

Conwy CBC
Penrhyn Bay FCERM
Ecological Impact Assessment

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 274649

Ove Arup & Partners Ltd
63 St Thomas Street
Bristol BS1 6JZ
United Kingdom
www.arup.com

ARUP

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1 Executive Summary

Ove Arup and Partners ('Arup') was commissioned by Conwy County Borough Council (CCBC) to carry out an Ecological Impact Assessment (EcIA) in relation to the proposed construction of a rock armour groyne as part of a Flood and Coastal Erosion Risk Management (FCERM) scheme within Penrhyn Bay, North Wales.

The Outline Business Case concluded that a T-shaped rock armour groyne structure would be the most effective form of structure, in similarity to the existing breakwaters present in the local area. The proposed groyne dimensions are 100m seaward projection and 90m width. Additional beach nourishment is required to build out the beach profiles adjacent to the groyne. The project also comprises improvements to the public realm on the land side of the sea defence.

In order to assess impacts of the proposed works on ecological receptors, a desk study search of designated sites and biodiversity records was undertaken, as well as on site surveys including an Extended Phase 1 habitat survey and an intertidal biotope survey.

The proposals are not located within a designated site, however the Liverpool Bay / Bae Lerpwl (Wales) SPA is adjacent to the site. A Preliminary Habitats Regulations Assessment (HRA) (Stage 1: Screening) has been undertaken in accordance with The Conservation of Habitats and Species Regulations 2017 (as amended) and included as a standalone document.

Two Priority Habitats were noted on site: *Sabellaria alveolata* reef and intertidal boulder communities. Both habitats will be directly impacted by the proposed works. Through the design process and with application of the mitigation hierarchy the design was altered to reduce the area of habitat loss and provide mitigation and enhancement for the loss of associated biodiversity.

A range of embedded mitigation measures are detailed to avoid and minimise impacts upon coastal receptors, e.g. pollution prevention, along with spatial and temporal separation. Further mitigation and best practice methods are detailed for any potential movement of rock armour by sea to site; the specific location for delivery and the proposed method statement is to be approved by Conwy County Borough Council (CCBC) and/or Rhyl Harbour Master, Maritime & Coastguard Agency and Natural Resources Wales. The mitigation measures will be integrated into the contractor's Construction Environmental Management Plan (CEMP); derived from the Outline CEMP (Penrhyn Bay FCERM Environmental Report, Appendix H).

With consideration and implementation of the mitigation measures, the proposed development is capable of being accommodated without significant negative impacts on ecologically sensitive receptors within the area, and with the potential for biodiversity enhancement.

This EcIA is intended to be viewed as a Biodiversity Statement in support of Policy NTE/3 as part of the Conwy Local Development Plan.

2 Introduction

2.1 Background

Ove Arup and Partners ('Arup') was commissioned by Conwy County Borough Council (CCBC) to carry out an Ecological Impact Assessment (EcIA) in relation to the proposed construction of a rock armour groyne as part of a Flood and Coastal Erosion Risk Management (FCERM) scheme within Penrhyn Bay, North Wales [National Grid Reference: SH 82703 81589], hereafter referred to as 'the Project' (Figure 1).

This report details ecological baseline conditions, assesses impacts on ecological receptors, and provides recommendations for avoiding and reducing any significant impacts to the local biodiversity, mitigation and compensation measures, and ecological enhancement, in line with current guidance^{1,2}. A Preliminary Ecological Appraisal was recently completed for the site (Appendix A); the results of which are used to, in part, inform this assessment.

2.2 Project Background

Penrhyn Bay is a coastal embayment which lends its name to the small town located between the renowned seaside resorts of Llandudno and Colwyn Bay, North Wales. The study frontage is approximately 450m in length contained between two breakwaters. At present the sand and shingle material which makes up the beach is mobile, particularly during storm events, encouraging transportation from the centre of the bay towards the eastern breakwater. Hence, CCBC must undertake regular beach maintenance activities in order to protect the existing back-shore assets at a significant cost to CCBC's capital maintenance funds.

The existing defences provide coastal erosion and tidal flooding protection to over 300 residential and commercial properties, utilities infrastructure (including a Dŵr Cymru Welsh Water (DCWW) pumping station, a Wastewater Treatment Works (WwTW) sea outfall and Scottish Power Energy Networks assets), the adjacent promenade, A547 highway, Wales Coast Path, National Cycle Route and the Rhos-on-Sea Golf Club. The present beach and promenade also form a key part of the local community's well-being and recreation space, whilst adding to Conwy's wider tourist attractions.

In the absence of the continuing beach management works, regularly undertaken by CCBC, the sea wall and revetment are highly likely to fail through the on-going draw-down of the foreshore exposing the corroded and structurally weak sheet piled toe foundations. The present regime of maintenance activities is considered unsustainable and is likely to increase in frequency over time, as the mobility of the beach increases due to gradual reduction in size from attrition and

¹ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester

² BSI (2013) Biodiversity – Code of practice for planning and development.

weathering and the increasing severity of storm events and sea level rise associated with climate change.

The Investment Objectives for the project are to:

1. Manage the effects of flood risk and coastal erosion to people and property;
2. Reduce the on-going capital maintenance costs experienced as part of the present beach maintenance regime to safeguard the public backshore assets;
3. Meet the objectives of the Shoreline Management Plan (SMP2) for Penrhyn Bay, which include:
 - ‘Hold the Line’;
 - Maintaining and widening the beach; and
 - To be environmentally acceptable.
4. Incorporate wider benefits and added amenity value into project design and construction (including consideration of Welsh Government’s Community Benefits Policy and the Well-Being of Future Generations (Wales) Act 2015). To maintain and, where possible, enhance the natural environment; and
5. Maintain and improve the local area – with an awareness of the amenity value presently provided by Colwyn Bay and Llandudno (neighbouring towns).

2.3 Proposed Works

The Outline Business Case (OBC) concluded that a T-shaped rock armour groyne structure would be the most effective form of structure, in similarity to the existing breakwaters present in the local area.

The proposed groyne dimensions are 100m seaward projection and 90m width. Additional beach nourishment is required to build out the beach profiles adjacent to the groyne. The nature of this beach material is likely to be similar to the existing.

The planned shape of the capital beach nourishment was determined from numerical modelling as the equilibrium position resulting from the incident wave direction and wave diffraction behind the groyne structure.

A limited degree of flexibility exists in the location of the rock groyne to achieve the requisite design parameters and project objectives. The baseline data presented within this report will inform potential intertidal biodiversity constraints that may facilitate micro-siting of the proposed coastal defences.

Rock armour (assumed 3-6 ton and 0.3-1 ton gradings) is anticipated to be brought to site by sea and/or road, subject to local quarry availability, and stockpiled on the beach, whilst construction plant access would be via Glan-y-Mor Road. Figure 2 details the proposed works.

The project also comprises improvements to the public realm on the land side of the sea defence:

- Pedestrian and cycle crossing on Glan-Y-Mor Road;

- Promenade re-surfacing in some areas;
- New beach access ramp;
- Soft landscaping to the garden at the western end of the site;
- Relocation of car park and bus stop;
- Replacement of handrails and new handrails in some locations;
- New street furniture; and
- Beach showers.

2.3.1 Construction Methodology

Below is the outline construction methodology for the construction of the groyne and the beach nourishment works. The methodology will be confirmed with appointment of the Contractor.

Indicative Method Statement

1. Install site compound at the eastern end of the site (NGR: SH 82939 81478) in elevated platform and all associated road and promenade signalling. Team of up to 20 people on site.
2. Build temporary access causeway along the upper beach to the central area of the site. Indicatively 7m wide (enough for 2 dumper trucks or 1 excavator and 1 dumper truck to cross) and 250-300m long. Material for the causeway can either be shingle, which can be retained as part of the permanent works, or if it is a different material not suitable for the permanent works the Contractor will be required to partially or completely remove.
3. Repairs to concrete seawall: new concrete works to re-form steps, patch repairs to concrete surface, filling of joints. No structural alteration to the seawall.
4. Bring in material for groyne construction (core material 1-200kg, underlayer 0.3-1t, armour layer 3-6t) by road with tippers/dumpers e.g. from Penmaenmawr Quarry (approx. 12 miles). This includes material brought directly from a quarry and/or material from overseas quarry e.g. Glensada Quarry in Scotland initially brought to a nearby port e.g. Ellesmere Port and then from the port to site by road (approx. 45 miles).
5. Material delivery – the delivery method for core materials is yet to be confirmed; three options are presented below and the worst-case assessed in the HRA.
 - a) Material Delivery Option #1 - This method would result in indicatively the movement of 21 vessels to Ellesmere Port, and approximately 9,615 truck journeys to site. This would equate to approximately 2.5 truck journeys per hour for each of the three material transport types (e.g. 3-6 tonne rocks, 0.3-1 tonne rocks, and core material) and 0.18-0.22 vessel journeys to Ellesmere Port per day for the duration of the project.
 - b) Material Delivery Option #2 - Bring in material for groyne construction (underlayer 0.3-1t, armour layer 3-6t) by sea directly to Penrhyn

Bay where it is deposited during high tides close to shore. There are two main options:

- (i) material is transferred from a large vessel (which transports the material from overseas to a location offshore of the site) to a barge which delivers to site assisted by low draft tugs e.g. Holyhead Towing Co. Barge to avoid grounding; or
 - (ii) use of side stone-dumping vessel or barge. It is very unlikely that core material will need to be imported from overseas. This method would result in indicatively the movement of 21 vessels journeys, 63 barge journeys, 63 tug journeys (all to a location offshore with ship to shore transport) and 47 vessel journeys (for the transport of material directly to site). This would equate to approximately 1.2-1.6 vessel journeys per day (to a location offshore with ship to shore transport) and 0.4-0.5 vessel journeys per day (for the transport of material directly to site) for the duration of the project.
 - c) Material Delivery Option #3 [Mix of Material Delivery Options #1 and #2]
 - Rock armour 3-6t is likely to be the more challenging material to source locally due to currently high demand on quarries. Possibly quarries in Ireland /Scotland may be used.
6. Core material to be placed immediately on the permanent works, underlayer and armour can be temporarily stored on the beach.
 7. Total duration of material transportation for all alternative options should be approximately 3 – 4 months for groyne material with a further 2.5 months for beach nourishment material. There may be limited overlap in groyne and beach material transportation.
 8. Tidal working to build the groyne. Construction to progress in small sections to minimise loss of material during high tide and minimise damage from storms to unfinished profile. Silt curtains will be employed to reduce sediment plume dispersion if construction is underwater. There is less risk of generating sediment plumes if construction is done mostly on the dry at low tide.
 9. Excavation of foreshore to the design profile for groyne toe trench, placement of geotextile as separator/filter to the existing seabed, placement of excavated material within the core footprint (subject to contamination results and particle size, i.e. not soft material).
 10. Placement of core material along groyne axis by barge/dumper truck, spreading by dozer and profiling by excavator. Core material to be used as working platform to maximise working windows, therefore minimum width assumed 5.5m required for plant. Contractor may reduce the width, subject to specific construction methodology and plant characteristics.
 11. Placement of underlayer (2 layers) and armour layer (2 layers) to follow closely the advancement of the core. Underlayer and armour rocks to be placed individually by excavator (assumed 30t) to achieve quality requirements.

12. After final footprint is completed, works will progress from the far end to the root of the groyne. Dumper to feed excavator armour rock for completion of groyne above working platform / core level.
13. Total weight of groyne material being transported is 61,092t.
14. Bring in material for beach nourishment by road from local quarry Cefn Graianog located 40 miles from site. Placement of material immediately on site, spreading by dozer/excavator. Total weight of beach nourishment is approx. 92.750t.

2.3.2 Access and Storage Areas

From Indicative Method Statement (above):

- Material for groyne construction - the 'core' material to be placed immediately on the permanent works, the 'underlayer' and 'armour' can be temporarily stored on the beach.
- Material for beach nourishment – placement of material immediately on site.

2.3.3 Programme

The construction stage is planned to take place from March 2022 and last for indicatively 12 months.

Following the construction stage of the project, the rock armour and beach nourishment are expected to require maintenance at 5-year intervals (to be confirmed by yearly inspections and surveys by Wales Coastal Monitoring programme).

2.4 Structure of this Report

- Section 3 provides information on the data and methodology used in the desk study and field survey;
- Section 4 provides information on the methodology to value the ecological receptors and on the methodology to assess impacts;
- Section 5 reports the baseline information and survey results;
- Section 6 provides the potential impacts of the proposed scheme during construction and operation;
- Section 7 provides the embedded mitigation used for the proposed scheme;
- Section 8 gives an evaluation of ecological receptors on site and assesses the potential effects of the construction and operation of the scheme on the ecological receptors;
- Section 9 highlights the mitigation and recommendations for the works; and
- Section 10 delivers a final assessment of the residual effects and conclusions.

2.5 Ecological Context

The Site is located on the North Wales coastline and includes a section of Marine Drive Road (in the south), sea wall and foreshore. The foreshore within the survey area is predominately shingle near the sea wall, with fine sand across much of the intertidal area. Rocky patches are present, which are clad with spiral wrack (*Fucus spiralis*) and honeycomb worm (*Sabellaria alveolata*). A rock groyne delineates the eastern extent of the survey area.

To the south of the Site residential housing predominates, with a golf course also present. The coastline continues to the east and west, which is similar in character to the Site, with the Irish Sea to the north.

A number of European Sites are present within 5km of the proposed works (Section 4). Consequently, a Preliminary HRA (Stage 1: Screening) has been undertaken in accordance with The Conservation of Habitats and Species Regulations 2017 (as amended).

2.6 Legislation and Policy

The UK is no longer a member of the European Union. EU legislation as it applied to the UK on 31 December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies. The European Union (Withdrawal) Act 2018 introduced "retained EU law" which provides that EU-derived domestic legislation continues to have effect after Exit day.

A framework of international, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. The following core legislation exists to protect habitats and species of nature conservation importance:

- i. The Conservation of Habitats and Species Regulations 2017 (referred to as the 'Habitats Regulations'); as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.
- ii. Wildlife and Countryside Act 1981 (as amended) (WCA);
- iii. Environment (Wales) Act 2016 including Section 7 biodiversity lists;
- iv. The Countryside and Rights of Way Act 2000;
- v. The Hedgerow Regulations 1997;
- vi. Protection of Badgers Act 1992;
- vii. The Salmon and Freshwater Fisheries Act 1975;
- viii. The Eels (England and Wales) Regulations 2009; and
- ix. The Invasive Alien Species (Enforcement and Permitting) Order 2019.

These pieces of legislation include a number of offences relating to protected species and requirements for licences to allow construction works to proceed. In addition, the Habitats Regulations set out the requirement for the consideration of the potential effects of a project on European Sites.

Actions which are prohibited by legislation can be made lawful on the approval and granting of a protected species licence from Natural Resources Wales (NRW), subject to conditions.

Details of the legislation are provided in Appendix B.

2.6.1 Local Policy

CCBC (“the Council”) have developed a Local Development Plan (LDP) with a major focus on incorporating biodiversity within planning (LDP5: Biodiversity in Planning). The LDP is informed by local biodiversity policy (NTE/3) which the Council have implemented to ensure obligations as stated within Section 6 of the Environment (Wales) Act 2016 are directly fulfilled.

