath <i>Erica tetralix</i>, bog moss <i>Sphagnum</i> spp. devil's bit scabious <i>Succisa pratensis</i> and bog asphodel <i>Narthecium ossifragum</i>; Competitive species indicative of under-grazing, particularly bracken, purple moor-grass <i>Molinia caerulea</i> and western gorse are kept in check; 70% of wet heath will be "good condition" wet heath; The wet heath supports sustainable (flowering) populations of marsh gentian, three-lobed water crowfoot, and pillwort; The wet heath supports a viable population of bog bush cricket; The wet heath contributes potential support of a meta-population of marsh fritillary; and, All factors affecting the achievement of these conditions are under control.

20.3.5 Sites screened out of HRA

As harbour porpoise *Phocoena phocoena* are wide-ranging within the Celtic and Irish Sea Management Unit (MU), no discrete population can be assigned to an SAC. It is assumed that, at any one time, harbour porpoise within or in the vicinity of the scheme would be associated with the Gogledd Môn Forol SAC / North Anglesey Marine SAC (they cannot simultaneously be part of the population of multiple designated sites, although all are part of the larger MU population). As such, other sites designated for harbour porpoise are screened out. Given that potential impacts on marine mammals have been scoped out of the EIA,

designated sites outwith the ZOI designated for bottlenose dolphin *Tursiops truncatus* and / or grey seal *Halichoerus grypus* have also been screened out of the HRA process.

Marine SACs that have been screened out of the HRA are as follows:

- West Wales Marine / Gorllewin Cymru Forol SAC;
- Llyn Peninsula and the Sarnau / Pen Llyn a'r Sarnau SAC;
- Cardigan Bay / Bae Ceredigion SAC; and,
- Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC.

20.4 Assessment of Likely Significant Effects

As described, the proposed scheme is within (or in close proximity to) four sites in the NSN, and, as it is a project not directly connected with or necessary to the management of those four sites, it is necessary for NRW and the IoACC (as competent authorities) to determine whether LSEs are predicted. Evidence is provided in the following section to assist them in reaching a conclusion.

20.4.1 Assessment of LSE when considering the scheme in isolation

A screening assessment for LSEs of the proposed scheme in isolation (i.e. not considering in-combination effects with other plans and / or projects) is presented in the following tables:

- **Table 20-3:** Anglesey Terns / Morwenoliaid Ynys Môn SPA;
- **Table 20-4:** North Anglesey Marine / Gogledd Môn Forol SAC;
- **Table 20-5:** Holy Island Coast / Glannau Ynys Gybi SPA; and,
- **Table 20-6** **20-6:** Holy Island Coast / Glannau Ynys Gybi SAC.

Table 20-3 Screening of LSE for Anglesey Terns / Morwenoliaid Ynys Môn SPA

Name of European Site	Anglesey Terns / Morwenoliaid Ynys Môn SPA	
Distance to the refurbishment scheme	0km	
Qualifying Features	Common tern, Arctic tern, roseate tern and Sandwich tern	
Potential Effects of the Proposed Scheme		LSE predicted
Disturbance of nesting and roosting activity leading to a reduction in the size, sustainability and distribution of the SPA populations of the qualifying tern species	There are no tern colonies within the study area – the nearest colony is at The Skerries, approximately 10km north of the Breakwater roundhead – therefore there is no impact pathway by which disturbances associated with the proposed scheme may affect terns already on nests or the ability of terns to nest or roost at existing colonies. Consequently, there would be no LSE on the qualifying features or overarching Conservation Objectives.	No
Disturbance of foraging activity leading to a reduction in the size, sustainability and distribution of the SPA populations of the qualifying tern species	Localised, temporary disturbance during the construction phase would be negligible in terms of the SPA population, as the area affected would represent i) a very small, low-usage proportion of the available foraging habitat for terns, and ii) an area in which there already exists a high level of commercial and recreational vessel activity. Evidence to support this conclusion is presented in Section 12.6.1.3 . As such, there would be no change in the size or viability of the SPA tern populations, nor the distribution of the populations within the SPA. Upon completion of the refurbishment, baseline conditions would be restored. Consequently, there would be no LSE on the qualifying features or the overarching Conservation Objectives.	No
Effects on habitat availability for foraging tern species in the SPA	Given that the proposed scheme essentially sees the existing rubble substructure of the Breakwater covered with new concrete armour (with lateral extension of the substructure occurring to a distance of c.70m at the roundhead), there would be very little change to the footprint of the Breakwater. Similarly, as detailed in Section 7.8 , there would be no significant change to hydrodynamic and sedimentary processes following completion of the refurbishment. As such, effects on the availability and condition of suitable habitat (i.e. water column in subtidal and intertidal areas) in the context of foraging range (Wilson <i>et al.</i> , 2014) and total available habitat within the SPA (an area of c.100km ²) would be extremely small. Considering this, plus the fact that the affected area is of low usage by terns (NRW, 2016; Wilson <i>et al.</i> , 2014), there would be no LSE on habitat availability for foraging tern species or the overarching Conservation Objectives of the SPA.	No
Impacts on prey resources as a result of reductions in water quality	Given the nature of the proposed scheme, the only potential sources of external contamination of the marine area are from vessel fuel and oil (there is no dredging involved and fine sediment that may be disturbed during rock placement would be otherwise brought into suspension during rough seas). Given that only two to three vessels would be in use at a time, the risk of chemical spillage or leaks is considered to be low and the Harbour Authority has existing pollution prevention and response plans in place should an incident occur. As such, no significant impact on prey resource from reductions in water quality is expected and hence there would be no LSE on prey resources or the overarching Conservation Objectives of the SPA.	No

