

Technical Note

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1 Introduction

1.1 SMP2 Epoch 2 Policy – Major Change Application

- 1.1.1 Barmouth is covered by the West of Wales Shoreline Management Plan 2 (SMP2) (2011). The North Promenade is located within the SMP2 Management Area 24 (MA24) and Policy Unit 15 (Barmouth North) of SMP Sub Cell 9 and Policy Development Zone (PDZ) 11 (refer to Figure 1) .

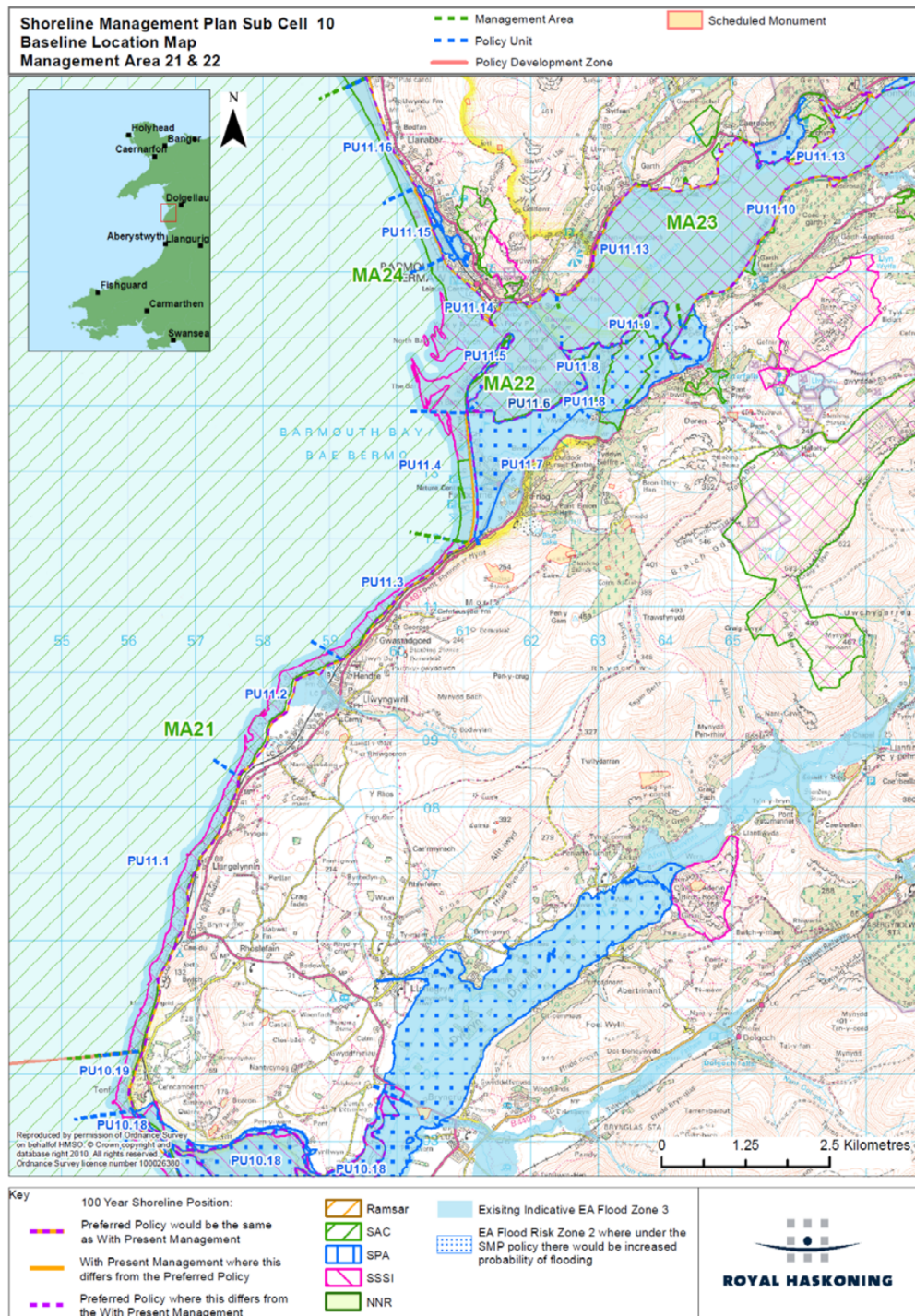


Figure 1 Map of specific SMP2 policies for Barmouth North and adjacent areas

- 1.1.2 The policy for Barmouth North Promenade is to 'Hold the Line' (HTL) in Epoch 1 [to 2025]. However, the SMP2 identified significant pressures from sea level rise, and suggests the present alignment is likely to become increasingly difficult to sustain and states that a change to 'Managed Realignment' (MR) for Epoch 2 [2026-2055] and Epoch 3 [2056-2105] is required noting that this may require the relocation of properties, new nearshore or shore-connected structures and a new defence line.
- 1.1.3 The Barmouth North Promenade FAS Outline Business Case (OBC) assessed a long-list of potential solutions which were refined into a short-list of four options. Each short-listed option was analysed against engineering performance, sustainability and well-being performance, their economic performance and their financial performance. This led to the selection of one Preferred Option.
- 1.1.4 In September 2024 during engagement with the West Wales Coastal Group, it was agreed that the Barmouth North Promenade FAS OBC Preferred Option - as approved by Welsh Government - required a change to the SMP2 Epoch 2 Policy from Managed Realignment to Hold the Line.
- 1.1.5 The policy change is proposed due to further detailed analysis of options to manage flood and coastal erosion risk as part of the OBC and subsequent Full Business Case (FBC), whilst delivering improvements to the amenity and environmental value of the frontage.
- 1.1.6 Cyngor Gwynedd have submitted a Major Change request to Welsh Ministers to amend the current Managed Realignment policy for Epoch 2 at Barmouth Promenade to maintain the Hold the Line policy to deliver the scheme objectives as outlined below.

1.2 Scheme Objectives

- 1.2.1 Cyngor Gwynedd seek a solution to reduce coastal flood and erosion risk to Barmouth North Promenade, whilst improving the amenity and environmental value of this section of coastline. Placemaking opportunities such as beach access, dwelling spaces and facilities, and improved connectivity and wayfinding have the potential to leverage the less-used asset, broadening the appeal of Barmouth and reducing pressure on the popular South Promenade area.
- 1.2.2 The following Investment Objectives were identified in the OBC:
- To reduce the threat of coastal flood and erosion risk to people and property with due consideration of SMP2 policy to ensure the long-term resilience and vitality of the community;
 - To support, and where possible enhance, recreation and amenity value of the local area;
 - To maintain, and where possible enhance, natural and historic environments;
 - To ensure marine amenity activities can continue to grow; and
 - Ensure an affordable and deliverable whole life option through a partnership approach and contributions.