The local biodiversity policy requires new development to “*conserve, and where possible, enhance biodiversity through the following:*

- a) *Sensitive siting; avoiding European protected sites or those of national or local importance;*
- b) *Sensitive layout and design which avoids impacts or mitigates through an agreed programme for any identified adverse impact on biodiversity;*
- c) *Creating, enhancing, and managing wildlife habitats and natural landscapes including connectivity;*
- d) *Integrating biodiversity measures into the built environment;*
- e) *Contributing to achieving targets in the Conwy Local Biodiversity Action Plan (LBAP);*
- f) *Providing for a management agreement with the Local Planning Authority to secure the retention and long-term future of biodiversity interest where applicable.”³*

³ [Topic Paper 6: Natural Environment \(conwy.gov.uk\)](https://www.conwy.gov.uk)

3 Methodology

3.1 Desk Study

The Multi-Agency Geographic Information for the Countryside (MAGIC) website⁴, the Joint Nature Conservation Committee (JNCC)⁵ website, and NRW's website⁶ were reviewed for information on national and internationally designated sites of nature conservation importance.

The search included Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites⁷, Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Local Nature Reserves (LNRs) and locally-designated sites.

Ecological records were obtained from North Wales Environmental Information Service (Cofnod) on 7 December 2020. Statutorily designated sites and non-statutory site details within 5km were obtained, with species records obtained from within a radius of 2km from the Site. The provided records included:

- Statutory nature conservation sites: SSSIs, SPAs, SACs, Ramsar Sites, NNRs, National Parks, Areas of Outstanding Natural Beauty (AONB) and LNRs.
- Non-statutory nature conservation sites: Local Wildlife Sites (LWS).
- Species with UK Legal Protection and Environment (Wales) Act 2016 (Section 7) Habitats and Species of Principal Importance (priority species and habitats in Wales).

The North Wales Important Bird Area (IBA) was also noted in consultation with the Conwy Ecologist on 28th June 2021.

Non-statutory designated sites were limited to those up to 2km from the site.

Habitats and Species of Principal Importance and the Local Biodiversity Action Plan (LBAP) priority habitats and species were also reviewed to compare to those habitats and species either recorded within the Site during the survey or recorded as having potential to be present. The LBAP which covers this Site is the Conwy LBAP⁸.

⁴ www.magic.gov.uk

⁵ <http://jncc.defra.gov.uk> Accessed online on 24th June 2020

⁶ <https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/protected-areas-of-land-and-seas/find-protected-areas-of-land-and-sea/?lang=en>
Accessed online on 24th June 2020

⁷ Ramsar sites are internationally important wetlands, designated under the Convention on Wetlands of International Importance especially as Waterfowl Habitat. Ramsar (Iran), 2 February 1971. UN Treaty Series No. 14583. As amended by the Paris Protocol, 3 December 1982, and Regina Amendments, 28 May 1987.

⁸ Wales Biodiversity Partnership (accessed 10/12/2020). Nature in Conwy. [online] available at: <https://www.biodiversitywales.org.uk/Conwy>

3.2 Field Survey

An Extended Phase 1 Habitat survey (which includes an initial protected/notable species assessment) was undertaken following standard methods as described in the JNCC's Phase 1 Habitat survey⁹ and with regard to the methodology set out in the Chartered Institute of Ecology and Environmental Management (CIEEM) 'Guidelines for Ecological Impact Assessment in the UK'¹.

Extended Phase 1 Habitat Survey is a standard technique for rapidly obtaining baseline ecological information over a large area of land. It is primarily a mapping technique and uses a standard set of habitat definitions for classifying areas of land on the basis of the vegetation communities present. The extended survey also provides an assessment of the potential for those habitats present to support legally protected or otherwise notable species.

Relevant species included all those protected by European or UK law, and notable species including those identified as being of principal importance in Wales, in response to Section 7 of the Environment (Wales) Act 2016 (Appendix A), as follows:

- Appraising any buildings or trees within the boundary (from the ground only) for their suitability to support breeding, resting and hibernating bats using survey methods based on those outlined in the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines¹⁰;
- Assessing the potential of terrestrial and aquatic habitats to support amphibians, both protected species and species of conservation concern¹¹;
- Searching for signs of badger (*Meles meles*) activity including setts, tracks, foraging holes and latrines within and up to 30m from the Site where possible¹²;
- Assessing the suitability of habitats for nesting birds (including any old nests);
- Assessing the suitability of habitats for common species of reptiles; adder, (*Vipera berus*), grass snake (*Natrix helvetica*), slow worm (*Anguis fragilis*) and common lizard (*Zootoca vivipara*)¹³;
- Assessing the suitability of watercourses for water vole (*Arvicola amphibius*)¹⁴ and otter (*Lutra lutra*)¹⁵;

⁹ Joint Nature Conservation Council (2010) Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit (ISBN 0 86139 636 7).

¹⁰ Collins, J. (2016). Bat Surveys: Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.). The Bat Conservation Trust, London.

¹¹ Odiham et al (2000) in ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.

¹² Harris, S., Cresswell, P. and Jefferies, D., 1989. Surveying Badgers. Mammal Society.

¹³ Gent, T. & Gibson, S. (2003). Herpetofauna Workers Manual. Joint Nature Conservation Committee, Peterborough.

¹⁴ Dean, M. et al. (2016). The Water Vole Mitigation Handbook (The Mammal Society Guidance Series). The Mammal Society, London.

¹⁵ Chanin, P. (2003). Monitoring the Otter, *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10., English Nature, Peterborough.

- Assessing the suitability of habitats for dormice (*Muscardinus avellanarius*)¹⁶;
- Assessing the suitability of habitats for assemblages of notable invertebrates; and
- Searching for evidence of the presence of invasive plants listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and The Invasive Alien Species (Enforcement and Permitting) Order 2019, which are subject to strict legal control, such as Japanese knotweed (*Reynoutria japonica*), Himalayan balsam (*Impatiens glandulifera*) and giant hogweed (*Heracleum mantegazzianum*).

The survey was undertaken on 10 December 2020 by Martyn Owen MCIEEM, commencing two hours before low-tide and concluding two-hours after high tide. All areas of the Site (Figure 1) were walked and relevant habitat types classified according to their vegetation types. The habitats present and Target Notes (TNs) have been mapped and presented in standard format. Points of ecological interest are recorded as TNs on Figure 3 and discussed within the text of this report. Photographs of habitats are provided at the end of this report.

3.2.1 Biotope Survey

An Intertidal Biotope Survey was undertaken by an experienced marine ecologist on 25th June 2021 between the two breakwaters (NGR: SH 82431 81981 to SH 82966 81587 (Appendix C). The survey also comprised the potential access point at SH 82941 81468 and the habitats above Mean High Water Springs (MHWS), including the cobble ridge (SH 82880 81493) that provides breeding habitat for ringed plover (*Charadrius hiaticula*) as breeding features of the North Wales Coast IBA.

The survey was undertaken in accordance with the Marine Nature Conservation Review (MNCR) Intermediate Level survey for rapid biotope assessment comprising broad biotope appraisal and identification of conspicuous flora and fauna. The survey was timed to target spring tides at low water to maximise the extent of accessible intertidal habitat. The Intertidal Biotope Survey was undertaken one hour either side of low water, which occurred at 05:58 BST at a tidal height of 0.44m Above Chart Datum [Llandudno].

In accordance with MNCR guidance an intermediate-level survey was considered appropriate to describe baseline conditions. This enabled a rapid assessment of habitats and conspicuous fauna, between MHWS and Mean Low Water Springs (MLWS), in addition to physical characteristics of the site and potential modifiers. Quadrat survey, core sampling, sieving and sediment size analysis were not considered necessary to inform this assessment. Abundances are described according to the MNCR SACFOR scale, which in summary is as follows: Superabundant (>80%), Abundant (40-79%), Common (20-39%), Frequent (10-19%), Occasional (5-9%), Rare (1-5%) and Present (<1%)¹⁷.

¹⁶ Bright, Paul, Morris, P, Mitchell Jones, T. (2006). The Dormouse Conservation Handbook 2nd ed. English Nature.

¹⁷ <https://mhc.jncc.gov.uk/media/1009/sacfor.pdf> [Accessed online 18th August 2021]

3.3 Limitations

The Extended Phase 1 habitat survey was undertaken outside the key period for terrestrial habitat assessment; however, given the nature of the intertidal habitats present and the very limited range of terrestrial plant communities, it is considered that adequate information was gathered to ascribe habitat types for this EcIA.

The findings presented in this report represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys can be limited by factors affecting the presence of plants and animals, such as the time of year, migration patterns and behaviour.

Whilst not a full protected species or botanical survey, an Extended Phase 1 Habitat Survey allows an experienced ecologist to obtain a sufficient understanding of the ecology of a Site in order to either evaluate the conservation importance of the Site and assess the potential for impacts on habitats and species likely to represent a material consideration in planning terms, or to ascertain that further surveys will be required before such an evaluation can be made.

The intertidal biotope survey was undertaken within the recommended months of April to October. The advisory survey period typically permits suitable daylight hours around spring tides, better weather and greater floristic density and diversity. At the time of survey (25th June 2021) the weather was warm (11°C) and overcast with moderately heavy rain. The survey was timed to take advantage of lower tides (0.44m) with the biotopes in the vicinity of MLWS assessed at low tide (05:58 BST). Access to the full extent of the eulittoral to MLWS was not possible due to the tidal state; however, the majority of habitats were accessible at the time of survey. It is therefore considered that the biotopes and species identified are representative.

The absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.

4 Assessment Methodology

CIEEM's EcIA guidance forms the basis of this impact assessment. These guidelines set out a process of identifying the value of ecological receptors and then characterising the impacts that are predicted. They go on to discuss the impacts on the integrity or conservation status of the receptor, the proposed mitigation and residual impacts.

The CIEEM guidelines recommend that the value of ecological receptors or features is determined based on a geographic frame of reference. For this assessment the following geographic frame of reference is used:

- International;
- National (Wales);
- Regional (north Wales);
- County (Conwy);
- Local (within circa 5km);
- Less than Local (site); and
- Negligible e.g. areas of hardstanding.

In accordance with CIEEM guidelines, when describing impacts reference is made to the following:

- Magnitude – i.e. the size of an impact in quantitative terms where possible;
- Extent – i.e. the area over which an impact occurs;
- Duration – i.e. the time for which an impact is expected to last;
- Reversibility – i.e. a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible;
- Timing and frequency – i.e. whether impacts occur during critical life stages or seasons and how often impacts occur; and,
- Direct and Indirect – i.e. direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through impacts on an intermediary ecosystem, process or receptor.

In accordance with the CIEEM guidelines, a significant impact, in ecological terms, is defined as 'an impact (whether negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area, including cumulative and in combination impacts'.

It is important to note, however, that in accordance with the CIEEM guidelines, the actual determination of whether an impact is ecologically significant is made irrespective of the value of the receptor in question.

5 Baseline Conditions

5.1 Desk Study

5.1.1 Designated Sites

Within 5km of the Site there are four internationally designated sites; Liverpool Bay (Wales) SPA, Menai Strait and Conwy Bay SAC, Creuddyn Peninsula Woods SAC and Great Orme's Head SAC (Figure 4). There are seven SSSIs and five LNRs within the search area (Figure 5). Cofnod provided information in relation to 35 non-statutory sites, however only those sites up to 2km are provided herein.

Available details in relation to statutorily and non-statutorily designated sites are provided within Table 1.

Table 1. Designated site details

Site	Approximate distance/direction from site boundary	Description
Statutorily Designated Sites (within 5km)		
Liverpool Bay / Bae Lerpwl (Wales) SPA	Adjacent/N	<p>Qualifying Features: <u>Red-throated diver <i>Gavia stellata</i></u> (non-breeding season); 6.89% of GB population <u>Little gull <i>Hydrocoloeus minutus</i></u> (non-breeding season) <u>Common scoter <i>Melanitta nigra</i></u> (non-breeding season); 10.31% of NW European Population <u>Little tern <i>Sterna albifrons</i></u> (breeding season); 6.84% of GB population <u>Common tern <i>Sterna hirundo</i></u> (breeding season); 1.80% of GB population</p> <p><u>Waterbird assemblage.</u> The main components of the assemblage include all of the non-breeding qualifying features listed above, as well as an additional two species present in numbers exceeding 1% of the GB total: red-breasted merganser <i>Mergus serrator</i> and great cormorant <i>Phalacrocorax carbo</i>.</p>
Menai Strait and Conwy Bay / Y Fenai a Bae Conwy SAC	0.8km/NW	<p>Annex I habitats that are a primary reason for selection of this site: <u>1110 Sandbanks which are slightly covered by sea water all the time</u> <u>1140 Mudflats and sandflats not covered by seawater at low tide</u> <u>1170 Reefs</u></p> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <u>1160 Large shallow inlets and bays</u> <u>8330 Submerged or partially submerged sea caves</u></p>
Creuddyn Peninsula Woods / Coedwigoedd Penrhyn Creuddyn SAC	1.2km/SW	<p>Annex I habitats that are a primary reason for selection of this site: <u>9180 <i>Tilio-Acerion</i> forests of slopes, screes and ravines</u></p> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <u>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>)</u> <u>91J0 <i>Taxus baccata</i> woods of the British Isles</u></p>
Great Orme's Head / Pen y Gogarth SAC	4.2km/W	<p>Annex I habitats that are a primary reason for selection of this site: <u>4030 European dry heaths</u> <u>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>)</u></p> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <u>1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts</u></p>
Creuddyn SSSI	0.6km/W	<p>Creuddyn is of special interest for its botanical and entomological features; semi-natural woodland, calcareous grassland, rare vascular plant assemblage including spiked speedwell <i>Veronica spicata</i> and grassland invertebrate assemblage.</p>

Site	Approximate distance/direction from site boundary	Description
Creigiau Rhiwledyn/Little Ormes Head SSSI	1.1km/NW	Little Ormes Head (Creigiau Rhiwledyn) is of special scientific interest for its geological, botanical, ornithological and marine biological features. The limestone headland, which rises to a height of 141 m, includes sea cliffs and boulders and extends for 1.4 km along the North Wales coastline, separating Penrhyn Bay from Llandudno Bay.
Bryn Euryn SSSI	1.2km/S	An area of species rich grassland developed on a prominent hill formed mainly of Carboniferous Limestone which outcrops on the southern side in a series of crags. The grassland, which is ungrazed, is dominated by hairy oat grass <i>Avenula pubescens</i> together with meadow oat grass <i>Avenula pratense</i> , crested hair grass <i>Koeleria macrantha</i> , quaking grass <i>Briza media</i> , common rockrose <i>Helianthemum nummularium</i> , salad burnet <i>Sanguisorba minor</i> and lesser meadow rue <i>Thalictrum minus</i> . Uncommon species include dropwort <i>Filipendula vulgaris</i> , white horehound <i>Marrubium vulgare</i> and green-winged orchid <i>Orchis morio</i> .
Pen y Gogarth / Great Ormes Head SSSI	4.4km/W	Pen y Gogarth/Great Ormes Head is of special interest for its geological, botanical, entomological, ornithological and marine biological features. The limestone headland, which rises to a height of 207 m, includes sea cliffs and boulder strewn shores, and extends for nearly 8km along the North Wales coastline, separating Conwy Bay and Llandudno Bay. There are sheer limestone cliffs on the north-eastern side, with less severe slopes with a series of low tiers of limestone ridges falling to soft sediment cliffs to the south-west.
Bwlch Mine SSSI	4.4km/SW	Designated due to its geological importance
Chwareli a Glaswelltir Degannwy SSSI	4.7km/SW	Chwareli a Glaswelltir Degannwy is of special interest for its geological and biological features: exposures of fossiliferous late Ordovician mudstone and sandstone rocks, maiden pink <i>Dianthus deltoides</i> , small-leaved sweet briar <i>Rosa agrestis</i> and a rare vascular plant assemblage.
Aber Afon Conwy SSSI	5.0km/SW	Aber Afon Conwy is of special interest for its marine and terrestrial invertebrate biology. The tidal reach of the site extends approximately 16 kilometres, encompassing Conwy Bay between Penmaenbach Point and Great Orme's Head at its seaward limit, to its upstream boundary south of Tal y Cafn. The shoreline is backed by natural rock and boulder clay cliff, sand dune, salt marsh and woodland, with artificial substrate and sea defence walls forming the boundary throughout the remainder of the estuary.
Bryn Euryn LNR	1.4km/SE	Bryn Euryn is a prominent limestone hill overlooking Rhos on Sea, with fine views from the summit. It is a rich mixture of grassland and woodland, part of it being a Site of Special Scientific Interest. It also has great historical interest with Llys Euryn - a house dating from the 15th century - and a hilltop fort from the 6th century. It is well served by a network of paths, including the Summit Trail, which links Llys Euryn and the fort at the summit.
Pwllcrochan Woods LNR	3.1km/SW	The wood is almost entirely deciduous with a variety of native trees and exotic species such as sweet chestnut.
Upper Dingle Woods LNR	4.4km/SE	This small broadleaved woodland in Colwyn Bay, situated not far from Pwllcrochan Woods Local Nature Reserve, provides a quiet haven for local wildlife, where native woodland plants such as lesser celandine and bluebells can be found.
Great Orme's Head LNR	4.5km/E	The Great Orme is a prominent headland, which lies at the north-western tip of the Creuddyn Peninsula near Llandudno comprising a headland of Carboniferous limestone of some 291 hectares (719 acres) which rises from sea level to 207m (679 feet) at the summit. The predominant vegetation is limestone grassland. However, pockets of heathland exist where soil of glacial origin has accumulated. Areas of limestone pavement, scrub and woodland occur as well as high sea cliffs. The grasslands, heathlands and sea cliffs are both nationally and internationally important and support rich communities of plants, insects and birds. Several species are of national significance. A number of Priority Species and Habitats of the UK Biodiversity Action Plan are found on the site.
Fairy Glen LNR	5.0km/SE	A wooded dingle following the course of the Afon Colwyn into the heart of Old Colwyn. There are a variety of trees and woodland flowers.
Non-Statutorily Designated Sites (within 2km)		
Rhos-on-Sea Links Pools Wildlife Site (WS)	0.1km/S	Standing Water
Pentre Isaf/Little Orme WS	0.5km/W	Calcareous grassland; neutral grassland; scrub; broadleaved woodland; bracken.
Morfa Penrhyn WS	0.6km/S	Winter flocks of waders - curlew <i>Numenius arquata</i> .