Table 20-4 Screening of LSE for North Anglesey Marine / Gogledd Môn Forol SAC

Name of European Site	North Anglesey Marine / Gogledd Môn Forol SAC	
Distance to the refurbishment scheme	0km	
Qualifying Features	Harbour porpoise	
Potential Effects of the Proposed Scheme		LSE predicted
Disturbance / injury from underwater noise leading to a reduction in the size, sustainability and distribution of the SAC population of harbour porpoise	Any underwater noise sources during the construction phase would be from slow-moving or stationary vessels transporting and laying armour units (there are no “noisy” activities such as piling, rock breaking or drilling). Given the baseline vessel traffic from Holyhead Port and the marina (c.2-3 vessel movements per hour from Holyhead Port alone, including large ferries (MarineTraffic 2020)), additional vessels associated with the proposed scheme would not result in a significant increase in underwater noise or consequent disturbance / auditory injury to harbour porpoises, should they be present. Upon completion of the works, underwater noise levels would return to baseline. As such, there would be no LSE on harbour porpoises or overarching Conservation Objectives of the SAC.	No
Increased collision risk leading to a reduction in the size, sustainability and distribution of the SAC population of harbour porpoise	Given the existing levels of boat traffic from Holyhead Port and the marina, the use of two or three additional construction vessels during the refurbishment period would not constitute a significant increase in vessel traffic. The construction vessels would be slow-moving or stationary, and harbour porpoises are a small, mobile species that would be expected to avoid collisions with slow-moving vessels as they are known to actively avoid vessel noise. Upon completion, construction vessels would depart the site. As such, there would be no LSE on harbour porpoises or overarching Conservation Objectives of the SAC.	No
Effects on supporting habitat availability as a result of changes in coastal processes	An assessment of the potential increase in suspended sediment levels is provided in Section 7.7.1 and 7.7.2. Given the nature of the proposed scheme, the only sediment likely to be disturbed would be fine sediments trapped in the existing rubble mound or the top layer of sediment at the roundhead, where the rock tiers will be placed. The magnitude of suspended sediment increase is assessed to be negligible at both near-field and far-field locations. Following completion, there would be no significant change to hydrodynamic and sedimentary processes, detailed in Section 7.8. As such, there would be no LSE on supporting habitats or overarching Conservation Objectives of the SAC.	No
Changes in prey availability leading to a reduction in the size, sustainability and distribution of the SAC population of harbour porpoise	During construction, subtidal habitat loss would constitute an extremely small proportion of the SAC area, and underwater noise disturbances would not significantly extend beyond this area (as detailed above). Given the size of the area affected, and the fact that it is within close proximity to areas of high vessel traffic, any changes in the availability and / or distribution of prey species, in the context of the SAC area and wider MU, would be indiscernible. As such, no LSE is predicted on harbour porpoises or the overarching Conservation Objectives of the SAC.	No