1.3 Proposed Development

- 1.3.1 Cyngor Gwynedd propose to carry out coastal flood and erosion risk management works on a 1.2km length of frontage at the North Promenade region in Barmouth, Gwynedd - Barmouth North Promenade FAS. The 1.2km scheme area comprises a mix of hard coastal defences (sheet piled wall, concrete revetment, and wave recurve wall, with masonry setback walls); in addition to landscape and amenity improvements. The defences run parallel with the promenade and adjacent to Marine Parade. Refer to drawings:
- BMTH-ARP-HGN-PROM-DR-Z-000003
 - BMTH-ARP-HGN-PROM-DR-Z-000004
 - BMTH-ARP-HGN-PROM-DR-Z-000005
 - BMTH-ARP-HGN-PROM-DR-Z-000006
 - BMTH-ARP-HGN-PROM-DR-Z-000007
- 1.3.2 The Proposed Development will provide a standard of protection (SoP) of 1 in 50-year annual chance (2% annual exceedance probability) in 2075 to manage risk to properties with tolerable residual overtopping of the coastal defence.
- 1.3.3 Refer to the Flood Consequences Assessment (BMTH-ARP-XGN-ZZ-RP-W-000003) for detailed information regarding an assessment of flood risk and consequences within and around the study area for the existing situation and with the Scheme in place; and the impact of the Scheme on flood risk and consequences.

1.4 Consultation

- 1.4.1 A summary of consultation responses can be found in Table 1 – note that comments relate to both the Major Change Application and the Proposed Development.

Table 1 NRW Consultation regarding Coastal Squeeze

Comments	Summary of comments
NRW Pre application Consultation (received 01/12/2025)	“...We refer to the Environmental Statement Chapter 12 – Marine and Coastal Physical Processes. In Section 12.15 it is stated that “coastal squeeze can be screened out of the HRA, and no further action is required. This is due to the Proposed Development being a “Hold the line” policy unit where the Shoreline Management Plan Habitats Regulation Assessment (HRA) did not identify any coastal squeeze losses”. We disagree with this when considering the lifetime of the proposed structure. The policy unit is no longer Hold the Line (HTL); with the start of the second epoch of shoreline management planning (SMP) in 2025 the unit has a policy of managed realignment (MR). While a policy change process is currently underway to change the second epoch policy to HTL, the previous SMP HRA will not have assessed the impact of a HTL policy in the second SMP epoch. Therefore, as the application intends to HTL, we advise that coastal squeeze assessment should be undertaken and submitted with any future planning application...” “...Our conclusion for coastal squeeze assessment screening: As there is potential for coastal squeeze to occur and the project is not within the definition of maintenance, this should be recorded at the Test of Likely Significant Effect Stage

Comments	Summary of comments
	of the HRA (See section 2.2, option 4 in this case) and the HRA should proceed to Appropriate Assessment. Coastal Squeeze should be assessed. See pages 12 and 14 of the guidance note. We therefore do not agree that an assessment of coastal squeeze is not needed. We advise that a coastal squeeze assessment is submitted with any planning application...”
NRW Major Change consultation (received 20/11/2025)	“...the implications for coastal squeeze arising from the proposed policy change (from Managed Realignment to Hold the Line) need to be assessed to inform the update to the SMP Habitats Regulations Assessment (HRA). It is recommended that the relevant sections of the guidance note GN 062 Assessment of coastal squeeze are applied. This should include consideration of screening step 1 (is there potential for coastal squeeze to occur?), and Screening Step 2 (are the proposed works considered to be maintenance?). In the case of screening step 2, because there is a proposal to hold the line, alongside a project to upgrade the defences in this policy unit, we consider that the answer to this step would be ‘no’. The advice regarding HRA process provided in section 2 should then be followed. Additional advice regarding the coastal squeeze assessment is also being provided in NRW’s separate response to the proposed scheme at Barmouth North...”
NRW confirmation of agreement of proposed response to PAC and Major change comments (received 14/01/2026)	...“, it is helpful to consider the Section 7 Priority Habitats in terms of wider environmental effects in line with the coastal squeeze guidance, but it’s not required for the HRA.” “We’ll actually be clarifying the approach to dealing with the above issue (and other minor aspects) through a revision of the coastal squeeze guidance [OGN62 <i>Internal Guidance</i>], with such work starting shortly. Given the below and your experience from related work at Barmouth Viaduct Gardens, there seems no need to meet with your consultants but the offer is always there...”

1.5 Purpose of this Document

- 1.5.1 Welsh Ministers have a duty to consider the Conservation of Habitats and Species Regulations 2017 (as amended) (the ‘Habitats Regulations’) in determination of the Major Change request. The SMP2 Habitats Regulations Assessment (HRA) proposed MR in Epoch 2; as such, the SMP2 HRA did not require a coastal squeeze assessment for this location. Any change in policy requires consideration under HRA for potential coastal squeeze impacts – specific development-led impacts are assessed separately via the project-level HRA. This HRA Addendum comprises the coastal squeeze assessment of the proposed policy change to inform the Welsh Ministers’ decision on the major Change request.
- 1.5.2 The purpose of this HRA Addendum is to consider the potential for coastal squeeze impacts on the features of the Pen Llyn a’r Sarnau / Lleyen Peninsula and the Sarnau Special Area of Conservation (SAC). This document may be considered as an addendum to the existing SMP2 HRA to document the coastal squeeze assessment of the Major Change from MR to HTL in Epoch 2 at Barmouth Promenade. A separate HRA has been undertaken to support the Proposed Development that will deliver the defence requirements in lieu of an approved policy change - Barmouth North Promenade FAS HRA (Document

Reference BMTH-ARP-EBD-ZZ-RP-OE-000003).

- 1.5.3 This HRA Addendum has been prepared in accordance with Natural Resources Wales (NRW) Operational Guidance Note OGN62 (Assessment of Coastal Squeeze) presuming acceptance of the Major Change, i.e. Epoch 2 HTL policy approval.
- 1.5.4 Although Section 7 Priority Habitats [Environment (Wales) Act 2016] are not a component of HRA, to align with NRWs OGN62 guidance, potential impacts on Section 7 Habitats are considered within the assessment. However, it is important to note that Section 7 Habitats are excluded from formal assessment under the Conservation of Habitats and Species Regulations 2017 (as amended). Note 'Natural Habitats' are defined by OGN62 to comprise both Annex I (Habitats Regulations Habitats) and Section 7 (Wales Priority Habitats).