Site	Approximate distance/direction from site boundary	Description
		Improved grassland; running water.
Mynydd Penygareg WS	0.6km/W	Dense scrub; woodland; calcareous grassland; quarry.
Royal Fishing Weir WS	0.9km/E	Intertidal.
Bryn Ifan WS	0.9km/W	Calcareous grassland.
Mynydd Pant WS	1.0km/W	Calcareous grassland.
Rhiwledyn WS	1.2km/W	Calcareous grassland.
Bodafon Fields WS	1.4km/W	Improved grassland.
Coed Rhos Fossil Woodland WS	1.6km/E	Fossilised woodland.
Bryn Euryr Woods WS	1.7km/SE	Broadleaved woodland.
Coed Isaf WS	1.8km/SW	Broadleaved woodland.
Limpley Lodge/Little Orme WS	2.0km/W	Neutral grassland.

The North Wales IBA¹⁸ is located partly on site and is important for wintering waterbirds, and shelduck *Tadorna tadorna* and ringed plover breed along the shoreline. IBAs form a subset of Key Biodiversity Areas (KBAs) that have been embedded in various international agreements and safeguard mechanisms and serve as indicators for the biodiversity policy framework of the Convention on Biological Diversity (CBD) and the Sustainable Development Goals (SDGs)¹⁹.

5.1.2 Protected and Notable Species

Cofnod provided a large number of species records. Within 2km, and the last ten years (i.e. since 2010) records of 66 species of bird, 28 species/sub-species of butterfly/moth, two species of fungi/lichen/slime moulds, eight species of mammal, seven species of plant and five species of herptile. Summary details are provided within Table 2.

Table 2 Biological records from Cofnod (within 2km and the last ten years)

Species	Most Recent Record, Total Number of Records
Birds	
Lesser Redpoll <i>Acanthis cabaret</i>	2016, 24
Goshawk <i>Accipiter gentilis</i>	2017, 1
Skylark <i>Alauda arvensis</i>	2016, 31
Kingfisher <i>Alcedo atthis</i>	2019, 2
Pintail <i>Anas acuta</i>	2018, 1
White-fronted Goose <i>Anser albifrons</i>	2011, 1
Scaup <i>Aythya marila</i>	2016, 6
Dark-bellied Brent Goose <i>Branta bernicla</i> subsp. <i>bernicla</i>	2012, 1
Goldeneye <i>Bucephala clangula</i>	2010, 1
Stone-curlew <i>Burhinus oedicephalus</i>	2013, 1
Lapland Bunting <i>Calcarius lapponicus</i>	2013, 3
Purple Sandpiper <i>Calidris maritima</i>	2020, 38
Ruff <i>Calidris pugnax</i>	2013, 1
Ringed Plover <i>Charadrius hiaticula</i>	2020, 73
Black Tern <i>Chlidonias niger</i>	2019, 3
Black-headed Gull <i>Chroicocephalus ridibundus</i>	2020, 192
Marsh Harrier <i>Circus aeruginosus</i>	2015, 1
Hen Harrier <i>Circus cyaneus</i>	2015, 2

¹⁸ <http://datazone.birdlife.org/site/factsheet/north-wales-coast-iba-united-kingdom> Accessed online 17/09/21.

¹⁹ <http://datazone.birdlife.org/site/ibacriteria> Accessed online 17/09/21.

Species	Most Recent Record, Total Number of Records
Long-tailed Duck <i>Clangula hyemalis</i>	2014, 6
Whooper Swan <i>Cygnus cygnus</i>	2013, 1
Reed Bunting <i>Emberiza schoeniclus</i>	2016, 9
Merlin <i>Falco columbarius</i>	2015, 4
Peregrine <i>Falco peregrinus</i>	2017, 16
Kestrel <i>Falco tinnunculus</i>	2017, 18
Pied Flycatcher <i>Ficedula hypoleuca</i>	2015, 2
Brambling <i>Fringilla montifringilla</i>	2013, 6
Great Northern Diver <i>Gavia immer</i>	2017, 24
Red-throated Diver <i>Gavia stellata</i>	2016, 23
Little Gull <i>Hydrocoloeus minutus</i>	2015, 10
Herring Gull <i>Larus argentatus</i>	2018, 210
Mediterranean Gull <i>Larus melanocephalus</i>	2020, 15
Bar-tailed Godwit <i>Limosa lapponica</i>	2018, 7
Black-tailed Godwit <i>Limosa limosa</i>	2013, 5
Linnet <i>Linaria cannabina</i>	2018, 30
Twite <i>Linaria flavirostris</i>	2016, 20
Grasshopper Warbler <i>Locustella naevia</i>	2016, 6
Common Crossbill <i>Loxia curvirostra</i>	2020, 11
Woodlark <i>Lullula arborea</i>	2010, 11
Velvet Scoter <i>Melanitta fusca</i>	2016, 9
Common Scoter <i>Melanitta nigra</i>	2019, 61
Red Kite <i>Milvus milvus</i>	2019, 2
Yellow Wagtail <i>Motacilla flava</i>	2014, 2
Curlew <i>Numenius arquata</i>	2020, 145
Whimbrel <i>Numenius phaeopus</i>	2018, 15
Leach's Petrel <i>Oceanodroma leucorhoa</i>	2017, 2
Osprey <i>Pandion haliaetus</i>	2015, 5
House Sparrow <i>Passer domesticus</i>	2018, 111
Tree Sparrow <i>Passer montanus</i>	2016, 3
Black Redstart <i>Phoenicurus ochruros</i>	2020, 44
Snow Bunting <i>Plectrophenax nivalis</i>	2012, 3
Golden Plover <i>Pluvialis apricaria</i>	2020, 5
Slavonian Grebe <i>Podiceps auritus</i>	2019, 3
Marsh Tit <i>Poecile palustris</i>	2015, 1
Duncock <i>Prunella modularis</i>	2019, 194
Balearic Shearwater <i>Puffinus mauretanicus</i>	2012, 6
Chough <i>Pyrrhocorax pyrrhocorax</i>	2020, 29
Bullfinch <i>Pyrrhula pyrrhula</i>	2018, 3
Firecrest <i>Regulus ignicapilla</i>	2016, 13
Roseate Tern <i>Sterna dougallii</i>	2010, 1
Little Tern <i>Sternula albifrons</i>	2016, 3
Starling <i>Sturnus vulgaris</i>	2020, 14
Redwing <i>Turdus iliacus</i>	2020, 17
Song Thrush <i>Turdus philomelos</i>	2017, 11
Fieldfare <i>Turdus pilaris</i>	2014, 4
Barn Owl <i>Tyto alba</i>	2020, 2
Lapwing <i>Vanellus vanellus</i>	2020, 23
Butterflies and Moths	
Grey Dagger <i>Acronicta psi</i>	2018, 4
Beaded Chestnut <i>Agrochola lychnidis</i>	2018, 6
Green-brindled Crescent <i>Allophytes oxyacanthae</i>	2012, 1
Mouse Moth <i>Amphipyra tragopoginis</i>	2018, 2
Dusky Brocade <i>Apamea remissa</i>	2013, 2
Centre-barred Sallow <i>Atethmia centrago</i>	2012, 1
Small Pearl-bordered Fritillary <i>Boloria selene</i>	2018, 1
Small Heath <i>Coenonympha pamphilus</i>	2020, 110
Small Square-spot <i>Diarsia rubi</i>	2012, 1
Figure of Eight <i>Diloba caeruleocephala</i>	2020, 6
Dusky Thorn <i>Ennomos fuscantaria</i>	2012, 1
Dingy Skipper <i>Erynnis tages</i>	2019, 20
Dingy Skipper <i>Erynnis tages tages</i>	2020, 2
White-line Dart <i>Euxoa tritici</i>	2013, 4
Small Emerald <i>Hemistola chrysoprasaria</i>	2013, 2
Grayling <i>Hipparchia semele</i>	2019, 13
Grayling <i>Hipparchia semele semele</i>	2019, 2
Rosy Rustic <i>Hydraecia micacea</i>	2018, 8
Wall <i>Lasiommata megera</i>	2018, 10

Species	Most Recent Record, Total Number of Records
Silver-studded Blue <i>Plebejus argus</i>	2019, 25
Silver-studded Blue <i>Plebejus argus caemensis</i>	2020, 1
Silver-studded Blue <i>Plebejus argus cretaceus</i>	2018, 8
White-letter Hairstreak <i>Satyrrium w-album</i>	2019, 2
Shaded Broad-bar <i>Scotopteryx chenopodiata</i>	2012, 1
White Ermine <i>Spilosoma lubricipeda</i>	2010, 1
Buff Ermine <i>Spilosoma lutea</i>	2020, 9
Cinnabar <i>Tyria jacobaeae</i>	2012, 1
Oak Hook-tip <i>Watsonalla binaria</i>	2018, 1
Fungi, Lichen and Slime Moulds	
<i>Collema polycarpon</i>	2015, 1
<i>Toninia sedifolia</i>	2015, 1
Mammals	
Hedgehog <i>Erinaceus europaeus</i>	2020, 50
Otter <i>Lutra lutra</i>	2016, 10
Badger <i>Meles meles</i>	2020, 8
Noctule Bat <i>Nyctalus noctula</i>	2019, 2
Common Porpoise <i>Phocoena phocoena</i>	2016, 1
Common Pipistrelle <i>Pipistrellus pipistrellus</i>	2019, 6
Soprano Pipistrelle <i>Pipistrellus pygmaeus</i>	2019, 3
Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i>	2019, 8
Plants	
Pretty Cord-moss <i>Entosthodon pulchellus</i>	2015, 1
Purple Ramping-fumitory <i>Fumaria purpurea</i>	2015, 2
Fragrant Orchid <i>Gymnadenia conopsea</i>	2016, 1
Bluebell <i>Hyacinthoides non-scripta</i>	2018, 3
Common Juniper <i>Juniperus communis</i> subsp. <i>communis</i>	2014, 2
Spiked Speedwell <i>Veronica spicata</i> (WCA Schedule 8)	2019, 2
Western Spiked Speedwell <i>Veronica spicata</i> subsp. <i>hybrida</i>	2011, 1
Reptiles and Amphibians	
Slow-worm <i>Anguis fragilis</i>	2015, 5
Common Toad <i>Bufo bufo</i>	2017, 4
Palmate Newt <i>Lissotriton helveticus</i>	2012, 1
Common Frog <i>Rana temporaria</i>	2019, 7
Common Lizard <i>Zootoca vivipara</i>	2013, 1

5.2 Extended Phase 1 Habitat Survey

5.2.1 Habitats

Seven JNCC Phase 1 habitat types were identified within the Site and immediate surrounding area. These are shown on Figure 3 and are described in the following sections. Photographs of habitats are provided at the end of this report.

5.2.1.1 Intertidal Sand (H1.1)

Intertidal sand formed a continuous habitat along the middle to lower part of the tidal range across much of the survey area (Photograph 1). No vegetation was present.

5.2.1.2 Intertidal Shingles/Cobbles (H1.2)

The upper part of the beach was dominated by shingle and cobbles, which was largely unvegetated (Photograph 2).

Where this habitat adjoined the sea wall, intertidal boulders/rocks sparse vegetation was noted (Photograph 3) which includes thistles (*Cirsium* sp.), sea beet (*Beta vulgaris* subsp. *maritima*), sea campion (*Silene uniflora*), dandelion

(*Taraxacum* sp.), groundsel (*Senecio vulgaris*), yarrow (*Achillea millefolium*), fescue sp. (*Festuca* sp.), sorrel (*Rumex acetosa*), curled dock (*Rumex crispus*), sea mayweed (*Tripleurospermum maritimum*), seaside daisy (*Erigeron glaucus*) and common mallow (*Malva sylvestris*).

5.2.1.3 Intertidal Boulders/Rocks (H1.3)

Sparse boulders/rock (relatively small) were present below the high tide line in the centre of the Site, which were clad with spiral wrack and channelled wrack (*Pelvetia canaliculata*) at higher elevations (shown as 'Ba' (brown algal beds) on Figure 3) (Photograph 4).

A honeycomb worm (*Sabellaria alveolata*) reef was present in the centre of the Site, associated with intertidal boulders/rock (Photograph 5 & 6, TN2). This ecological feature is discussed within Section 5.2.2.10.

5.2.1.4 Boulders/Rocks Above High Tide Mark (H3)

In the east of the Site an area of large boulders was present, which formed part of the sea defences (Photograph 7).

5.2.1.5 Introduced Shrub (J1.4)

A small ornamental memorial garden was present on the west of the Site (Photograph 8).

5.2.1.6 Wall (J2.5)

The sea wall was present in the south of the Site, which was formed of concrete, around 5m high (Photograph 9). Vegetation on the wall was very sparse, although in the west of the survey where the wall gradient was lower occasional seaside daisy, fescue grass sp. (*Festuca* sp.) and traveller's joy (*Clematis vitalba*) were present.

5.2.1.7 Hardstanding (J5)

A road/pavement were present in the south of the Site (Photograph 10). An area used for parking (although gated to prevent public access) was present in the west of the survey area (Photograph 11). This parking area was created using cellular plastic/matrix pavers to stabilise the ground and concrete, which had become sparsely vegetated with common grasses.

5.2.2 Species

5.2.2.1 Bats

No features with the potential to support roosting bats were present within the survey area, and the regular presence of foraging bats is considered highly unlikely.

5.2.2.2 Badgers

No evidence of badger was present within Site, and the Site is unsuitable for this species.

5.2.2.3 Dormouse

No habitats with the potential to support this species were present within the site.

5.2.2.4 Riparian Mammals

All areas within the Site were surveyed for otter. No evidence of this species presence was encountered, and no potential holt/den sites were present.