Table 20-5 Screening of LSE for Holy Island Coast / Glannau Ynys Gybi SPA

Name of European Site	Holy Island Coast / Glannau Ynys Gybi SPA	
Distance to refurbishment scheme	<1km (at nearest point)	
Qualifying Feature	Breeding and non-breeding chough	
Potential Effects of the Proposed Scheme		LSE predicted
Disturbance of nesting activity leading to a reduction in the size, sustainability and distribution of the breeding SPA chough population	As outlined in Section 12.6.2 , suitable nesting locations for choughs are likely to be more than 1km from the footprint of the Breakwater, which is beyond the ZOI of any likely auditory or visual disturbances. As such, there is no impact pathway by which noise or visual disturbance associated with the proposed scheme may affect breeding choughs or the ability of choughs to nest within suitable locations. Consequently, there would be no LSE on breeding chough or the overarching Conservation Objectives of the SPA.	No
Disturbance of foraging activity leading to a reduction in the size, sustainability and distribution of the SPA breeding and non-breeding chough populations	Localised, temporary disturbance during the construction phase would be negligible in terms of the SPA population of breeding and non-breeding chough as the area affected would represent i) a small area of sub-optimal feeding habitat in the context of the available foraging habitat for chough within the SPA, and ii) an area in which there already exists anthropogenic disturbance, given the public access along the Breakwater / Soldier's Point and the Anglesey Coastal Path. Evidence to support this conclusion is presented in Section 12.6.2 . As such, there would be no change in the size or viability of the SPA chough population, nor the distribution of the population within the SPA. Upon completion of the refurbishment, baseline conditions would be restored. Consequently, there would be no LSE on breeding / non-breeding chough or the overarching Conservation Objectives of the SPA.	No
Change in coastal processes leading to effects on the foraging habitats available for non-breeding choughs.	No significant effects on local hydrodynamic or sedimentary conditions are predicted (see Section 7.8). As such there would be no LSE on non-breeding chough or the overarching Conservation Objectives of the SPA.	No

Table 20-6 Screening of LSE for Holy Island Coast / Glannau Ynys Gybi SAC

Name of European Site	Glannau Ynys Gybi / Holy Island Coast SAC	
Distance to Proposed Scheme	<1km (at nearest point)	
Qualifying Features	Vegetated sea cliffs of the Atlantic and Baltic Coasts	
Potential Effects of the Proposed Scheme		LSE predicted
Effects on integrity of sea cliff habitats due to changes in coastal processes	No significant effects on local hydrodynamic or sedimentary conditions are predicted (see Section 7.8). As such there would be therefore no LSE on the integrity of sea cliff habitats or the overarching Conservation Objectives of the SAC.	No
Qualifying Feature	European dry heaths	
Potential Effects of the Proposed Scheme		
Direct effects on the integrity of dry heaths during the construction phase	Soldier's Point Quay would be used as a storage for concrete units; however, all aspects of the proposed scheme would remain outside the boundaries of the SAC. As such, there would be no LSE on the integrity of dry heaths or the overarching Conservation Objectives of the SAC.	No
Indirect effects on the integrity of dry heaths as a result of changes in air quality	European dry heath habitats within the SAC are located outside the predicted range to which potential impacts to air quality are expected on ecological receptors (i.e. 200m from the site, see Section 9.4.1). As such, there would be no LSE on the integrity of dry heaths as a result of changes in air quality or the overarching Conservation Objectives of the SAC.	No
Qualifying Feature	Northern Atlantic wet heaths with <i>Erica tetralix</i>	
Potential Effects of the Proposed Scheme		
Direct effects on wet heaths habitats during the construction phase	The nearest substantial area of wet heath is at Holyhead Mountain and Tre Wilmot (CCW, 2008), over 1km from the proposed scheme. As such, there would be no LSE on wet heaths or the overarching Conservation Objectives of the SAC..	No
Indirect effects on the integrity of wet heaths as a result of changes in air quality	Wet heath habitats within the SAC are located outside the predicted range to which potential impacts to air quality are expected on ecological receptors (i.e. 200m from the site, see Section 9.4.1). As such, there would be no LSE on the integrity of wet heaths as a result of changes in air quality or the overarching Conservation Objectives of the SAC.	No

20.4.2 Assessment of LSE when considering in-combination effects

The in-combination assessment determines whether the proposed scheme could have a LSE when considered in-combination with other plans and projects in the wider area, as opposed to in isolation.