2 Site Context

2.1 Local Context

- 2.1.1 The proposed policy area is defined by a steeply elevated profile rapidly rising from the beach to a steep embankment of cobbles. The ground continues to rise crossing the nationally important Cambrian Railway Line before rising towards agricultural land, residential dwellings, caravan sites, local business and the A496. The Barmouth North Promenade FAS OBC documents that made ground is present to the rear of the existing coastal defences, which could compromise water quality and condition of coastal habitats if disturbed.
- 2.1.2 The SMP2 notes that residential dwellings may need to be relocated to allow for the planned Epoch 2 Managed Realignment policy to be applied. Similarly, local businesses, caravan parks, agricultural land and local amenities would need to be relocated or lost.
- 2.1.3 Noting the steep gradient at Barmouth North it is not clear how an extensive and beneficial Managed Realignment solution could be delivered without significant land lowering and excavation to promote or create intertidal habitats and without being likely to cause significant risks to the safety of the general public and local communities. Any realistic managed realignment scenario would still require the construction of new coastal defences, most likely in advance of the Cambrian Railway. Alternatively, the Cambrian Railway would require closure or extensive realignment. This is further detailed in the Managed Realignment Option BMTH-ARP-XGN-ZZ-RP-C-000001.
- 2.1.4 The SMP2 expresses that whilst the frontage at Barmouth is split over three areas (refer to Table 1 below), the policies should be considered and 'progressed as one overall area' – due to the complex coastal process influences between the areas. The 'manner in which the apex between north Barmouth and south Barmouth is approached needs to be integrating management to both north and south'.
- 2.1.5 In summary, the local shoreline management context is complex in that the individual policy units require management as a whole, whilst amending one policy unit unilaterally can disrupt the adjacent policy units requiring further interference and additional capital works.

Table 1. Summary of Barmouth MA24 Policies (SMP2 PDZ11, 2012)

MA 24 BARMOUTH: From Porth Aberamffra to Llanaber Point

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
11.14	Barmouth South	HTL	HTL	HTL	
11.15	Barmouth North	HTL	MR	MR	This may include relocation of properties
11.16	Llanaber	HTL	HTL	HTL	This needs to be considered in term of management to the above policy unit.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

- 2.1.6 The rationale and context from the SMP2 is repeated below:
- 2.1.7 'To the south the SMP2 policy for the area of southern Barmouth, Barmouth harbour and the access road to Barmouth is to Hold the Line. To the north the general policy at Llanaber Point would also be to Hold the Line. However, to the north end of Barmouth the SMP1 policy of Hold the Line is going to become increasingly difficult to sustain.
- 2.1.8 Consideration should be given to widening the overall defence system in this area. This may require nearshore or shore connected structures to reduce wave energy but is also likely to require some future realignment of the defences, quite probably with the loss of property. This would require a more integrated approach to management, considering how the northern seafront could be developed to better advantage both in term of use and shoreline management. The SMP2 policy for the northern end of Barmouth would be to Hold the Line during epoch 1, but to change to one of Managed Realignment over epochs 2 and 3.
- 2.1.9 Whilst the Barmouth frontage through to Llanaber would be defined as three policy units, the policies need to be progressed as one overall area. The manner in which Llanaber Point is managed influences the way in which the north Barmouth frontage and the manner in which the apex between north Barmouth and south Barmouth is approached needs to be integrating management to both north and south. In all probability works will be needed to the north Barmouth frontage towards the end of Epoch 1. Planning for a more adaptive approach to management, therefore, needs to be undertaken during Epoch 1.'

2.2 SMP2 HRA

- 2.2.1 For Epoch 1 (2005-2025) "Hold the Line" policy, SMP HRA (West of Wales SMP2: Appendix G Stage 4: Appropriate Assessment) does not identify any habitat loss through coastal squeeze within SPU11.15.
- 2.2.2 For Epoch 2 (2025- 2055) "Managed Realignment" policy for SPU 11.15, assessment was deferred to the project level for 'Managed Realignment' policy units in the SMP2 HRA.
- 2.2.3 Regarding Llyn Peninsula and the Sarnau SAC, the SMP2 HRA concluded that "*No constraint on the SAC features would occur*" in SPU 11.15, for Epoch 1, 2 and 3. This conclusion assumes MR in Epoch 2 and 3.
- 2.2.4 Regarding Compensatory Habitat in Units within the SAC Frontage, the SMP2

HRA concluded that “Intertidal area fronting the unit is not within the designated site; therefore, at this stage the potential habitat created during MR is not examined. However, could potentially review opportunity to improve intertidal habitat within the foreshore, and realignment of defences could provide additional intertidal habitat”.

2.3 Environmental Baseline

- 2.3.1 Key relevant baseline elements are described below - refer to Barmouth North Promenade FAS HRA (BMTH-ARP-EBD-ZZ-RP-OE-000003), and associated appendices and supporting reports for further detail and wider context.
- 2.3.2 The Pen Llyn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC (UK0013117) is located outside the location of the proposed policy change, c.30m seaward of the coastal defence, beyond the MLWS mark. No works are proposed within the SAC boundary and no direct loss or gain to the SAC, or its associated features is anticipated from either a HTL or MR scenario.
- 2.3.3 The SAC is considered to be one of the best areas in the UK for: *reefs, large shallow inlets and bays, sandbanks which are slightly covered by sea water all the time* (subtidal sandbanks), *estuaries and coastal lagoons*; and considered to support a significant presence of: *Mudflats and sandflats not covered by seawater at low tide* (intertidal mudflats and sandflats), *Atlantic salt meadows Glauco-Puccinellietalia maritimae, Salicornia and other annuals colonising mud and sand*, and *submerged or partially submerged sea caves*. The site is also designated for bottlenose dolphin (*Tursiops truncatus*), otter (*Lutra lutra*) and grey seal (*Halichoerus grypus*). The SAC designation extends over a vast area of which the Barmouth North Policy Unit, although outside the SAC boundary, represents a negligible area.
- 2.3.4 Only certain SAC features record coastal squeeze as a key vulnerability in the SAC Management Plan; both are detailed in Table 2.