5.2.2.5 Other Mammals

No other mammal species were encountered. The regular presence of any mammalian species within the Site is considered to be highly unlikely.

5.2.2.6 Birds

During the Site survey the following species were noted:

- rock pipit (*Anthus petrosus*) – one on sea wall.
- oystercatcher (*Haematopus ostralegus*) – three foraging within intertidal area.
- common redshank (*Tringa totanus*) – four foraging within intertidal area.
- herring gull – 17 in the shallows offshore.
- black-headed gull – six in the shallows offshore.
- great black-backed gull (*Larus marinus*) – one overflew the Site.
- starling – calling from nearby housing areas.
- carrion crow (*Corvus corone*) – one foraging in the strandline.
- red-breasted merganser (*Mergus serrator*) – four offshore (at least 0.2km from Site).
- common scoter – seven offshore (at least 0.5km from Site).

The sole habitat within the Site that could support nesting birds (waders) was the shingle/cobbles near the seawall. However, this habitat was significantly disturbed by walkers, and is considered sub-optimal for breeding purposes.

The intertidal biotope survey (see Section 4.3) also comprised the potential access point at SH 82941 81468 and the habitats above MHWS, including the local IBA to the rear of the cobble ridge (SH 82880 81493) that forms part of the North Wales Coast IBA²⁰. At this location the area is used for breeding ringed plover (despite potentially high disturbance); three individuals were present foraging on

²⁰ CCBC Barbara Owsianka / Kate Surry [County Ecologists] pers. comms.20210628.

the adjacent foreshore and alighting atop the cobble ridge during the biotope survey.

5.2.2.7 Reptiles

Habitats within the Site were considered unsuitable for all reptilian species.

5.2.2.8 Amphibians

Habitats within the Site were considered unsuitable for all amphibian species.

5.2.2.9 Fish

A number of rockpools were present on the centre of the Site, associated with the areas of intertidal boulders/rocks. These pools are likely to support a variety of marine fish species.

5.2.2.10 Invertebrates

As outlined in Appendix A, a *Sabellaria alveolata* (honeycomb worm) reef was present in the centre of the Site, associated with intertidal boulders/rock (TN2, Photograph 9).

Sabellaria reefs are biogenic habitats formed by tube-forming polychaete worms. The two species found in Wales are generally, but not always, restricted to either the intertidal (*Sabellaria alveolata*) or subtidal (*S. spinulosa*) habitats, where they can form dense colonies of tubes built from sand-sized particles.

Under the Water Framework Directive (WFD) ‘Polychaete reef’ is identified as one of several higher sensitivity habitats that specifically need to be considered if a proposed development of activity needs to be subject to a WFD assessment.

Sabellaria alveolata reef is listed as a Priority Habitat under Section 7 of the Environment (Wales) Act 2016 within the category of ‘Littoral Rock’.

Lugworm (*Arenicola marina*) beds were noted in the west of the Site as well as occasional sand mason worms (*Lanice conchilega*) on the lower parts of the beach.

5.2.2.11 Invasive Non-native Species

No invasive non-native species were recorded; marine nor terrestrial.

5.3 Intertidal Biotope Survey

An Intertidal Biotope Survey was undertaken on 25th June 2021, full details of the survey are presented in Appendix C.

6 Potential Impacts

Impacts may arise from the construction of the scheme in relation to the biodiversity of the area. Construction activities could have potential impacts on habitats and species within the site and the wider study area.

Once the groyne and beach nourishment are operational, there is anticipated to be yearly inspections of the rock armour and beach nourishment by Wales Coastal Monitoring programme, with potential maintenance of material (maintenance to occur from CCBC); however the scope of this activity is of a similar scale to baseline operational activities.

Maintenance of the groyne is considered to be irregular and not occur for at least 10 years post-construction; any maintenance that does occur will be of a lower magnitude than that of construction and is unlikely to give rise to a significant effect.

Consequently, there are not considered to be significant effects during operation.

Public realm improvements are similarly excluded from operational consideration given the small scale of these works and their negligible impact upon ecological receptors during operation.

Potential construction impacts of the proposed works are:

- Habitat loss;
- Habitat degradation, from potential pollution events;
- Species disturbance from noise, lighting and visual effects; and
- Species mortality / injury.

7 Embedded Mitigation

Adherence to the Guidelines for Pollution Prevention²¹ will be integral to the project to avoid pollution incidents. As best practice, construction areas will be demarcated to avoid access to sensitive habitats where trafficking of vehicles may directly impact *Sabellaria alveolata* colonies or the Intertidal Boulder communities.

A Coastal Water Framework Directive (WFD) Compliance Assessment will be undertaken to confirm the design and construction methods will not lead to a deterioration in WFD status or prolong the attainment of targeted objectives.

The risk of a pollution incident during and any avoidance measures for trafficking/works within *Sabellaria alveolata* colonies or the Intertidal Boulder communities will require integration into the appointed Contractor's Construction Environmental Management Plan (CEMP) as best construction practice. Measures will be required to prevent the tracking of vehicles or storage of materials on or near sensitive habitats.

The potential movement of vessels at sea will require certification from all vessels/barges to demonstrate compliance with current UK Government Guidance "Prevent pollution and reduce harmful emissions at sea", which includes regulations issued by the Maritime and Coastguard Agency (MARPOL Convention compliance). Furthermore, vessels will not be permitted to bunker en-route or at site, no waste disposal to sea, no grounding at any point (without approval) or in designated sites. Vessels are expected to demonstrate the provision of emergency plans for adverse weather conditions and in the event of any oil/fuel spill.

The delivery of rock to site by vessel will require all rocks to be wet and free from dust before placement into the marine environment. The specific location for delivery and the proposed method statement is to be approved by CCBC and/or Rhyl Harbour Master, Maritime & Coastguard Agency and NRW. Silt curtains may be required to reduce sediment plume dispersion if construction (deposit / movement of materials within the marine environment).

General management measures for potential ecological impacts include measures relating to:

1. Limiting the physical works footprint and the dimensions of the access corridor as far as reasonably practicable;
2. All plant will be sourced from a trusted reputable company and will come with spill kits which site personnel will be trained to use;
3. Utilising a marine specific product; rapid set marine grade concrete if required;

²¹ <http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/>

4. Vehicles will be loaded with all plant and materials necessary to undertake the works to minimise plant movements below MHWS;
5. Minimal quantities of fuels, materials, etc. will be taken on to the foreshore to reduce the risk of pollution; and,
6. All storage containers will remain within the site compound and be appropriately banded to prevent any spillages or leaks. No storage of materials or refuelling operations will be permitted for vehicles/plant outside the site compound.

7.1 Mitigation in the Design

Under the existing coastal processes, beach material is transported by wave and current action away from the centre of the bay towards the eastern groyne where it accumulates due to the physical barrier. To achieve the OBC objectives listed in Section 1.2, at OBC stage in 2017 several options were studied, from a promontory structure, to detached breakwater, groyne field, beach nourishment with large material and the baseline case of continuing the current maintenance regime (Drawing 1). The preferred option was a promontory structure to reduce the longshore sediment transport and new capital beach nourishment.

During Design Development in 2020, the promontory structure was optimised into a T-shape rock groyne and its geometry and location was modified to deal with the following constraints:

- avoid impact on Welsh Water assets on the foreshore (outfalls) – structure had to shift west 30m
- contain the beach nourishment to avoid losing material offshore. A minimum beach nourishment berm of 10m and a characteristic slope of (V:H) 1:8 for shingle determined the extent of the toe of the beach nourishment. Consequently, the groyne had to extend further offshore 20m.
- minimise the longshore sediment transport from west to east by having a sufficiently high crest level. The crest level, crest width and slope determine the footprint.
- protect the central area of the sea defence against direct wave impact. Induce wave diffraction which is important for maintaining the beach shape under predominant wave climate. Reduce wave transmission which can cause sediment transport and disturb the overall beach shape.

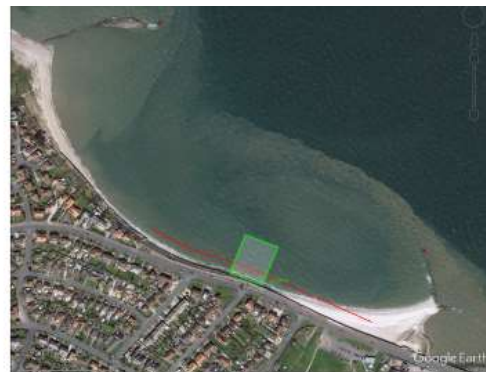
During Design Development numerical modelling of waves and currents was also carried out to estimate the impact of the proposed works on the surrounding foreshore and in particular Welsh Water assets, which was considered low.

All the numerical modelling and design evolution is summarized in a Coastal Processes Impact Assessment by Arup.

Table 3 details the work undertaken to optimise the design to be effective whilst also minimising ecological impacts, through the mitigation hierarchy.



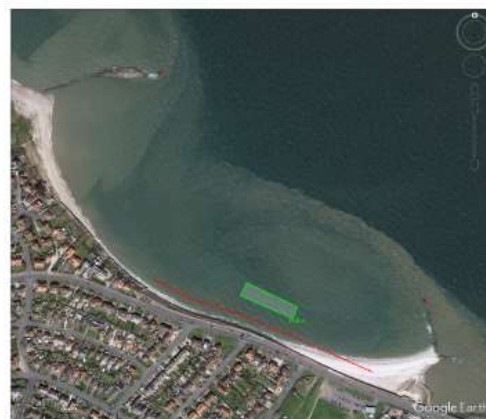
Option 2: Beach re-cycling



Option 3: Promontory structure



Option 4: Rock groynes



Option 5: Nearshore detached breakwater

Drawing 1. Design options for the proposed sea defences.

Table 3. Design processes to reduce potential ecological impact.

Activity/Option	Description	Conclusion
Investigate biodiversity associated with existing rock groynes	Intertidal biotope survey: Porous structures, like groynes, provide adequate substrate for species like <i>Sabellaria</i> , fucoids, red and green algae, which cover all aspects and elevations of the rock armour, most likely obscuring assemblages of cryptic fauna. Crustaceans were also observed within rocks.	Conclusion: benefits of groyne could potentially offset ecological impact of habitat destruction
Reduction of groyne footprint	Engineering optimisation Compared to OBC outline design: a) the width of the groyne stem (section perpendicular to coastline) was reduced from 40-43m to 33-38m. The width varies as the foreshore is not flat. b) the root of the groyne stem was cut by 15m and no longer extends all the way to the seawall. This almost mitigates the constraint which required the extension of the groyne offshore by 20m to contain the beach nourishment, as described earlier.	Conclusion: implemented
Optimisation of the groyne width in cross section	The groyne is made of several layers of material from small core to large rock armour. In intertidal conditions the core material can be used as a platform for plant to build the structure therefore a minimum width is required, or the groyne can be slightly narrower by 3m but temporary access causeways are required to increase working windows. Due to the T-shape of the structure, to achieve a narrower permanent structure, two access causeways could be required, from the upper beach going down either side of the groyne stem, there would be less control over plant movement on the foreshore and there would be greater uncertainty regarding construction method by the Contractor i.e. higher risk of changes to a consented scheme. Therefore the design includes a 5.5m wide core which should allow plant to circulate with minimal destruction of habitat outside the permanent footprint of the works.	Conclusion: implemented
Moving the groyne west	Only one survey is available to map the extent of <i>Sabellaria</i> . The proposed works impact on 0.5ha of <i>Sabellaria</i> area and intertidal boulder communities.	Conclusion: not implemented

Activity/Option	Description	Conclusion
	<p>A shift of the structure west to reduce direct impact on <i>Sabellaria</i> area means that additional volume of beach nourishment is required in the western embayment to maintain a stable beach against predominant wave conditions. The predominant wave conditions determine the shape of the beach.</p> <p>Shifting the groyne 15-20m west has little impact on the <i>Sabellaria</i> habitat loss, 0.03ha. The additional beach nourishment material required to maintain a stable beach is estimated at 10,000m³ and would cover an additional 0.12ha of sandy beach amenity. Based on the OBC cost of approx. £40/m³ of beach nourishment, this change would increase the overall cost by £400,000 and is not justifiable.</p> <p>Shifting the groyne structure 40m west to reduce almost entirely the direct impact on <i>Sabellaria</i> would likely result in more than twice the additional volume of beach nourishment and cost, but more importantly would not be effective as coastal defence and not achieve the necessary objectives.</p> <p>The estimates are based on hand calculations and extrapolation of existing numerical modelling results. No additional numerical modelling was carried out since there is already a good understanding of beach behaviour.</p>	
Reducing the offshore extent of the groyne	Reducing the extent of the groyne by 20m would reduce almost half the area of <i>Sabellaria</i> under the structure footprint. However, since the arms (shore parallel elements) of the T-shape groyne are closer to shore, there is a significant risk that the beach nourishment material can be lost from the bay not only in storm events but more frequent conditions, which can undermine scheme resilience. This was one of the layouts tested during Design Development numerical modelling.	Conclusion: not implemented
Reduction of beach nourishment berm width	<p>Engineering optimisation</p> <p>At OBC stage the required berm width of the beach nourishment was 20m. Through Design Development and acknowledgement that the beach is an additional protection measure to the primary defence – the seawall, the berm was reduced to 10m, therefore reducing the offshore extent by 10m.</p>	Conclusion: implemented

Activity/Option	Description	Conclusion
Reduction of groyne crest level	<p>Engineering optimisation</p> <p>A higher crest level would be more efficient in reducing the wave energy that reaches the beach material behind the groyne arms and the flood defence, however it would obstruct the sea view significantly and represent a relative cost increase from what was considered at OBC stage.</p> <p>A lower crest level was investigated but the larger overtopping of the groyne would greatly disturb the beach behind it, pushing the toe back and increasing the risk of loss of material from the bay permanently.</p> <p>At +5.4m AOD the groyne arms will still be overtopped during low frequency storm events, however the reduction of wave energy and the shape of both the groyne and the beach nourishment result in a low risk that sediment is lost from the beach offshore.</p>	Conclusion: not implemented

7.2 Landscaping

The proposed soft landscaping to gardens at the western end of the site will incorporate native species, aiming to provide a species-rich community and be sympathetic to the local environment, as well as use plants ideally of local provenance. Wildflowers on verges will also use native species and avoid the use of herbicide application for both creation and management.

Management of the soft landscaping is anticipated to be undertaken by CCBC.

7.3 *Sabellaria alveolata*

Noting the inclusion of *Sabellaria* on the Priority Habitats list, and the duties imposed on CCBC to conserve and enhance biodiversity, impacts on *Sabellaria alveolata* have been mitigated through design in accordance with the mitigation hierarchy: avoid, cancel, reduce or offset adverse effects.

It was apparent that rock armour (eastern and western breakwaters) provides suitable attachment material and hydrological conditions to support the active growth of *Sabellaria alveolata* colonies (Appendix C). The breakwaters were also observed to support better quality aggregations than the more exposed intertidal boulder area. The addition of hard substrate in the form of the extant breakwaters has already increased local biodiversity and actively managed local coastal processes to favour increased intertidal biodiversity.

Direct loss of *Sabellaria* and intertidal boulder habitat is considered to be directly offset by the provision of the rock armour units which create new attachment substrate for colonisation with similar habitat complexity. Without mobility, reduced exposure, abrasion and smothering risk, the rock armour habitat is likely

to lead to enhanced abundance and support the growth of robust and healthy *Sabellaria* aggregations that will increase local fecundity, supporting natural regeneration of *Sabellaria* in locations benefiting from the improved coastal processes delivered by the groyne. In time, the cobbles installed as beach nourishment may support further colonisation by *Sabellaria*, extending the reach of the boulder habitat.