Given that the proposed scheme would not result in direct impacts on qualifying features of the Holy Island Coast / Glannau Ynys Gybi SAC, and the distance between the proposed scheme and the qualifying features is such that indirect impacts would not occur (see

Table 20-6), there is no pathway by which in-combination effects on the SAC may occur.

Taking account of the status of other projects in **Chapter 17** Cumulative Impact Assessment, the following projects have been included in the in-combination assessment, as presented in **Tables Table 20-7, Table 20-8 and Table 20-9**:

- Holyhead Waterfront Regeneration Scheme;
- Holyhead Port Expansion;
- Maintenance dredging at the Port of Holyhead;
- Morlais (West Anglesey) Demonstration Zone;
- Penrhos Leisure Village;
- Anglesey Eco Park and Biomass Energy Centre;
- Penrhos Business units;
- Anwyl Homes - Residential development at South Stack Road (Phase 2); and,
- Huws Gray: Builders Merchant Yard.

Table 20-7 In-combination assessment for LSE: Anglesey Terns / Morwenoliaid Ynys Môn SPA

Anglesey Terns / Morwenoliaid Ynys Môn SPA		
Designated Features	Common tern, Arctic tern, roseate tern and Sandwich tern	
Potential effects of other plans or projects in-combination with the proposed scheme		LSE predicted
Holyhead Waterfront Regeneration Scheme	As per the proposed scheme, the marine elements of the Holyhead Waterfront Regeneration Scheme are restricted to marine areas within the Holyhead New Harbour. As described in Section 20.4.1 , localised and temporary disturbances within the New Harbour and areas immediately seaward of the Holyhead Breakwater would have no discernible effect on the population and distribution of terns from the SPA. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Holyhead Port Expansion	The conclusion of the Holyhead Port Expansion project HRA was that the project would have no LSE on the SPA, given the distance from key foraging and nesting areas. In the event that the project coincides with the proposed scheme, both projects would affect low usage areas and, as described in Section 20.4.1 , disturbances within this area would have no discernible effect on the population and distribution of terns from the SPA. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Maintenance dredging at Port of Holyhead	As described in Section 20.4.1 , localised and temporary disturbances within the Holyhead Harbour area would have no discernible effect on the population and distribution of terns from the SPA. Furthermore, the proposed scheme would not have a significant effect on suspended sediment concentrations. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Morlais (West Anglesey) Demonstration Zone	The nearest Morlais subzone lies over 2km from the Holyhead Breakwater. Given this, the localised and temporary nature of disturbances that would be associated with the proposed scheme, plus the fact that such effects would be confined to an area of low usage by terns, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Penrhos Leisure Village	Given that both projects would only affect relatively small, low usage areas in the context of the SPA, disturbances would have no discernible effect on the population and distribution of terns, as described in Section 20.4.1 . As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Anglesey Eco Park and Biomass Energy Centre	Given that both projects would only affect relatively small, low usage areas in the context of the SPA, disturbances would have no discernible effect on the population and distribution of terns, as described in Section 20.4.1 . As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Penrhos Business units	Land based projects with no potential of affecting the SPA. No in-combination effects possible.	No
Anwyl Homes - Residential development at South Stack Road (Phase 2)		
Huws Gray - Builders Merchant Yard		

Table 20-8 In-combination assessment for LSE: North Anglesey Marine / Gogledd Môn Forol SAC