Table 2 Annex I Habitats Vulnerable to Coastal Squeeze Impacts

Interest Features	Description of Features	Conservation Objectives	Key Vulnerabilities	Proximity to Policy Unit
Pen Llyn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC (UK0013117) (Joint Nature Conservation Committee (JNCC) , 2025) (Natural Resource Wales (NRW), 2018)				
Annex I habitats that are a primary reason for selection of this Site				
1110 Sandbanks which are slightly covered by sea water all the time	On the north-west coast of Wales includes the sandbanks of Devil's Ridge, Bastram Shoal, the Tripods, and areas within and to the south of Tremadog Bay. These include examples of full salinity, tide-swept sandbanks and relatively sheltered	- These dynamic habitats rely on natural processes such as sediment transport and deposition, which must be maintained to support the species that depend on them. - A key objective is to conserve the biological communities associated with these sandbanks, including infaunal species such as polychaete worms, bivalve molluscs, crustacean, and	- Coastal squeeze due to sea level rise and the presence of hard coastal defences; - Water pollution, nutrient enrichment and eutrophication; - Spread of invasive non-native species (INNS). - Dredging, trawling, mooring and anchoring	4km west

Interest Features	Description of Features	Conservation Objectives	Key Vulnerabilities	Proximity to Policy Unit
	sandbanks. On Devil's Ridge, Bastram Shoal and the Tripods, strong tides mean that the sand, shell and gravel sediments are constantly shifting, and as a result the sandbanks support animals that can tolerate these high levels of disturbance.	echinoderms, as well as interstitial meiofauna that live between sand grains and contribute to ecosystem productivity. Epifaunal species, including mobile fauna and sessile organisms like hydroids attached to larger sediment particles, also form an important part of the ecosystem. Ensuring water quality is essential to support these communities, with key parameters such as salinity, oxygenation, and nutrient levels needing to be maintained within natural ranges.	which can disrupt sediment structure and formation. - Shipping (vessel traffic) and vessel wash induced substrate erosion and local modification of the wave exposure regime. - Harvesting of marine resources - Access and recreation disturbance.	
Annex I habitats present as a qualifying feature, but not a primary reason for selection of this Site				
1330 Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>)	The Atlantic salt meadow within the SAC is located within the estuaries of the Meirionnydd and Ceredigion coasts: the Glaslyn/Dwyrhyd, Artro, Mawddach and Dyfi estuaries. The most extensive areas occur in the Dyfi Estuary with over 380ha, whilst the greatest variety of vegetation types occurs in the Mawddach Estuary. The saltmarsh communities vary from transitional low marsh vegetation to extreme upper marsh vegetation often dominated by sea couch	- The Conservation Objectives are to maintain the natural structure, function, and ecological diversity of these coastal habitats. The integrity of the salt meadow vegetation should be preserved, ensuring that characteristic plant communities, including species such as common saltmarsh-grass (<i>Puccinellia maritima</i>) and sea purslane (<i>Atriplex portulacoides</i>) are maintained across their natural range. - The natural hydrological regime must be protected, allowing for regular tidal inundation and sediment deposition to sustain habitat dynamics. The habitat should remain free from excessive physical disturbance, including erosion, trampling, or inappropriate grazing pressure, which could lead to degradation of vegetation structure and species composition.	- Coastal squeeze due to sea level rise and the presence of hard coastal defences. - Water pollution, nutrient enrichment and eutrophication. - Spread of INNS. - Dredging, trawling, mooring and anchoring which can disrupt sediment structure and formation. - Shipping (vessel traffic) and vessel wash induced substrate erosion and local modification of the wave exposure regime. - Harvesting of marine resources. - Access and recreation disturbance (particularly trampling and	2.5km south-east

Interest Features	Description of Features	Conservation Objectives	Key Vulnerabilities	Proximity to Policy Unit
	(<i>Elytrigia atherica</i>). In total these saltmarshes have zonation which include seven different communities. The SAC includes the rare slender spike-rush (<i>Eleocharis uniglumis</i>) saltmarsh community which occurs locally along the west coast from the Dyfi Estuary northwards. The Atlantic salt meadow also provides habitat for a variety of rare or uncommon plant species. Some areas are lightly grazed and have good vegetation structure, which may be important for breeding waders.	• Good water and sediment quality status is essential, preventing pollution and nutrient enrichment, which could alter the plant communities and reduce habitat quality. Additionally, the salt meadows must be allowed to respond naturally to sea level rise through landward migration, avoiding habitat loss due to coastal squeeze from hard sea defences or development.	• grazing pressures). • Changes in hydrology, such as drainage or altered tidal flows, which can affect the salinity regime and habitat conditions.	

2.3.5 Annex I Habitat Reefs (1170) are a primary reason for selection of the Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau SAC (Refer to Table 3). The closest that this feature is delineated in the SAC Management Plan is approximately 2-3km offshore from the Policy Unit.

2.3.6 The reefs across the SAC are extremely varied and support a wide variety of communities of marine fauna and flora reflecting the broad range of physiographic factors such as wave action, tidal streams, variation in seabed type, scour regimes, water clarity and variation in water depth. The reef feature occurs throughout the entire SAC and incorporates a range of different habitat types. These include rocky intertidal and subtidal reefs, biogenic reefs (e.g. those formed by the horse mussel (*Modiolus modiolus*) or the honeycomb worm (*Sabellaria alveolata*) [present north of the policy unit] and carbonate reef structures formed by methane gas leaking from the seabed (the most prominent of these reefs is known as Holden's Reef). No reefs are present nor within the immediate vicinity of the policy unit, nor are such subtidal features considered to be at risk of coastal squeeze.

Table 3 Annex I Habitat - Reefs

Interest Features	Description of Features	Conservation Objectives	Key Vulnerabilities	Proximity to the Site (approximate)
Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC (UK0013117) (Joint Nature Conservation Committee (JNCC) , 2025) (Natural Resource Wales (NRW), 2018)				
Annex I habitats that are a primary reason for selection of this Site				
1170 Reefs	The reefs are extremely varied and support a wide variety of communities of marine fauna and flora reflecting the broad range of physiographic factors such as wave action, tidal streams, variation in seabed type, scour regimes, water clarity and variation in water depth. The reef feature occurs throughout the entire SAC and incorporates a range of different habitat types. These include rocky intertidal and subtidal reefs, biogenic reefs (e.g. those formed by the horse mussel (<i>Modiolus modiolus</i>) or the honeycomb worm (<i>Sabellaria alveolata</i>) and carbonate reef structures formed by methane gas leaking from the seabed (the most prominent of these reefs is known as Holden's Reef). Relatively few <i>Modiolus</i> reefs are still known to exist within the Irish Sea, and the north Llŷn reef is	• The Conservation Objectives for the Pen Llŷn a'r Sarnau SAC reefs focus on maintaining their structural integrity, biodiversity, and ecological functionality. This includes the protection of rocky intertidal and subtidal reefs, extensive boulder and cobble reefs, and biogenic reefs formed by species such as horse mussels and honeycomb worms. • Key objectives include preventing physical degradation from anthropogenic activities, ensuring that water quality parameters support reef-associated communities, and conserving the diverse assemblages of species dependent on these habitats. This includes kelp forests (<i>Laminaria saccharina</i>, <i>Halidrys siliquosa</i>), turf-forming red seaweeds, and benthic invertebrates such as sponges, soft corals, anthozoans, bryozoans, ascidians, molluscs, echinoderms, and crustaceans. • Additionally, the natural ecological processes of these systems, including recruitment, succession, and interspecies interactions, should remain undisturbed to maintain the dynamic equilibrium of the reef ecosystem. Managing pressures such as pollution, climate change, and non-native species introductions is crucial to ensure the long-term resilience and	• Physical damage from fishing equipment, anchoring, and coastal developments (including alternations of water and sediment movement impacting reef integrity). • Shipping (vessel traffic) and vessel wash induced substrate erosion and local modification of the wave exposure regime. • Pollution and nutrient enrichment, chemical discharges, and sedimentation affecting water quality. • Recreational activities such as scuba diving, boat traffic, and shoreline access causing habitat disturbance (particularly trampling across honeycomb worm reefs). • Climate change and rising sea temperatures and ocean acidification impacting reef health. • INNS and competition or	2-3km offshore

Interest Features	Description of Features	Conservation Objectives	Key Vulnerabilities	Proximity to the Site (approximate)
	considered one of the best examples in this area.	conservation status of these ecologically significant marine habitats.	predation from non-native species.	