A pre-construction condition survey is advised prior to construction (including temporary works) to enable pre- and post-construction monitoring of *Sabellaria* extent and condition, in addition to wider biotopes, to inform subsequent coastal defence schemes. Pre-construction surveys for *Sabellaria* are recommended noting the ability of this species to change distribution throughout the year given its mobility.

8 Evaluation of Ecological Receptors and Assessment of Effects

This section initially evaluates the nature conservation importance of the habitats and species present within the study area in terms of the importance in an international, national, county, local, and less than local context as per the geographic scale identified in Section 4. Evaluation of ecological receptors is undertaken with consideration of construction activities.

The assessment of effects from the construction of the scheme are then assessed for all the ecological receptors present, or potentially present, within the study area that are valued as local and above or if they require legal compliance in relation to international and national legislation. Note that habitat types of negligible value or less than local value, such as wall, hardstanding, boulders/rocks above the high tide mark and introduced shrub are omitted.

Section 5.2 identified a number of species where habitats on site did not support the potential for their occurrence; nor were signs of their presence recorded. Given that habitats on site are unlikely to support terrestrial species (the site being predominantly intertidal), specifically roosting bats, badgers, reptiles/amphibians, dormice and otter (no signs or places of rest recorded) (Appendix A), these species are omitted from assessment.

8.1 Statutory Designated Sites

8.1.1 European Sites

All European Site are of International value due to being designated for internationally important habitats and species.

Liverpool Bay / Bae Lerpwl (Wales) SPA is designated for a number of breeding and non-breeding species. The proposed works are considered likely to occur over the summering period (although the total construction programme may last for approximately one year), and thus there is not considered to be a pathway for effect to non-breeding birds during construction. Little tern and common tern do not breed within the proposed works area and their nearest colonies are a minimum 20km away²²; consequently, there is no pathway for effect for terns during summer construction.

If works were to occur over winter, the proposed works area is disturbed regularly by the public, so bird numbers are likely to be low (or absent), the works area is relatively small (approximately 10.8ha), and there is a large area of alternative coastal habitat for foraging nearby if any birds are temporarily displaced during the construction period. As works are assumed to mostly occur in the dry, i.e. low tide, disturbance impacts on species, which occur more frequently at distance

²² Allcorn, R. I., Eaton, M. A. Cranswick, P. A., Perrow, M., Hall, C., Smith, L., Reid, J., Webb, A., Smith, K.W. S., Langston, R. H.W. & Ratcliffe, N. 2003. A pilot study of breeding tern foraging ranges in NW England and East Anglia in relation to potential development areas for offshore windfarms. RSPB/WWT/JNCC report to DTI, Sandy, UK.,

from the shore, e.g. red-throated diver and common scoter, are assumed to be limited. If materials are transported by vessel to site, impacts on features of European sites are considered minimal given that: deposition of material is outside the European sites, there are a limited number of slow vessel movements, the works are of a temporary and limited duration, deposition of rock occurs close to the shore away from the offshore habitats of the Liverpool Bay SPA. Consequently, there is considered to be no significant effect on avian feature of the Liverpool Bay / Bae Lerpwl (Wales) SPA from either visual or noise disturbance.

With the incorporation of embedded mitigation measures, e.g. the Outline CEMP, pollution events from marine deposition of material and other construction activities, which may lead to habitat degradation and species mortality/injury, are considered to be not significant.

Menai Strait and Conwy Bay / Y Fenai a Bae Conwy SAC is designated for a number of habitats. This SAC occurs approximately 800m north-west of the site. With the incorporation of the Outline CEMP and with the distance involved separating the site from the works, there is not considered to be a significant effect from any potential habitat degradation as a result of any potential pollution event. No other pathways for effect are considered likely. Consequently, there is considered to be no significant effect on the SAC.

Creuddyn Peninsula Woods / Coedwigoedd Penrhyn Creuddyn SAC and Great Orme's Head / Pen y Gogarth SAC are both at distance from the site (1.2 and 4.2km, respectively) and terrestrial in nature. With the distances involved and with the scale of the proposed works there is not considered to be a pathway for effect to these designated sites.

8.1.2 National and Local Sites

SSSIs are of National value and LNRs are of local value.

All the SSSIs and LNRs as recorded within Section 4.1.1 are at a distance from the site, the closest SSSI and LNR are 600m and 1.4km away respectively. With the distances involved, the terrestrial nature of these sites and with the scale of the proposed works there is not considered to be a pathway for effect to these designated sites.

8.2 Non-Statutory Designated Sites

All of the Local Wildlife Sites are inland and a sufficient distance away from the site to avoid any potential impact; pathways for effect are not considered for these sites. The Rhos-on-Sea Links Pools Wildlife Site is located 100m from the site, however, is not anticipated to be impacted given the limited pathways for effect and its features of standing water. The Royal Fishing Weir Local Wildlife Site (900m E) is an intertidal WS, however this site is sufficiently separated from the proposed works for a pathway for effect to also occur, noting the scale of the works and the Local value of the Local Wildlife Sites.

Whilst the presence of the North Wales IBA is offshore to the proposed works the presence of potentially breeding ringed plover on the existing cobble ridge on site could be considered as a feature of the IBA. Consequently, without mitigation there is the potential for a significant effect on this IBA, during construction from potential disturbance, and habitat loss and degradation, on a feature of National value.

8.3 Priority Habitats

The only Priority Habitats noted on site and with the potential to be impacted are the *Sabellaria alveolata* reef on site and the intertidal boulder communities. *Sabellaria alveolata* reef and the intertidal boulder communities are listed as Priority Habitats under Section 7 of the Environment (Wales) Act 2016 within the category of ‘Littoral Rock’ (Figure 4) and are considered to be of County value.

8.3.1 *Sabellaria alveolata*

The proposed works will result in the loss of 0.15ha of *Sabellaria alveolata* reef habitat. As discussed in Section 7, the design process went through the mitigation hierarchy aiming to avoid and reduce impacts, where possible and in relation to the operational viability of the proposed groyne.

Sabellaria colonies are ephemeral features, as such their distribution can change markedly from year to year resulting from natural and / or anthropogenic impacts. *Sabellaria* are resilient to inundation by sand for short to medium periods or annual decimation by winter storms^{23,24}. As an R-selected species that relies on reproduction and larval settlement to maintain populations, significant losses naturally occur with often rapid recruitment to re-establish local populations²³.

The extent of the *Sabellaria alveolata* reef at Penrhyn Bay confers high value, considered to be of importance for its own inherent value and the benefits it provides in stabilising habitat, creating habitat complexes and locally increasing diversity. *Sabellaria alveolata* reef is considered to be of County value.

Habitat quality of the reef is poorer to the west (where the groyne is proposed), and consequently only poorer habitat is to be lost. The groyne provides embedded mitigation for habitat loss, noting that *Sabellaria* is likely to colonise on the boulder habitat of the groyne. The groyne is likely to infer greater protection to the reef habitat as habitat heterogeneity and opportunities for successful colonisation will increase in relation to the existing boulder substrate. Given the ephemeral nature of *Sabellaria* and the likely colonisation of the groyne once operational, there is considered to be a temporary loss in *Sabellaria* extent, which will re-establish on suitable habitat (the groyne). The existing *Sabellaria* will be

²³ JNCC, 2016. UK Biodiversity Action Plan Priority Habitat Descriptions. *Sabellaria alveolata* Reefs.

²⁴ Gibb, N., Tillin, H., Pearce, B. and Tyler-Walters, H., 2014. Assessing the sensitivity of *Sabellaria spinulosa* reef biotopes to pressures associated with marine activities. JNCC Report No. 504

protected as best practice during construction and will potentially act as a donor source for population re-establishment.

No *Sabellaria* will be affected by the proposed beach nourishment as this activity is proposed beyond the southerly limit of *Sabellaria*.

During construction, the embedded mitigation measures will avoid and reduce the potential impact of habitat degradation as a result of any potential pollution event and/or accidental trampling of *Sabellaria*.

8.3.2 Intertidal boulders

The proposed works will result in the loss of 0.5ha of intertidal boulders from the groyne construction and beach nourishment. It is however considered that the proposed groyne (approximately 0.86ha) will provide direct offsetting for the habitat loss of intertidal boulders during construction.

8.4 Habitats

Construction of the groyne will result in a loss of intertidal sand and intertidal shingles/cobbles. However, with the proposed beach nourishment, the relatively small area of impact and the local value of these habitats, there is not considered to be a significant effect of habitat loss.

During construction, the embedded mitigation measures will avoid and reduce the potential impact of habitat degradation as a result of any potential pollution event on these habitats.

8.5 Birds

A number of birds were noted on the Extended Phase 1 survey; these species are considered to be unlikely to be impacted by the proposed works with the implementation of the Outline CEMP. The Outline CEMP will avoid and reduce any potential pollution event and limit the extent of the works spatially. Given the relatively small scale and temporal duration of the proposed works, as well as the availability of alternative habitat, there is not considered to be a significant effect upon breeding birds (apart from ringed plover – see 9.5.1), or birds as a feature of the designated sites (Section 8.1.1), during construction.

8.5.1 Ringed Plover

As for Section 8.2, there is the potential presence of breeding ringed plover on the existing cobble ridge on site. Consequently, without mitigation there is the potential for a significant effect on this species, during construction from potential disturbance, and habitat loss and degradation, on a feature of Local value.

8.6 Invertebrates

Sabellaria alveolata is the only invertebrate species of consideration for this assessment and is considered within Section 8.3.

8.7 Fish

Fish are considered of Local value and whilst there is limited habitat loss within rockpools, there is not considered to be a significant effect.

8.8 Plants

Spiked speedwell was noted during the desk study as within the search area. The proposed works are predominantly within an intertidal and shingle/sand habitat which is considered unlikely to support spiked speedwell. Consequently, no significant impact is anticipated upon this species.

9 Recommended Mitigation

9.1 Mitigation Measures During Construction

Since works are proposed within the marine environment, it is recommended that a Biosecurity Risk Assessment is prepared in advance to avoid the risk of introduction of marine invasive non-native species (INNS).

Breeding ringed plover, as a feature of the North Wales IBA, may be present behind the existing cobble ridge. Temporary hoardings are recommended during any construction works within the ringed plover breeding season (May – August inclusive) to minimise visual and acoustic disturbance. All breeding birds and their nests are protected by law (WCA, 1981).

Sensitive alignment of the temporary construction access track will be required to avoid direct and indirect (visual and acoustic disturbance) impacts on breeding ringed plover (unless programme allows avoidance of the breeding period – May to August inclusive). A suitable buffer (as advised by an experienced ecologist) between the breeding area and the temporary access track should be implemented throughout the breeding season.

A pre-construction condition survey is advised prior to construction (including temporary works) to enable pre- and post-construction monitoring of *Sabellaria* extent and condition, in addition to wider biotopes, to inform subsequent coastal defence schemes.

An ecological toolbox talk will be given to all contractors before works commence to promote understanding of breeding bird disturbance, Priority Habitats and any spiked speedwell that may be present.

It is recommended that where practicable, construction plant do not access the areas north and east of the groyne footprint to avoid damage to existing habitat features and the intertidal construction footprint should be minimised as far as practicable. Much of the habitat to the south (sandy sediment) is resilient to disturbance and will rapidly remediate post-construction. By commencing material deployment from the north and east shorewards, the more sensitive habitats should incur less disruption.

All worked are to be in adherence to any marine licencing requirements and any best-practice measures as required through the Stage 1 Habitats Regulations Assessment report.

These mitigation measures are to be incorporated into the contractor's CEMP and/or Method Statement.

9.2 Enhancement

Operationally, information boards are recommended to inform local residents and visitors of the presence, importance and fragile nature of the *Sabellaria alveolata* reefs. Education should reduce trampling effects and combined with the provision of additional refuse (including dog waste) and recycling bins, will support an

improvement of local habitat quality. The information boards will also highlight the presence of marine biodiversity enhancement features, delivered on site, as far as this is practicable.

A permanent fenced and landscaped screening design is recommended for the ringed plover breeding area behind the shingle ridge. This would provide screening from disturbance from promenade users and include appropriate exclusion and signage on the beach-side breeding area of ringed plover.

Six tidal pools are to be created at the toe of the groyne at the low tide area. These concrete tidal pools will retain water at low tide and improve the biodiversity of the groyne through an increase in habitat heterogeneity. Integration of units such as Econcrete: Tide Pool Armour²⁵ or similar are recommended as they can be integrated into the detailed design whilst concomitantly delivering marine biodiversity enhancement. Should beach nourishment levels allow, installation of Vertipools²⁶ (or similar) on the front face of the stepped concrete revetment would provide additional offsetting / enhancement. Installation in groups of five spaced at c. 50m intervals would provide clusters of biodiversity enhancement further up the beach and provide an educational interest and resource for beach users.

Whilst operational impacts are scoped out from this assessment, noting that no maintenance activities are proposed, it is worth noting that changes to coastal process following installation of the groyne are considered to be beneficial in managing existing sediment budgets and reducing the exposed nature of the site, which is considered will support more robust growth of *Sabellaria* through reduced erosion.

²⁵ https://econcretetech.com/wp-content/uploads/2020/06/2020_06_07_ECONcrete_Product_Pages_web_Tech_TP.pdf

²⁶ <https://www.artecology.space/vertipools>

10 Residual Effects and Conclusion

With consideration and implementation of the mitigation measures discussed above, the proposed development is capable of being accommodated without significant negative impacts on ecologically sensitive receptors within the survey area.

Following this, and with the integration of established and uncontroversial best practice measures, it is reasonable to conclude that there would be no significant effects to the ecological receptors in the local area.