North Anglesey Marine / Gogledd Môn Forol SAC		
Designated Feature	Harbour Porpoise	
Potential effects of other plans or projects in-combination with the proposed scheme		LSE predicted
Holyhead Waterfront Regeneration Scheme	As with the proposed scheme, there would be no underwater piling activities or other 'noisy' underwater activities associated with the Holyhead Waterfront Regeneration Scheme. As described in Section 20.4.1 , potential impacts from the proposed scheme would have no discernible effect on the population and distribution of harbour porpoises from the SAC and wider MU. Neither project is considered to affect supporting habitats or prey resource. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SAC.	No
Maintenance dredging at Port of Holyhead	As described in Section 20.4.1 , potential impacts from the proposed scheme would have no discernible effect on the population and distribution of harbour porpoises from the SAC and wider MU. Neither project is considered to affect supporting habitats or prey resource. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SAC.	No
Holyhead Port Expansion	Potential impacts identified by the Holyhead Port Expansion HRA were underwater noise from the proposed piling activities, increased vessel collision risk and changes in prey resource as a result of changes in coastal processes and contamination. The proposed scheme would not result in any significant underwater noise or changes in prey resource. Given the low number of vessels involved during the construction of the proposed scheme, there would not be a significant increase in vessel numbers using the area. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SAC.	No
Penrhos Leisure Village	Penrhos Leisure Village project is principally a land-based project with no works below MHWS. As such, there is no pathway for in-combination LSE on the qualifying features or the overarching conservation objectives of the site.	No
Anglesey Eco Park and Biomass Energy Centre	Anglesey Eco Park is principally a land-based project with no works below MHWS. Given this, and the fact that the proposed scheme does not include and 'noisy' underwater activities and only involves a small number of slow moving vessels there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SAC.	No
Morlais (West Anglesey) Demonstration Zone	The nearest Morlais subzone lies over 2km from the Holyhead Breakwater. Given this, and the fact that the proposed scheme does not include and 'noisy' underwater activities and only involves a small number of slow moving vessels there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SAC.	No
Penrhos Business units	Land based projects with no potential of affecting the SAC. No in-combination effects possible.	No
Anwyl Homes - Residential development at South Stack Road (Phase 2)		
Huws Gray - Builders Merchant Yard		

Table 20-9 In-combination assessment for LSE: Holy Island Coast / Glannau Ynys Gybi SPA

Holy Island Coast / Glannau Ynys Gybi SPA		
Designated Feature	Breeding and non-breeding chough	
Potential effects of other plans or projects in-combination with the proposed scheme		LSE predicted
Holyhead Waterfront Regeneration Scheme	As described in Section 12.6.2 (and summarised in Table 20-5), disturbance effects around the Soldier's Point area would not have a significant effect on the population or distribution of choughs within the SPA. Given that the two projects would affect small sub-optimal areas for foraging chough, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Holyhead Port Expansion	The Holyhead Port Expansion HRA identified no potential impacts on this SPA. As such there can be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Penrhos Leisure Village	The Penrhos Leisure Village is outside of the SPA boundary; however, could potentially cause disturbance to foraging chough. Given the proposed scheme would affect a small area of sub-optimal habitat for foraging chough that is already subjected to high levels of anthropogenic activity, no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Anglesey Eco Park and Biomass Energy Centre	The Anglesey Eco Park and Biomass Energy Centre is located c.2.5km from the SPA at the nearest point and is therefore beyond the distance to which disturbance effects may be expected. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Morlais (West Anglesey) Demonstration Zone	This Morlais (West Anglesey) Demonstration Zone project is approximately 4km from the nearest boundary of the SPA and is therefore beyond the distance to which disturbance effects may be expected. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Penrhos Business units	The Penrhos Business units project is located approximately 2km from the SPA at the nearest point and is therefore beyond the distance to which disturbance effects may be expected. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Anwyl Homes - Residential development at South Stack Road (Phase 2)	The Anwyl Homes - Residential development at South Stack Road (Phase 2) project is approximately 750m from the SPA at the nearest point and is set within a residential location and close to a school. As such, it is unlikely that it would affect the SPA. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No
Huws Gray builders merchant yard	The Huws Gray builders merchant yard project is located c.2km from the SPA at the nearest point, and is therefore beyond the distance to which disturbance effects may be expected. As such, there would be no in-combination LSE on the qualifying features or overarching Conservation Objectives of the SPA.	No

20.5 Requirement for Appropriate Assessment

Given that the assessment of LSE presented in **Section 20.4** has predicted that the proposed scheme would have no LSE, either alone or in combination with other projects, on any of the qualifying features or Conservation Objectives of the SACs / SPAs screened into the assessment, there would be **no requirement** for NRW and the IoACC to undertake an AA on the proposed scheme under the Habitats Regulations.

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