Intertidal Biotopes

- 2.3.7 An Intertidal Biotope Survey was conducted across the intertidal zone of the study area, with the results shown in ES Volume 3, Appendix 6.1 – Arup (2025) Barmouth North Promenade, Intertidal Biotope Survey Report. A summary of the biotopes recorded are included in Table 2 below.
- 2.3.8 The upper shore was characterised either by *barren littoral shingle* (LS.LCS.Sh.BarSh) or *barren littoral coarse sand* (LS.LSa.MoSa.BarSa) with the lower shore dominated by the impoverished fine sand biotope LS.LSa.MoSa.AmSco.Sco - *Scolecopsis spp. in littoral mobile sand* – a community defined by very low macroinfaunal biodiversity and very low abundance / biomass. This community dominates the proposed policy change area due to the high exposure presented by the westerly aspect of the site creating constant natural disturbance to the substrate. Consequently, all three main intertidal biotopes are either devoid of conspicuous fauna or defined by their lack of diversity and biomass.
- 2.3.9 The primary biodiversity interest is associated with the anthropogenic structures along the beach, primarily wooden groynes and an outfall pipe. *Mytilus edulis* (blue mussels)- a Section 7 Priority Habitat- have colonised the majority of these structures, but for the purposes of this assessment are not considered 'natural habitats' as their distribution would be negligible in the absence of man-made structures. Furthermore, this assessment does not consider *M. edulis* in this situation as a habitat likely to be able to take advantage of unconstrained sea level rise due to lack of suitable natural attachment habitat. Notably, blue mussel beds are anticipated to be c. 100m offshore and potentially a biogenic component of the Annex I reef qualifying feature, but are not considered vulnerable to coastal squeeze in this context.
- 2.3.10 Similarly, areas of honeycomb worm reefs (*Sabellaria alveolata* - LS.LBR.Sab.Salv) and *Fucus vesiculosus* and *barnacle mosaics on moderately exposed mid eulittoral rock* (LR.MLR.BF.FvesB) were recorded in the rocky intertidal area north of the policy unit - outside of the proposed policy change area. Noting the importance of the 'reefs' as supportive of wider biodiversity, *Sabellaria* reefs are listed as 'Biogenic Reefs', a sub-category of the 'Reefs' feature under Annex I of the Habitats Directive. *S. alveolata* reef is also listed as a Priority Habitat under Section 7 of the Environment (Wales) Act 2016 and is also part of the Annex I reef feature of the Pen Llŷn a'r Sarnau SAC, adjacent to the Site. Noting this feature is outside the policy unit, *Sabellaria alveolata* reef is not considered further within this assessment.
- 2.3.11 One localised area of *Porphyra purpurea* and *Ulva spp. on sand-scoured mid or lower eulittoral rock* (LR.HLR.MusB.Sem.LitX) was present on the mid-shore where stabilised cobbles were embedded in the sediment. This habitat is neither deemed Annex I habitat nor Section 7 Priority Habitat and is no longer

considered within this assessment.

Table 2 Intertidal Biotopes Recorded on Site

Zonation	Biotope Code	Biotope	Locality	Comments / Status
Supralittoral Upper Littoral Fringe Lower Littoral Fringe	LS.LCS.Sh.BarSh	Barren littoral shingle	Cobble ridge – variable width, throughout scheme area	No conspicuous flora or fauna - barren
Supralittoral Upper Littoral Fringe Lower Littoral Fringe	LS.LSa.MoSa.BarSa	Barren littoral coarse sand	Upper beach with larger expanses to south of RLB	No conspicuous flora or fauna - barren
Upper Eulittoral	LR.MLR.BF.FvesB [summer-variant; reduced exposure]	<i>Fucus vesiculosus</i> and barnacle mosaics on moderately exposed mid eulittoral rock	North of RLB; consider indirect effects. Located shoreward of <i>Sabellaria alveolata</i> reef.	North of HTL Area - Not affected by Policy Change [MR to HTL] Seasonal variation linked to exposure. LR.HLR.MusB.Sem.FvesR [winter variant] <i>Semibalanus balanoides</i> , <i>Fucus vesiculosus</i> and red seaweeds on exposed to moderately exposed eulittoral rock
Mid Eulittoral	LS.LBR.Sab.Salv	<i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock	North of RLB; consider indirect effects.	North of HTL Area - Not affected by Policy Change [MR to HTL] Priority Habitat
Upper Eulittoral	LR.HLR.MusB.Sem.LitX	<i>Semibalanus balanoides</i> and <i>Littorina</i> spp. On exposed to moderately exposed eulittoral boulders and cobbles	Central RLB	Stable embedded cobbles in sediment
Upper Eulittoral Mid Eulittoral	LR.FLR.Eph.UlvPor	<i>Porphyra purpurea</i> and <i>Ulva</i> spp. on sand-scoured mid or lower eulittoral rock	Central RLB, South of RLB	Stable embedded cobbles in sediment
Mid Eulittoral	LS.LSa.MoSa.AmSco.Sco	<i>Scoleclepis</i> spp. in littoral mobile sand	Majority of sandy beach	Potential muddy sand biotope at MLWS – as

Zonation	Biotope Code	Biotope	Locality	Comments / Status
Lower Eulittoral				per NRW mapping - no conclusive evidence.