Figures

- 1 Site Boundary
- 2 Proposed Works
- 3 Extended Phase 1 Habitat Survey
- 4 European Sites within 5km
- 5 Nationally Designated Sites within 5km
- 6 Proposed Works in relation to Priority Habitats

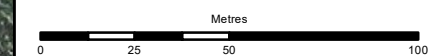


Legend

 Site boundary

F1	2021-01-09	CH	GM	PC
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Issue	Date	By	Chkd	Appd
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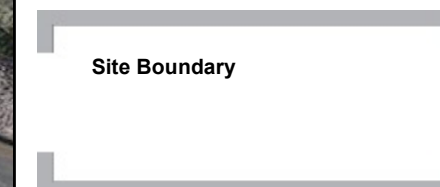
4 Pierhead Street
 Cardiff CF10 4QP
 Tel +44 29 2047 3727 Fax +44 29 2047 2277
 www.arup.com

Client

CONWY CBC

Job Title

PENRHYN BAY



Scale at A3

1:2,000

Job No	Drawing Status
274649	For Issue

Drawing No	Issue
001	F1

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

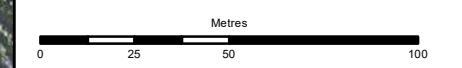


Legend

- Proposed Beach Nourishment Outline
- Proposed Groyne Outline
- Site compound, vehicle and site access and temporary access causeway
- Works Area

001	2021-09-21	VS	SC	GM
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Issue	Date	By	Chkd	Appd
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ARUP

4 Pierhead Street
Cardiff CF10 4QP
Tel +44 29 2047 3727 Fax +44 29 2047 2277
www.arup.com

Client
CONWY COUNTY BOROUGH COUNCIL

Job Title
PENRHYN BAY COASTAL DEFENCE IMPROVEMENTS

SITE LOCATION PLAN, PENRHYN BAY

Scale at A3
1:2,000

Job No 282129-50	Drawing Status FINAL
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Drawing No 001	Issue 001
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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

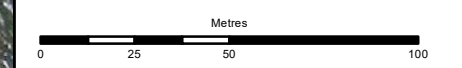


TN Notes:
 1 Intertidal Shingles / Cobbles
 2 Sabellaria alveolata (honeycomb worm) reef; Section 7 Habitat

- Legend**
- Site boundary
 - Groyne and beach nourishment outline
 - TN - Target note
 - H1.1 - Intertidal - mud/sand
 - H1.2 - Intertidal - shingles/cobbles
 - H1.3 - Intertidal - boulders/rocks
 - H1.3.3 - Intertidal - boulders/rocks - brown algal beds
 - J1.4 - Introduced shrub
 - J2.5 - Wall
 - J5 - Gravel/hard standing

F1	2020-12-16	AK	GM	PC
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Issue	Date	By	Chkd	Appd



ARUP

4 Pierhead Street
 Cardiff CF10 4QP
 Tel +44 29 2047 3727 Fax +44 29 2047 2277
 www.arup.com

Client
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Job Title
PENRHYN BAY

EXTENDED PHASE 1 HABITAT SURVEY

Scale at A3
1:2,000

Job No 274649	Drawing Status For Issue
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Drawing No Figure 3	Issue F1
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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- 5km Buffer
- Site Boundary
- Special Area of Conservation
- Special Protection Area

F1	2021-08-18	AC	CJ	PC
Issue	Date	By	Chkd	Appd

Metres

ARUP

4 Pierhead Street
Cardiff CF10 4QP
Tel +44 29 2047 3727 Fax +44 29 2047 2277
www.arup.com

Client
CONWY CBC

Job Title
PENRHYN BAY

**European Sites within 5km
of the Site Boundary**

Scale at A3 **1:40,807**

Job No 274649	Drawing Status For Issue
Drawing No 001	Issue F1

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

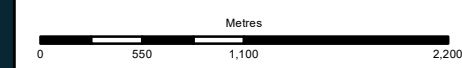


Legend

- 5km Buffer
- Site Boundary
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)

F1	2021-08-18	AC	CJ	PC
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Issue	Date	By	Chkd	Appd
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ARUP

4 Pierhead Street
Cardiff CF10 4QP
Tel +44 29 2047 3727 Fax +44 29 2047 2277
www.arup.com

Client
CONWY CBC

Job Title
PENRHYN BAY

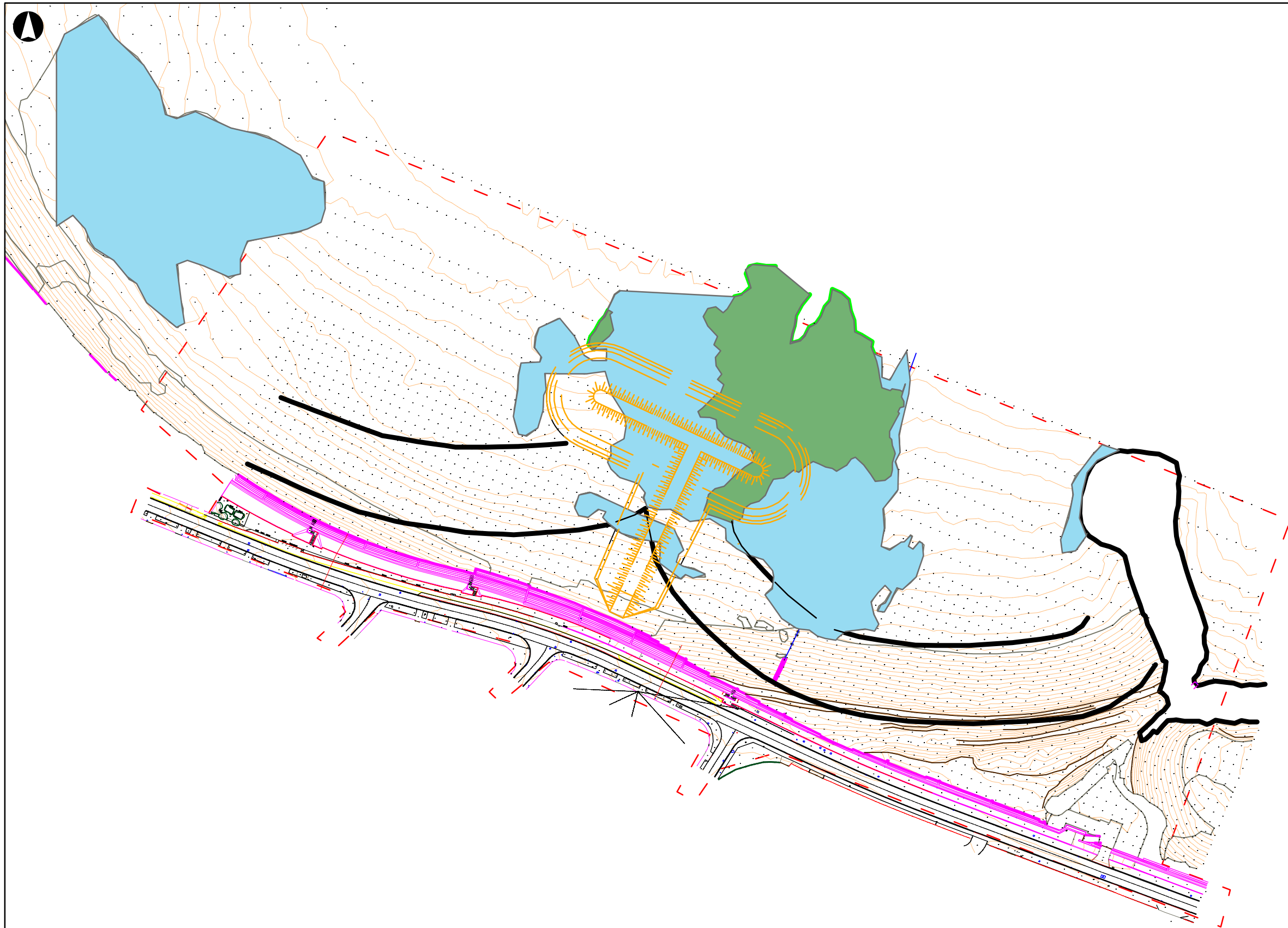
Nationally Designated Statutory Sites within 5km of the Site Boundary

Scale at A3
1:40,807

Job No 274649	Drawing Status For Issue
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Drawing No 001	Issue F1
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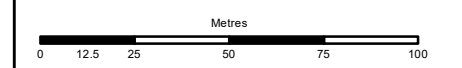
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



- Legend
- Proposed Groyne Outline
 - Proposed Beach Nourishment Outline
 - COVER
 - Sabellaria alveolata (honeycomb worm) reefs
 - Intertidal boulder communities
 - Works Area

001	2021-09-21	VS	SC	GM
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Issue	Date	By	Chkd	Appd



ARUP

4 Pierhead Street
 Cardiff CF10 4QP
 Tel +44 29 2047 3727 Fax +44 29 2047 2277
 www.arup.com

Client
CONWY COUNTY BOROUGH COUNCIL

Job Title
PENRHYN BAY COASTAL DEFENCE IMPROVEMENTS

SABELLARIA ALVEOLATA & INTERTIDAL BOULDER COMMUNITIES, PENRHYN BAY

Scale at A3
1:2,000

Job No 282129-50	Drawing Status FINAL
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Drawing No 001	Issue 001
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Photographs



1 Intertidal sand (seawall and shingle/cobbles in foreground) in west of site.



2 Intertidal shingle/cobbles.



3 Sparse vegetation.



4 Brown algal beds associated with intertidal boulders/rocks in centre of site.



5 Approximate extent of *Sabellaria* reef in the centre of the site.



6 *Sabellaria* reef in the centre of the site.



7 Area of large boulders in east of site.



8 Ornamental memorial garden in west of site.



9 Sea wall.



10 Road/pavement on south of site.



11 Hardstanding in east of site.

Appendix A

Preliminary Ecological Appraisal

A1 Preliminary Ecological Appraisal

Conwy CBC
Penrhyn Bay FCERM
Preliminary Ecological Appraisal

Issue | 16 December 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 274649

Ove Arup & Partners Ltd
4 Pierhead Street
Capital Waterside
Cardiff CF10 4QP
United Kingdom
www.arup.com

ARUP

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Figures

No table of figures entries found.

Appendices

Appendix A

Legislation

Appendix B

Photographs

1 Introduction

1.1 Scope of the Report

Ove Arup and Partners ('Arup') was commissioned by Conwy County Borough Council (CCBC) to carry out an Preliminary Ecological Appraisal (PEA) in relation to the proposed construction of a rock armour groyne as part of a Flood and Coastal Erosion Risk Management (FCERM) scheme within Penrhyn Bay, North Wales [National Grid Reference: SH 82703 81589], hereafter referred to as 'the Project'.

The objectives of the preliminary ecological appraisal work included the following:

- To identify key ecological constraints to the Project;
- To inform Project design to allow significant ecological effects to be avoided or minimised wherever possible;
- To allow the further ecological surveys needed to inform ecological impact assessment to be identified and appropriately designed; and
- To identify potential ecological enhancements relevant to the site and proposed Project.

The extent of this survey area is shown within Figure 1: Site Location and is henceforth referred to as 'the Site'.

1.2 Description of the Site

The Site is located on the North Wales coastline and includes a section of Marine Drive Road (in the south), sea wall and foreshore. The foreshore within the survey area was predominately shingle near the sea wall, with fine sand across much of the intertidal area. Rocky patches were present, which were clad with spiral wrack (*Fucus spiralis*). A rock groyne delineated the eastern extent of the survey area.

To the south of the Site residential housing predominated, with a golf course also present. The coastline continued to the east and west, which was similar in character to the Site, with the Irish Sea to the north.

1.3 Description of the Proposed Works

Penrhyn Bay is a coastal embayment which lends its name to the small town located between the renowned seaside resorts of Llandudno and Colwyn Bay, North Wales. The study frontage is approximately 450m in length contained between two breakwaters. At present the sand and shingle material which makes up the beach is mobile, particularly during storm events, encouraging transportation from the centre of the bay towards the eastern breakwater. Hence, CCBC must undertake regular beach maintenance activities in order to protect the

existing back-shore assets at a significant cost to CCBC's capital maintenance funds.

The existing defences provide coastal erosion and tidal flooding protection to over 300 residential and commercial properties, utilities infrastructure (including a Dŵr Cymru Welsh Water (DCWW) pumping station, a Wastewater Treatment Works (WwTW) sea outfall and SP Energy Networks assets), the adjacent promenade, A547 highway, Wales Coast Path, National Cycle Route and the Rhos-on-Sea Golf Club. The present beach and promenade also form a key part of the local community's well-being and recreation space, whilst adding to Conwy's wider tourist attractions.

In the absence of the continuing beach management works, regularly undertaken by CCBC, the sea wall and revetment are highly likely to fail through the on-going draw-down of the foreshore exposing the corroded and structurally weak sheet piled toe foundations. The present regime of maintenance activities is unsustainable and is likely to increase in frequency over time, as the mobility of the beach increases due to the beach material particle attrition and the increasing severity of storm events and sea level rise associated with climate change.

The Investment Objectives for the project are to:

1. Manage the effects of flood risk and coastal erosion to people and property.
2. Reduce the on-going capital maintenance costs experienced as part of the present beach maintenance regime to safeguard the public backshore assets.
3. Meet the objectives of the Shoreline Management Plan (SMP2) for Penrhyn Bay, which include:
 - 'Hold the Line'.
 - Maintaining and widening the beach.
 - Environmentally acceptable.
4. Incorporate wider benefits and added amenity value into project design and construction (including consideration of Welsh Government's Community Benefits Policy and the Well-Being of Future Generations (Wales) Act 2015). To maintain and, where possible, enhance the natural environment.
5. Maintain and improve the local area – with an awareness of the amenity value presently provided by Colwyn Bay and Llandudno (neighbouring towns).

The Outline Business Case (OBC) concluded that a T-shaped rock armour groyne structure would be the most effective form of structure, in similarity to the existing breakwaters present in the local area. The OBC dimensions are 80m seaward projection and 65m width. Additional beach nourishment would be required to build out the beach profiles adjacent to the groyne. The nature of this beach material is likely to be similar to existing.

The preferred structure, location, dimensions and profile of beach nourishment were refined through subsequent numerical modelling at Design Development Stage. The main changes relative to the OBC design are an increase of approximately 20m in length (total 100m from shore), a lateral shift of the

structure along the beach, and through modelling, the beach nourishment profile was determined. Public realm enhancement of the adjacent promenade is anticipated to support the scheme proposal. Rock armour (assumed 3-6 ton and 100-300kg gradings) is anticipated to be brought to site by sea and stockpiled on the beach, whilst construction plant access would be via Glan-y-Mor Road.

1.4 Legislative Context

A framework of international (European), national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. The following core legislation exists to protect habitats and species of nature conservation importance:

- i. The Conservation of Habitats and Species Regulations 2019 (Amendment) (EU Exit) transposes Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) into UK law.
- ii. Wildlife and Countryside Act 1981 (as amended) (WCA);
- iii. Environment (Wales) Act 2016 including Section 7 biodiversity lists;
- iv. The Countryside and Rights of Way Act 2000;
- v. The Hedgerow Regulations 1997;
- vi. Protection of Badgers Act 1992;
- vii. The Salmon and Freshwater Fisheries Act 1975;
- viii. The Eels (England and Wales) Regulations 2009; and
- ix. The Invasive Alien Species (Enforcement and Permitting) Order 2019.

These pieces of legislation include a number of offences relating to protected species and requirements for licences to allow construction works to proceed. In addition, the Habitats Regulations set out the requirement for the consideration of the potential effects of a project on European Sites.

Actions which are prohibited by legislation can be made lawful on the approval and granting of a protected species licence from Natural Resources Wales (NRW), subject to conditions.

Details of the legislation are provided in Appendix A.

2 Methodology

2.1 Desk Study

Ecological records were obtained from North Wales Environmental Information Service (Cofnod) on 7 December 2020. Statutorily designated sites and non-statutory site details within 5km were obtained, with species records obtained from within a radius of 2km from the Site. The provided records included:

- Statutory nature conservation sites: Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPA), Special Areas of Conservation (SAC), Ramsar Sites, National Nature Reserves (NNR), National Parks, Areas of Outstanding Natural Beauty (AONB) and Local Nature Reserves (LNR).
- Non-statutory nature conservation sites: Local Wildlife Sites (LWS).
- Species with European and/or UK Legal Protection, Environment (Wales) Act 2016 (Section 7) species and/or UK BAP Priority Species.

Habitats and Species of Principal Importance and the Local Biodiversity Action Plan (LBAP) priority habitats and species were also reviewed to compare to those habitats and species either recorded within the Site during the survey or recorded as having potential to be present. The LBAP which covers this Site is the Conwy LBAP¹.

2.2 Extended Phase 1 Habitat Survey

The aim of the Extended Phase 1 Habitat Survey, which forms part of the PEA process, was to identify and map the habitats present within the Site. The survey methodology followed the methodology set out in the JNCC's Handbook for Phase 1 Habitat Surveys². The PEA follows standard guidance³.

Extended Phase 1 Habitat Survey is a standard technique for rapidly obtaining baseline ecological information over a large area of land. It is primarily a mapping technique and uses a standard set of habitat definitions for classifying areas of land on the basis of the vegetation communities present. The extended survey also provides an assessment of the potential for those habitats present to support legally protected or otherwise notable species.

Relevant species included all those protected by European or UK law, and notable species including those identified as being of principal importance in Wales, in response to Section 7 of the Environment (Wales) Act 2016 (Appendix A), as follows:

¹ Wales Biodiversity Partnership (accessed 10/12/2020). Nature in Conwy. [online] available at: <https://www.biodiversitywales.org.uk/Conwy>

² JNCC (2016). Handbook for Phase 1 habitat Survey: technique for environmental audit.

³ Chartered Institute of Ecology and Environmental Management (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine (September 2018).

- Appraising any buildings or trees within the boundary (from the ground only) for their suitability to support breeding, resting and hibernating bats using survey methods based on those outlined in the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines⁴;
- Assessing the potential of terrestrial and aquatic habitats to support amphibians, both protected species and species of conservation concern⁵;
- Searching for signs of badger (*Meles meles*) activity including setts, tracks, foraging holes and latrines within and up to 30m from the Site where possible⁶;
- Assessing the suitability of habitats for nesting birds (including any old nests);
- Assessing the suitability of habitats for common species of reptiles; adder, (*Vipera berus*), grass snake (*Natrix helvetica*), slow worm (*Anguis fragilis*) and common lizard (*Zootoca vivipara*)⁷;
- Assessing the suitability of watercourses for water vole (*Arvicola amphibius*)⁸, otter (*Lutra lutra*)⁹ and white-clawed crayfish (*Austropotamobius pallipes*)¹⁰.
- Assessing the suitability of habitats for dormice (*Muscardinus avellananrius*)¹¹;
- Assessing the suitability of habitats for assemblages of notable invertebrates; and
- Searching for evidence of the presence of invasive plants listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and The Invasive Alien Species (Enforcement and Permitting) Order 2019, which are subject to strict legal control, such as Japanese knotweed (*Reynoutria japonica*), Himalayan balsam (*Impatiens glandulifera*) and giant hogweed (*Heracleum mantegazzianum*).

The survey was undertaken on 10 December 2020 by Martyn Owen MCIEEM, commencing two hours before low-tide and concluding two-hours after high tide. All areas of the Site (Figure 1) were walked and relevant habitat types classified according to their vegetation types. The habitats present and Target Notes (TNs) have been mapped and presented in standard format. Points of ecological interest

⁴ Collins, J. (2016). Bat Surveys: Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.). The Bat Conservation Trust, London.

⁵ Odiham et al (2000) in ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.

⁶ Harris, S., Cresswell, P. and Jefferies, D., 1989. Surveying Badgers. Mammal Society.

⁷ Gent, T. & Gibson, S. (2003). Herpetofauna Workers Manual. Joint Nature Conservation Committee, Peterborough.

⁸ Dean, M. et al. (2016). The Water Vole Mitigation Handbook (The Mammal Society Guidance Series). The Mammal Society, London.

⁹ Chanin, P. (2003). Monitoring the Otter, *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10., English Nature, Peterborough.

¹⁰ Peay, Stephanie (2002). Guidance on Habitat for White-clawed Crayfish and its restoration. Environment Agency.

¹¹ Bright, Paul, Morris, P, Mitchell Jones, T. (2006). The Dormouse Conservation Handbook 2nd ed. English Nature.

are recorded as TNs on Figure 2 and discussed within the text of this report. Photographs of habitats and target notes are given in Appendix B.

2.3 Limitations

The survey was undertaken outside the key period for terrestrial habitat assessment; however, given the nature of habitats present, it is considered that adequate information was gathered to ascribe habitat types for PEA.

The findings presented in this report represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys can be limited by factors affecting the presence of plants and animals, such as the time of year, migration patterns and behaviour.

Whilst not a full protected species or botanical survey, an Extended Phase 1 Habitat Survey allows an experienced ecologist to obtain a sufficient understanding of the ecology of a Site in order to either evaluate the conservation importance of the Site, and assess the potential for impacts on habitats and species likely to represent a material consideration in planning terms, or to ascertain that further surveys will be required before such an evaluation can be made.

The absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.

3 Results

3.1 Desk Study

3.1.1 Statutory and Non-Statutory Designated Sites

Within 5km of the Site there are four internationally designated sites; Menai Strait and Conwy Bay SAC, Creuddyn Peninsula Woods SAC, Great Orme's Head SAC and Liverpool Bay (Wales) SPA. There are seven SSSIs and five LNRs within the search area. Cofnod provided information in relation to 35 non-statutory sites.

Available details in relation to statutorily and non-statutorily designated sites are provided within Table 1.

Table 1 Designated site details

Site	Approximate distance/direction from site boundary	Description
Statutorily Designated Sites (within 5km)		
Liverpool Bay / Bae Lerpwl (Wales) SPA	Adjacent/N	<p>Qualifying Features: <u>Red-throated diver</u> <i>Gavia stellata</i> (non-breeding season); 6.89% of GB population <u>Little gull</u> <i>Hydrocoloeus minutus</i> (non-breeding season) <u>Common scoter</u> <i>Melanitta nigra</i> (non-breeding season); 10.31% of NW European Population <u>Little tern</u> <i>Sterna albifrons</i> (breeding season); 6.84% of GB population <u>Common tern</u> <i>Sterna hirundo</i> (breeding season); 1.80% of GB population</p> <p>Waterbird assemblage. The main components of the assemblage include all of the non-breeding qualifying features listed above, as well as an additional two species present in numbers exceeding 1% of the GB total: red-breasted merganser <i>Mergus serrator</i> and great cormorant <i>Phalacrocorax carbo</i>.</p>
Menai Strait and Conwy Bay / Y Fenai a Bae Conwy SAC	0.8km/NW	<p>Annex I habitats that are a primary reason for selection of this site: <u>1110 Sandbanks which are slightly covered by sea water all the time</u> <u>1140 Mudflats and sandflats not covered by seawater at low tide</u> <u>1170 Reefs</u></p> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <u>1160 Large shallow inlets and bays</u> <u>8330 Submerged or partially submerged sea caves</u></p>
Creuddyn Peninsula Woods / Coedwigoedd Penrhyn Creuddyn SAC	1.2km/SW	<p>Annex I habitats that are a primary reason for selection of this site: <u>9180 <i>Tilio-Acerion</i> forests of slopes, screes and ravines</u></p> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <u>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>)</u> <u>91J0 <i>Taxus baccata</i> woods of the British Isles</u></p>
Great Orme's Head / Pen y Gogarth SAC	4.2km/W	<p>Annex I habitats that are a primary reason for selection of this site: <u>4030 European dry heaths</u> <u>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>)</u></p> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <u>1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts</u></p>
Creuddyn SSSI	0.6km/W	Creuddyn is of special interest for its botanical and entomological features; semi-natural woodland, calcareous grassland, rare vascular plant assemblage including spiked speedwell <i>Veronica spicata</i> and grassland invertebrate assemblage.
Creigiau Rhiwledyn/Little Ormes Head SSSI	1.1km/NW	Little Ormes Head (Creigiau Rhiwledyn) is of special scientific interest for its geological, botanical, ornithological and marine biological features. The limestone headland, which rises to a height of 141 m, includes sea cliffs and boulders and extends for 1.4 km along the North Wales coastline, separating Penrhyn Bay from Llandudno Bay.

Site	Approximate distance/direction from site boundary	Description
Bryn Euryn SSSI	1.2km/S	An area of species rich grassland developed on a prominent hill formed mainly of Carboniferous Limestone which outcrops on the southern side in a series of crags. The grassland, which is ungrazed, is dominated by hairy oat grass <i>Avenula pubescens</i> together with meadow oat grass <i>Avenula pratense</i> , crested hair grass <i>Koeleria macrantha</i> , quaking grass <i>Briza media</i> , common rockrose <i>Helianthemum nummularium</i> , salad burnet <i>Sanguisorba minor</i> and lesser meadow rue <i>Thalictrum minus</i> . Uncommon species include dropwort <i>Filipendula vulgaris</i> , white horehound <i>Marrubium vulgare</i> and green-winged orchid <i>Orchis morio</i> .
Pen y Gogarth / Great Ormes Head SSSI	4.4km/W	Pen y Gogarth/Great Ormes Head is of special interest for its geological, botanical, entomological, ornithological and marine biological features. The limestone headland, which rises to a height of 207 m, includes sea cliffs and boulder strewn shores, and extends for nearly 8km along the North Wales coastline, separating Conwy Bay and Llandudno Bay. There are sheer limestone cliffs on the north-eastern side, with less severe slopes with a series of low tiers of limestone ridges falling to soft sediment cliffs to the south-west.
Bwlch Mine SSSI	4.4km/SW	Designated due to its geological importance
Chwareli a Glaswelltir Degannwy SSSI	4.7km/SW	Chwareli a Glaswelltir Degannwy is of special interest for its geological and biological features: exposures of fossiliferous late Ordovician mudstone and sandstone rocks, maiden pink <i>Dianthus deltoides</i> , small-leaved sweet briar <i>Rosa agrestis</i> and a rare vascular plant assemblage.
Aber Afon Conwy SSSI	5.0km/SW	Aber Afon Conwy is of special interest for its marine and terrestrial invertebrate biology. The tidal reach of the site extends approximately 16 kilometres, encompassing Conwy Bay between Penmaenbach Point and Great Orme's Head at its seaward limit, to its upstream boundary south of Tal y Cafn. The shoreline is backed by natural rock and boulder clay cliff, sand dune, salt marsh and woodland, with artificial substrate and sea defence walls forming the boundary throughout the remainder of the estuary.
Bryn Euryn LNR	1.4km/SE	Bryn Euryn is a prominent limestone hill overlooking Rhos on Sea, with fine views from the summit. It is a rich mixture of grassland and woodland, part of it being a Site of Special Scientific Interest. It also has great historical interest with Llys Euryn - a house dating from the 15th century - and a hilltop fort from the 6th century. It is well served by a network of paths, including the Summit Trail, which links Llys Euryn and the fort at the summit.
Pwllcrochan Woods LNR	3.1km/SW	The wood is almost entirely deciduous with a variety of native trees and exotic species such as sweet chestnut.
Upper Dingle Woods LNR	4.4km/SE	This small broadleaved woodland in Colwyn Bay, situated not far from Pwllcrochan Woods Local Nature Reserve, provides a quiet haven for local wildlife, where native woodland plants such as lesser celandine and bluebells can be found.
Great Orme's Head LNR	4.5km/E	The Great Orme is a prominent headland, which lies at the north-western tip of the Creuddyn Peninsula near Llandudno comprising a headland of Carboniferous limestone of some 291 hectares (719 acres) which rises from sea level to 207m (679 feet) at the summit. The predominant vegetation is limestone grassland. However, pockets of heathland exist where soil of glacial origin has accumulated. Areas of limestone pavement, scrub and woodland occur as well as high sea cliffs. The grasslands, heathlands and sea cliffs are both nationally and internationally important and support rich communities of plants, insects and birds. Several species are of national significance. A number of Priority Species and Habitats of the UK Biodiversity Action Plan are found on the site.
Fairy Glen LNR	5.0km/SE	A wooded dingle following the course of the Afon Colwyn into the heart of Old Colwyn. There are a variety of trees and woodland flowers.
Non-Statutorily Designated Sites (within 5km)		
Rhos-on-Sea Links Pools Wildlife Site (WS)	0.1km/S	Standing Water
Pentre Isaf/Little Orme WS	0.5km/W	Calcareous grassland; neutral grassland; scrub; broadleaved woodland; bracken.
Morfa Penrhyn WS	0.6km/S	Winter flocks of waders - curlew <i>Numenius arquata</i> . Improved grassland; running water.
Mynydd Penygareg WS	0.6km/W	Dense scrub; woodland; calcareous grassland; quarry.
Royal Fishing Weir WS	0.9km/E	Intertidal.

Site	Approximate distance/direction from site boundary	Description
Bryn Ifan WS	0.9km/W	Calcareous grassland.
Mynydd Pant WS	1.0km/W	Calcareous grassland.
Rhiwledyn WS	1.2km/W	Calcareous grassland.
Bodafon Fields WS	1.4km/W	Improved grassland.
Coed Rhos Fossil Woodland WS	1.6km/E	Fossilised woodland.
Bryn Euryn Woods WS	1.7km/SE	Broadleaved woodland.
Coed Isaf WS	1.8km/SW	Broadleaved woodland.
Limpley Lodge/Little Orme WS	2.0km/W	Neutral grassland.
Coed Sempyr WS	2.1km/S	Broadleaved woodland.
Nant y Gamar WS	2.3km/W	Calcareous grassland; neutral grassland; cliff edge; scrub.
Bro Dawel WS	2.6km/SW	Neutral grassland.
Ffridd y Bont WS	2.8km/SW	Marshy grassland; broadleaved woodland.
Pwllcrochan Woods WS	2.9km/SE	Broadleaved woodlands.
Fron Pabo (Brynteg Pasture) WS	3.0km/SW	Semi-improved limestone grassland.
The View, Mochdre WS	3.1km/S	Dry dwarf shrub heath.
Conwyrd Mochdre WS	3.2km/S	Roadside verge.
Hendre Wen Reedbeds WS	3.5km/S	Reeds
Bryniau WS	3.5km/W	Acid grassland; scrub; calcareous grassland.
Coed Isaf / Coed Cae-mawr WS	3.7km/S	Broadleaved woodland.
Bryn y Glyn WS	3.9km/SE	Broadleaved woodland.
Bryniau calcareous grassland and scrub WS	4.3km/SW	Scrub; calcareous grassland.
Upper Dingle Woods WS	4.1km/SE	Broadleaved woodland.
Honeysuckle Lane Meadow WS	4.1km/SE	Neutral grassland.
Coed Greanllyn WS	4.2km/S	Broadleaved woodland.
Glyn Wood, Colwyn Bay WS	4.2km/SE	Broadleaved woodland.
Glyn Farm WS	4.3km/SE	Broadleaved woodlands.
Coed Cilglasin WS	4.4km/S	Broadleaved woodland.
Coed-y-Glyn WS	4.6km/SE	Broadleaved woodland.
The Vardre (Deganwy Castle) WS	5.0km/SW	Calcareous grassland; scrub.
Deganwy Dunes WS	5.0km/W	Dune grassland (golf course).

Cofnod provided a large number of species records. Within 2km, and the last ten years (i.e. since 2010) records of 66 species of bird, 28 species/sub-species of butterfly/moth, two species of fungi/lichen/slime moulds, eight species of mammal, seven species of plant and five species of herptile. Summary details are provided within Table 2.