3 Initial Assessment of Coastal Squeeze

3.1.1 The following screening steps have been followed using NRW OGN62 - Assessment of Coastal Squeeze Guidance.

3.2 Screening Step 1 - Is there Potential for Coastal Squeeze to Occur?

- 3.2.1 Question 1 - Is there a plan or project to undertake works to a structure or an activity occurring which implements hold the line and/or maintains the current shoreline position (this can include works to the landward side of a defence)? Note that maintenance activities are considered at screening step 2. **YES**
- 3.2.2 Question 2 - Would the habitats be able to migrate landwards in response to sea level rise if there was no coastal structure or the management activity was stopped (i.e., the land behind the defence would be susceptible to flooding if the defence failed or would be expected to erode rapidly)? This includes land which is currently developed as explained in section 1.2 above). **YES**
- 3.2.3 Question 3 - Is there a National Site Network designated site with Annex 1 habitats present in the area seaward of the defence? Note that the designated site does not need to be immediately adjacent to the proposed works or structure, and the site boundary could be nearby or lower down the shore. **YES**
- 3.2.4 Question 4 - If the proposed works are in a 'Hold the Line' policy unit, does the SMP HRA identify coastal squeeze losses? If the proposed works are in a 'No Active Intervention' or 'Managed Realignment' policy unit then this question does not apply as coastal squeeze will not have been assessed for these policy types. The preferred policy may change over time. Consideration should be given to the policy periods (SMP epochs) relevant to the proposed lifespan of the works. For works which overlap or cross 2 policy units or more than one epoch you would need to consider the policies for all. **N/A - The SMP HRA does not assess coastal squeeze losses for Epoch 2 or 3 as this is currently 'Managed Realignment' and does not require plan-level coastal squeeze assessment. Due to uncertainty, the formal answer is deemed 'Yes'.**
- 3.2.5 Therefore, proceed to Screening Step 2.

3.3 Screening Step 2 – Are the Proposed Works considered to be Maintenance?

- 3.3.1 NRW's definition of maintenance - the "upkeep, repair or reasonable improvement of works". This means the maintenance need not be like for like, but the work must not be a "significant alteration" to what is already there. Does the proposed project or activity fall into the definition of maintenance? If the project is not within the definition of maintenance, this should be recorded at the Test of Likely Significant Effect Stage of the HRA, and the HRA should proceed to Stage

3: Appropriate Assessment. **NO**.

3.3.2 Therefore, proceed to Habitats Regulations Assessment (HRA).

4 Habitats Regulations Assessment (HRA)

4.1 Stage 1 - Screening

4.1.1 Is the project directly connected with or necessary for the management of the Special Area of Conservation for conserving its designated features? **No - Proceed to Stage 2: Test of Likely Significant Effect.**

4.2 Stage 2 – Test of Likely Significant Effect

4.2.1 Is the project likely to have a significant effect on the designated features of the Special Area of Conservation, either alone or in combination with other plans or projects?

4.2.2 Refer to Figure 1 below - Flow chart to explain the options under Stage 2 of the HRA.

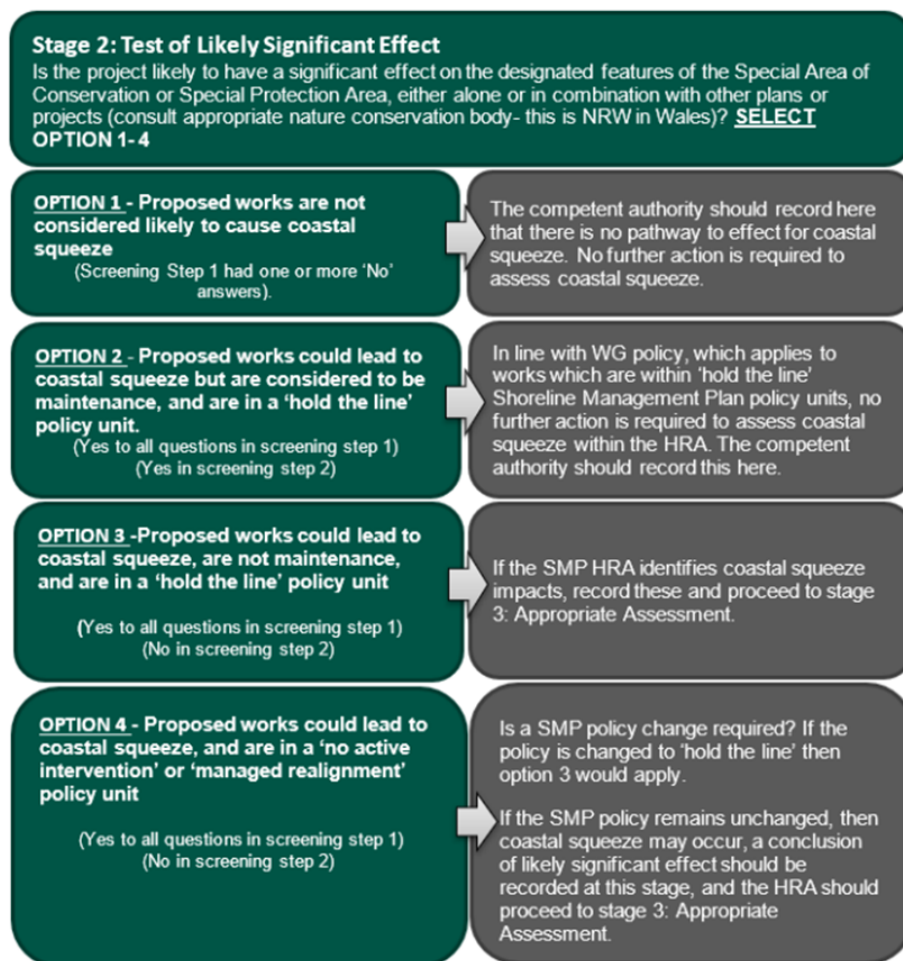
4.2.3 Option 4 - Proposed works could lead to coastal squeeze, and are in a “no active intervention” or “managed realignment” policy unit. → If the answers to Screening Step 1 (questions 1 - 4) are all ‘yes’ (i.e., there is the potential for coastal squeeze to occur) and are in ‘no active intervention’ or ‘managed realignment’ policy units in the SMP, then coastal squeeze will not have been assessed at the plan level.

4.2.4 Noting that Screening Step 1 concluded ‘Yes’ to all questions and that the current policy is for Managed Realignment, then coastal squeeze assessment is required.

4.2.5 If the policy is changed to ‘Hold the Line’ then Option 2 or 3 set out in Figure 1 below would apply.

4.2.6 Therefore, assuming the Major Change request is approved amending policy from MR to HTL, then Option 3 applies: Option 3 - Proposed works could lead to coastal squeeze, are not maintenance, and are in a ‘Hold the Line’ policy unit → proceed to Stage 3: Appropriate Assessment.

Figure 1 Flow chart to explain the options under Stage 2 of the HRA

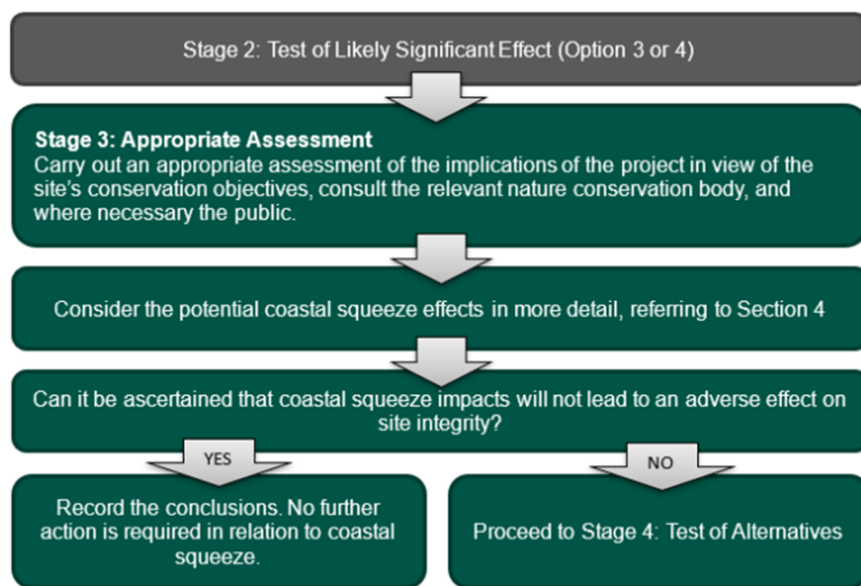


4.3 Stage 3 – Appropriate Assessment

- 4.3.1 The risk of likely significant effects from coastal squeeze on the Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau SAC cannot be ruled out, therefore a Stage 3: Appropriate Assessment is required. Refer to Figure 2 - Flow chart to explain the considerations to be made under Stage 3 of the HRA.
- 4.3.2 The below sections therefore provide detailed consideration of the scale, location and timing of the Proposed Development in relation to the site's features and conservation objectives, with a view to determining if the development would incur an adverse effect on the integrity of the site. This section considers the mitigating factors and the coastal squeeze effects (if any) on the Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau SAC for HTL policy with indicative consideration of the potential risks of a MR policy progressing. Section 4 of Guidance Note 062 has been followed.

Figure 2
the HRA

Flow chart to explain the considerations to be made under Stage 3 of



- 4.3.3 It is important to note that the Pen Llyn a'r Sarnau SAC commences at the Mean Low Water Springs (MLWS) mark and continues offshore. Notably, the intertidal area and areas affected by the proposed policy change are not located within the SAC and therefore no direct loss or gain to the SAC or its associated features is anticipated in either a HTL or MR scenario.

Potential Effects on SAC Annex I Features

- 4.3.4 Section 2.3: Environmental Baseline, lists the relevant features of the Pen Llyn a'r Sarnau SAC alongside a description of the SAC features, Conservation Objectives, Proximity to the Policy Unit and Key Vulnerabilities – including coastal squeeze risk. Coastal squeeze is only listed as a key vulnerability of the following features of the SAC:
- 1110 Sandbanks which are slightly covered by sea water all the time (subtidal sandbanks).
 - 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).
- 4.3.5 Neither habitat is located within the vicinity of the policy unit. Figure 1 of the Pen Llyn a'r Sarnau SAC Management Plan¹ delineates SAC feature 1110 *Sandbanks which are slightly covered by sea water all the time* as being located at least 4km west of the proposed HTL policy unit. Whilst the nearest Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and *Salicornia and other annuals colonising mud and sand* feature are located within the Mawddach Estuary, several kilometres south within another policy unit.
- 4.3.6 Neither the *large shallow inlets and bays* feature, *estuaries* feature, *coastal lagoons* feature, nor the *submerged or partially submerged sea caves* are present within the vicinity of the policy unit, whilst the nearest *reef* features are delineated c. 3km offshore. As such, neither Annex I feature shall be considered

¹ [conservation-advice-for-pen-llŷn-ar-sarnau-sac.pdf](#)

further within this assessment.

- 4.3.7 Whilst the NRW SAC Condition Assessment for the Pen Llyn a'r Sarnau SAC does indicate '*Unfavourable*' condition for the *Mudflats and sandflats not covered by seawater at low tide* feature with 'Low' confidence, this feature is not categorised as vulnerable to coastal squeeze in the SAC Management Plan, nor is it noted within the activities risking feature deterioration, which include: '*historic pollutants, bait collection, winkle collection, moorings and marine invasive non-native species*', rather than coastal squeeze impacts. Furthermore, the NRW SAC Condition Assessment report focusses on the estuarine extents as of primary importance for this feature where biodiversity and biomass are greater, rather than the more impoverished exposed open coastline such as at Barmouth North.
- 4.3.8 Consequently, it is considered that there is no effect on the Pen Llyn a'r Sarnau SAC Annex I habitats from coastal squeeze in the event of a policy change from MR to HTL alone. As such, there can be no impact in-combination with any other plans or projects.

Potential Effects on Section 7 Habitats

- 4.3.9 Section 2.3 describes the baseline, composition and extent of Section 7 Priority Habitats within and near the policy unit. The baseline describes the mussel colonisation of the groynes and outfall pipe as comparable with the blue mussel 'bed' Section 7 habitat, however, in the absence of the anthropogenic structures there would be no blue mussels in the intertidal. As such, blue mussels would not be affected by coastal squeeze since there is no suitable habitat to sustain or allow colonisation. Additionally, the Section 7 habitat is described as a subtidal feature, such as that recorded c. 3km offshore, rather than intertidal as present along Barmouth Promenade.
- 4.3.10 Similarly, Section 2.3 describes the extent of the Section 7 Priority Habitat - *Sabellaria alveolata* reef - as being outside the policy unit and thus not affected by the proposed policy change. The *Sabellaria* biotope is also back by natural cliffs so would not be able to 'roll-back' even under natural processes.
- 4.3.11 The Section 7 list does include 'subtidal sands and gravels' as a Priority Habitat. As such, the assessment aligns with the Annex I *intertidal sandflats* feature as assessed above. Notably, the assessment concludes no likely significant effect on the feature from coastal squeeze.
- 4.3.12 Consequently, it is considered that there is no effect on any Section 7 Priority Habitats from coastal squeeze in the event of a policy change from MR to HTL.

4.4 Can it be Ascertained that Coastal Squeeze Impacts will not lead to an Adverse Effect on Site Integrity?

Likelihood of Coastal Squeeze Impact

- 4.4.1 In accordance with the definition of coastal squeeze provided by the UK Statutory Nature Conservation Bodies in *What is Coastal Squeeze?*, the definition excludes habitat loss against steeply rising land (sloping coastal hinterlands). In the event of a managed realignment scenario at Barmouth, any coastal habitats susceptible to coastal squeeze, would not be able to reasonably increase extent due to the steep elevation. Assuming the extant Cambrian Railway, residences, agricultural land, etc. were removed from the scenario, the elevation change from MHWS to the A496 is 25m in elevation over the first 200m inland. In this scenario, and with the geology present, rather than providing space for habitat to roll-back, a natural cliff formation would likely be reached prior to any appreciable increase in extent were achieved. As such, natural squeeze would be the limiting factor, rather than coastal squeeze.
- 4.4.2 Similarly, with reference to Section 4 of OGN62, the predicted coastal squeeze is very small for the relevant policy unit and lifetime of the scheme noting the higher ground levels behind the existing defences. Section 4 notes that where potential for coastal squeeze is small (less than 1 Ha) – as it is in Barmouth North – there is limited benefit in carrying out a more detailed assessment.

Adverse Impact on Site Integrity

- 4.4.3 Following an assessment of the potential likelihood and impacts of coastal squeeze associated with the Hold the Line scenario for Epoch 2, it can be concluded that there will be no adverse effect on the integrity of the Pen Llyn a'r Sarnau / Lleyen Peninsula and the Sarnau SAC site.
- 4.4.4 The intertidal area and areas affected by the proposed policy change are not located within the SAC and therefore no direct loss or gain to the SAC or its associated features is anticipated in either a HTL or MR scenario.
- 4.4.5 The SAC Management Plan identifies two SAC features vulnerable to coastal squeeze – subtidal sandbanks [c. 4km offshore] and Atlantic saltmarsh [Mawddach Estuary] – neither of which are located in the vicinity of the policy unit. As such neither feature will be affected by any change from a MR to a HTL policy.
- 4.4.6 The remaining Annex I SAC Habitats are either not present within the affected area or not vulnerable to coastal squeeze. The closest feature is the intertidal sandflats features which is discussed below.
- 4.4.7 The primary biotope [LS.LSa.MoSa.AmSco.Sco - *Scolecopsis spp. in littoral sand*] is categorised by both the high exposure of the environment and the very low diversity and abundance within the substrate. As such, any natural squeeze or coastal squeeze impact at the site would not incur a significant change in local biodiversity or feature condition. Similarly, the two other main biotopes are also associated with negligible biodiversity and biomass [*barren littoral shingle* - LS.LCS.Sh.BarSh – and *mobile barren sand* - LS.LSa.MoSa.BarSa]; neither biotope would provide meaningful benefits if able to roll-back.

- 4.4.8 In the event that the recorded intertidal sand biotopes were within the boundary of the SAC and coincident with the *intertidal sandflats* feature, it is considered that the 'significance' test would not be met due to: [1] the habitat – in the context of the SAC as presented in the SAC Management Plan and NRW's Condition Assessment Report - is not vulnerable to or at risk from coastal squeeze (intertidal sandflats), [2] opportunity ultimately constrained by the limited area available to 'roll-back' due to high ground behind existing defences, nationally important infrastructure (Cambrian Railway), residential dwellings, caravan parks, local businesses and local amenities, [3] impacts or gains only for barren or impoverished biotopes such that any loss or gain would have a *de minimus* influence on the overarching SAC from both an extent and condition perspective.
- 4.4.9 Whilst climate change driven sea level rise is 'likely' to cause the potential for coastal squeeze, it is not 'likely' to incur any coastal squeeze impact on any of the Annex I SAC Habitats as any direct loss or gain would occur beyond the boundaries of the SAC and not affect the SAC features, irrespective of a HTL or MR policy. Consequently, there would be no effect on the SAC Annex I Habitat features from a policy change from MR to HTL.
- 4.4.10 The likely future baseline scenario in either a HTL or MR scenario is considered to be constrained either by coastal squeeze from a defence structure protecting nationally significant infrastructure, residences, etc., or natural squeeze caused by the steep elevation and natural geology. In either event, there may be foreshortening of the LS.LSa.MoSa.AmSco.Sco - *Scolecopsis spp. in littoral sand* biotope, but as noted this would result in a negligible loss of biodiversity and biomass noting the high exposure of the site and impoverished habitats.

Managed Realignment Scenario

- 4.4.11 In considering the alternative, delivering managed realignment, and initially negating the need to address public and community safety, extensive demolition and land lowering would be required to enable new intertidal habitat, a new defence line would be required adjacent to the Cambrian Railway that would limit the extent of managed realignment, and new coastal defence assets would require construction within the Pen Llyn a'r Sarnau SAC (nearshore or cross-shore breakwater to manage the policy unit's high exposure) that would have direct (footprint) and indirect (change to coastal processes) impacts within the SAC, affecting Annex I Habitats, Section 7 Priority Habitats and adjacent policy units triggering further works and compensation requirements.
- 4.4.12 Furthermore, any new habitat created through managed realignment would be limited due to the high ground present behind the defences and would likely only expand the barren and impoverished habitats currently present due to the extreme exposure of the site such that biodiversity gains may be limited.
- 4.4.13 Similarly, the SMP2 stresses the need for universal management of the three Barmouth policy units, with unilateral policy change likely to cause deterioration in adjacent policy units without further interventions. As such, amending the North Barmouth policy unit to Managed Realignment is likely to have impacts on the adjacent policy units. This may in turn have a detrimental effect on Annex I and Section 7 Priority Habitats in the adjacent policy units. Similarly, the Managed Realignment proposal of the SMP2 suggests that such an approach '*may require nearshore or shore connected structures to reduce wave energy*',

which would be constructed within the Pen Llyn a'r Sarnau SAC and may require compensatory measures to deliver. Consequently, maintaining the status quo in sustaining a HTL policy is preferable.

- 4.4.14 Additionally, risks associated with made ground present behind the defences would need to be investigated and addressed to avoid any deterioration to the Pen Llyn a'r Sarnau SAC and nearby Section 7 Priority Habitats. Environmental risks to the intertidal and subtidal biotopes would be introduced as coastal erosion impacts areas of made ground behind the defence. The composition of the made ground is not fully understood, but would be released into the coastal environment potentially releasing harmful contaminants that may undermine SAC conservation objectives and degrade adjacent priority habitats. By maintaining the defence in situ, the made ground is secured behind the defence preventing any potential for contamination due to disturbance and mobilisation.

Conclusion

- 4.4.1 Following an assessment of the potential likelihood and impacts of coastal squeeze associated with the Hold the Line scenario for Epoch 2, it can be concluded that there will be no adverse effect on the integrity of the Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau SAC site.
- 4.4.2 It is also considered that there is no effect on any Section 7 Priority Habitats from coastal squeeze in the event of a policy change from MR to HTL.
- 4.4.3 Overall, the assessment confirms that the proposed Policy Change from MR to HTL will not result in coastal squeeze impacts on the Annex I SAC features, nor any Section 7 Priority Habitats.
- 4.4.4 No further action is required in relation to coastal squeeze.