Table 2 Biological records from Cofnod (within 2km and the last ten years)

Species	Most Recent Record, Total Number of Records
Birds	
Lesser Redpoll <i>Acanthis cabaret</i>	2016, 24
Goshawk <i>Accipiter gentilis</i>	2017, 1
Skylark <i>Alauda arvensis</i>	2016, 31
Kingfisher <i>Alcedo atthis</i>	2019, 2

Species	Most Recent Record, Total Number of Records
Pintail <i>Anas acuta</i>	2018, 1
White-fronted Goose <i>Anser albifrons</i>	2011, 1
Scaup <i>Aythya marila</i>	2016, 6
Dark-bellied Brent Goose <i>Branta bernicla</i> subsp. <i>bernicla</i>	2012, 1
Goldeneye <i>Bucephala clangula</i>	2010, 1
Stone-curlew <i>Burhinus oediconemus</i>	2013, 1
Lapland Bunting <i>Calcarius lapponicus</i>	2013, 3
Purple Sandpiper <i>Calidris maritima</i>	2020, 38
Ruff <i>Calidris pugnax</i>	2013, 1
Ringed Plover <i>Charadrius hiaticula</i>	2020, 73
Black Tern <i>Chlidonias niger</i>	2019, 3
Black-headed Gull <i>Chroicocephalus ridibundus</i>	2020, 192
Marsh Harrier <i>Circus aeruginosus</i>	2015, 1
Hen Harrier <i>Circus cyaneus</i>	2015, 2
Long-tailed Duck <i>Clangula hyemalis</i>	2014, 6
Whooper Swan <i>Cygnus cygnus</i>	2013, 1
Reed Bunting <i>Emberiza schoeniclus</i>	2016, 9
Merlin <i>Falco columbarius</i>	2015, 4
Peregrine <i>Falco peregrinus</i>	2017, 16
Kestrel <i>Falco tinnunculus</i>	2017, 18
Pied Flycatcher <i>Ficedula hypoleuca</i>	2015, 2
Brambling <i>Fringilla montifringilla</i>	2013, 6
Great Northern Diver <i>Gavia immer</i>	2017, 24
Red-throated Diver <i>Gavia stellata</i>	2016, 23
Little Gull <i>Hydrocoloeus minutus</i>	2015, 10
Herring Gull <i>Larus argentatus</i>	2018, 210
Mediterranean Gull <i>Larus melanocephalus</i>	2020, 15
Bar-tailed Godwit <i>Limosa lapponica</i>	2018, 7
Black-tailed Godwit <i>Limosa limosa</i>	2013, 5
Linnet <i>Linaria cannabina</i>	2018, 30
Twite <i>Linaria flavirostris</i>	2016, 20
Grasshopper Warbler <i>Locustella naevia</i>	2016, 6
Common Crossbill <i>Loxia curvirostra</i>	2020, 11
Woodlark <i>Lullula arborea</i>	2010, 11
Velvet Scoter <i>Melanitta fusca</i>	2016, 9
Common Scoter <i>Melanitta nigra</i>	2019, 61
Red Kite <i>Milvus milvus</i>	2019, 2
Yellow Wagtail <i>Motacilla flava</i>	2014, 2
Curlew <i>Numenius arquata</i>	2020, 145
Whimbrel <i>Numenius phaeopus</i>	2018, 15
Leach's Petrel <i>Oceanodroma leucorhoa</i>	2017, 2
Osprey <i>Pandion haliaetus</i>	2015, 5
House Sparrow <i>Passer domesticus</i>	2018, 111
Tree Sparrow <i>Passer montanus</i>	2016, 3
Black Redstart <i>Phoenicurus ochruros</i>	2020, 44
Snow Bunting <i>Plectrophenax nivalis</i>	2012, 3
Golden Plover <i>Pluvialis apricaria</i>	2020, 5
Slavonian Grebe <i>Podiceps auritus</i>	2019, 3
Marsh Tit <i>Poecile palustris</i>	2015, 1
Duncock <i>Prunella modularis</i>	2019, 194
Balearic Shearwater <i>Puffinus mauretanicus</i>	2012, 6
Chough <i>Pyrrhonorax pyrrhonorax</i>	2020, 29
Bullfinch <i>Pyrrhula pyrrhula</i>	2018, 3
Firecrest <i>Regulus ignicapilla</i>	2016, 13
Roseate Tern <i>Sterna dougallii</i>	2010, 1
Little Tern <i>Sternula albifrons</i>	2016, 3
Starling <i>Sturnus vulgaris</i>	2020, 14
Redwing <i>Turdus iliacus</i>	2020, 17
Song Thrush <i>Turdus philomelos</i>	2017, 11
Fieldfare <i>Turdus pilaris</i>	2014, 4
Barn Owl <i>Tyto alba</i>	2020, 2
Lapwing <i>Vanellus vanellus</i>	2020, 23
Butterflies and Moths	
Grey Dagger <i>Acrionicta psi</i>	2018, 4
Beaded Chestnut <i>Agrochola lychnidis</i>	2018, 6
Green-brindled Crescent <i>Allophyes oxyacanthae</i>	2012, 1
Mouse Moth <i>Amphipyra tragopoginis</i>	2018, 2
Dusky Brocade <i>Apamea remissa</i>	2013, 2

Species	Most Recent Record, Total Number of Records
Centre-barred Sallow <i>Atethmia centrago</i>	2012, 1
Small Pearl-bordered Fritillary <i>Boloria selene</i>	2018, 1
Small Heath <i>Coenonympha pamphilus</i>	2020, 110
Small Square-spot <i>Diarsia rubi</i>	2012, 1
Figure of Eight <i>Diloba caeruleocephala</i>	2020, 6
Dusky Thorn <i>Ennomos fuscantaria</i>	2012, 1
Dingy Skipper <i>Erynnis tages</i>	2019, 20
Dingy Skipper <i>Erynnis tages tages</i>	2020, 2
White-line Dart <i>Euxoa tritici</i>	2013, 4
Small Emerald <i>Hemistola chrysoprasaria</i>	2013, 2
Grayling <i>Hipparchia semele</i>	2019, 13
Grayling <i>Hipparchia semele semele</i>	2019, 2
Rosy Rustic <i>Hydraecia micacea</i>	2018, 8
Wall <i>Lasiommata megera</i>	2018, 10
Silver-studded Blue <i>Plebejus argus</i>	2019, 25
Silver-studded Blue <i>Plebejus argus caernensis</i>	2020, 1
Silver-studded Blue <i>Plebejus argus cretaceus</i>	2018, 8
White-letter Hairstreak <i>Satyrrium w-album</i>	2019, 2
Shaded Broad-bar <i>Scotopteryx chenopodiata</i>	2012, 1
White Ermine <i>Spilosoma lubricipeda</i>	2010, 1
Buff Ermine <i>Spilosoma lutea</i>	2020, 9
Cinnabar <i>Tyria jacobaeae</i>	2012, 1
Oak Hook-tip <i>Watsonalla binaria</i>	2018, 1
Fungi, Lichen and Slime Moulds	
<i>Collema polycarpon</i>	2015, 1
<i>Toninia sedifolia</i>	2015, 1
Mammals	
Hedgehog <i>Erinaceus europaeus</i>	2020, 50
Otter <i>Lutra lutra</i>	2016, 10
Badger <i>Meles meles</i>	2020, 8
Noctule Bat <i>Nyctalus noctula</i>	2019, 2
Common Porpoise <i>Phocoena phocoena</i>	2016, 1
Common Pipistrelle <i>Pipistrellus pipistrellus</i>	2019, 6
Soprano Pipistrelle <i>Pipistrellus pygmaeus</i>	2019, 3
Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i>	2019, 8
Plants	
Pretty Cord-moss <i>Entosthodon pulchellus</i>	2015, 1
Purple Ramping-fumitory <i>Fumaria purpurea</i>	2015, 2
Fragrant Orchid <i>Gymnadenia conopsea</i>	2016, 1
Bluebell <i>Hyacinthoides non-scripta</i>	2018, 3
Common Juniper <i>Juniperus communis</i> subsp. <i>communis</i>	2014, 2
Spiked Speedwell <i>Veronica spicata</i>	2019, 2
Western Spiked Speedwell <i>Veronica spicata</i> subsp. <i>hybrida</i>	2011, 1
Reptiles and Amphibians	
Slow-worm <i>Anguis fragilis</i>	2015, 5
Common Toad <i>Bufo bufo</i>	2017, 4
Palmate Newt <i>Lissotriton helveticus</i>	2012, 1
Common Frog <i>Rana temporaria</i>	2019, 7
Common Lizard <i>Zootoca vivipara</i>	2013, 1

3.2 Extended Phase 1 Habitat Survey

Habitats

Seven JNCC Phase 1 habitat types were identified within the Site and immediate surrounding area. These are shown on Figure 2 and are described in the following sections. Photographs of habitats and target notes are given in Appendix B.

3.2.1 Intertidal Sand (H1.1)

Intertidal sand formed a continuous habitat along the middle to lower part of the tidal range across much of the survey area (Photograph 1). No vegetation was present.

3.2.2 Intertidal Shingles/Cobbles (H1.2)

The upper part of the beach was dominated by shingle and cobbles, which was largely unvegetated (Photograph 2).

Where this habitat adjoined the sea wall, intertidal boulders/rocks sparse vegetation was noted (Photograph 3, TN1) which includes thistles (*Cirsium* sp.), sea beet (*Beta vulgaris* subsp. *maritima*), sea campion (*Silene uniflora*), dandelion (*Taraxacum* sp.), groundsel (*Senecio vulgaris*), yarrow (*Achillea millefolium*), fescue sp. (*Festuca* sp.), sorrel (*Rumex acetosa*), curled dock (*Rumex crispus*), sea mayweed (*Tripleurospermum maritimum*), seaside daisy (*Erigeron glaucus*) and common mallow (*Malva sylvestris*).

3.2.3 Intertidal Boulders/Rocks (H1.3)

Sparse boulders/rock (relatively small) were present below the high tide line in the centre of the Site, which were clad with spiral wrack and channelled wrack (*Pelvetia canaliculata*) at higher elevations (shown as 'Ba' (brown algal beds) on Figure 2) (Photograph 4).

A honeycomb worm (*Sabellaria alveolata*) reef was present in the centre of the Site, associated with intertidal boulders/rock (Photograph 5 & 6, TN2). This ecological feature is discussed within Section 3.2.17.

3.2.4 Boulders/Rocks Above High Tide Mark (H3)

In the east of the Site an area of large boulders was present, which formed part of the sea defences (Photograph 7).

3.2.5 Introduced Shrub (J1.4)

A small ornamental memorial garden was present on the west of the Site (Photograph 8).

3.2.6 Wall (J2.5)

The sea wall was present in the south of the Site, which was formed of concrete, around 5m high (Photograph 9). Vegetation on the wall was very sparse, although in the west of the survey where the wall gradient was lower occasional seaside daisy, fescue grass sp. (*Festuca* sp.) and traveller's joy (*Clematis vitalba*) were present.

3.2.7 Hardstanding (J5)

A road/pavement were present in the south of the Site (Photograph 10). An area used for parking (although gated to prevent public access) was present in the west of the survey area (Photograph 11). This parking area was created using cellular plastic/matric pavers to stabilise the ground and concrete, which had become sparsely vegetated with common grasses.

Protected/Notable Species

3.2.8 Bats

No features with the potential to support roosting bats were present within the survey area, and the regular presence of foraging bats is considered highly unlikely.

3.2.9 Badgers

No evidence of badger was present within Site, and the Site is unsuitable for this species.

3.2.10 Dormouse

No habitats with the potential to support this species were present within the site.

3.2.11 Riparian Mammals

All areas within the Site were surveyed for otter. No evidence of this species presence was encountered, and no potential holt/den sites were present.

3.2.12 Other Mammals

No other mammal species were encountered. The regular presence of any mammalian species within the Site is considered to be highly unlikely.

3.2.13 Birds

During the Site survey the following species were noted:

- rock pipit (*Anthus petrosus*) – one on sea wall.
- oystercatcher (*Haematopus ostralegus*) – three foraging within intertidal area.
- common redshank (*Tringa totanus*) – four foraging within intertidal area.
- herring gull – 17 in the shallows offshore.
- black-headed gull – six in the shallows offshore.
- great black-backed gull (*Larus marinus*) – one overflew the Site.
- starling – calling from nearby housing areas.
- carrion crow (*Corvus corone*) – one foraging in the strandline.

- red-breasted merganser (*Mergus serrator*) – four offshore (at least 0.2km from Site).
- common scoter– seven offshore (at least 0.5km from Site).

The sole habitat within the Site that could support nesting birds (waders) was the shingle/cobbles near the seawall. However, this habitat was significantly disturbed by walkers, and it is therefore considered highly unlikely that any species may use this habitat for breeding purposes.

3.2.14 Reptiles

Habitats within the Site were considered unsuitable for all reptilian species.

3.2.15 Amphibians

Habitats within the Site were considered unsuitable for all amphibian species.

3.2.16 Fish

A number of rockpools were present on the centre of the Site, associated with the areas of intertidal boulders/rocks. These pools are likely to support a variety of fish species.

3.2.17 Invertebrates

A *Sabellaria alveolata* (honeycomb worm) reef was present in the centre of the Site, associated with intertidal boulders/rock (TN2, Photograph 9).

Sabellaria reefs are biogenic habitats formed by tube-forming polychaete worms. The two species found in Wales are generally, but not always, restricted to either the intertidal (*Sabellaria alveolata*) or subtidal (*S. spinulosa*) habitats, where they can form dense colonies of tubes built from sand-sized particles.

The reefs are thought to contribute to beneficial ecosystem processes as they can be topographically complex, providing microhabitats for an abundance of marine life. The Habitats Directive lists habitats and species of interest in Annex I and Annex II respectively. Both *S. alveolata* and *S. spinulosa* reefs can be considered as biogenic reefs and are encompassed by the following Annex I habitats; Reef (code 11704), Estuaries (code 1130) and Large Shallow Inlets and Bays (code 1160). Reef is a designating feature of Menai Strait and Conwy Bay SAC, located 0.8km from the Site.

Under the Water Framework Directive (WFD) ‘Polychaete reef’ is identified as one of several higher sensitivity habitats that specifically need to be considered if a proposed development of activity needs to be subject to a WFD assessment.

Sabellaria alveolata reef is listed as a Priority Habitat under Section 7 of the Environment (Wales) Act 2016 within the category of ‘Littoral Rock’.

Lugworm (*Arenicola marina*) beds were noted in the west of the Site as well as occasional sand mason worms (*Lanice conchilega*) on the lower parts of the beach.

3.2.18 Invasive Non-native Species

No invasive non-native species were recorded.

4 Recommendations

The PEA has identified that the Project may impact ecological features within/surrounding the Site. Initial avoidance and mitigation measures are recommended below in order to prevent adverse effects from the Project on these ecological features of the Site.

Ecological input to the ongoing project design should be sought to ensure constraints and opportunities are maximised. Once design has been finalised, an Ecological Impact Assessment (EcIA) report should be produced to accompany associated planning and Marine Licence applications, in line with CIEEM guidance.

4.1 Designated Sites

Liverpool Bay SPA is located adjacent to the Site. This Natura 2000 site is designated due to the populations of red-throated diver, little gull, common scoter and waterbird assemblage it supports during the non-breeding season and the little and common tern during the breeding season. These wintering species favour offshore areas, and no areas within the Site offer potential to support breeding terns (while broadly suitable habitat (shingle) is present this is subject to much disturbance). It is therefore considered highly unlikely that any significant impacts will occur in relation to this Natura 2000 site, however, it is possible due to proximity that the competent authority may require Habitat Regulations Assessment (HRA) to fully assess potential effects. Visual and acoustic disturbance effects should be considered within the HRA.

Menai Strait and Conwy Bay SAC is present 0.8km from the Site. One qualifying feature (reefs) of this Natura 2000 site was identified within the Site; due to the distance of the SAC from the Site and the nature of the qualifying feature (sedentary) it is considered highly unlikely that this habitat within the Site would be considered to be a constituent part of this Natura 2000 site. However, again it is possible due to proximity that the competent authority may require HRA to fully assess potential effects.

Taking into account the location of the Site in relation to designated sites, and the qualifying features of these sites, assuming environmental best practice during construction, adverse impacts to other designated sites are considered unlikely.

4.2 Habitats

One Section 7 habitat has been identified within the site; Littoral Rock; *Sabellaria alveolata* reefs. Studies carried out on reefs of *Sabellaria alveolata* within the low intertidal suggest that areas of small, superficial damage within reefs may be rapidly repaired by the tube building activities of adult worms. Where reefs are extensively damaged or removed, then recovery will rely on larval

recolonization¹². The likely recovery rate of *Sabellaria spinulosa* reefs from impacts is limited and there are currently significant information gaps regarding recovery rates¹³.

This habitat is located within the footprint of the proposed groyne and will be lost to the project. Measures to remove or minimise impacts (i.e. relocation) to this habitat should be investigated, and if no such measures are possible offsetting measures may be required; i.e. the creation of suitable habitats for *Sabellaria* elsewhere within the Site or adjacent areas. An Intertidal Biotope Survey is recommended to provide further information to inform design development, constraints and opportunities.

4.3 Otter

The desk study returned one record of otter on the last ten years. No potential den/holt sites were identified, although occasional foraging otters within the site is considered possible. To ensure that no otters are harmed during construction it is recommended that:

- At the conclusion of each working day excavations are covered, or a means of escape for any animal falling into excavations is installed, and
- Any temporarily exposed open pipe systems are capped in such a way as to prevent otter gaining access.

4.4 General Mitigation

- Investigate opportunities to avoid Section 7 *Sabellaria* reef.
- All works should be undertaken in accordance with Guidance for Pollution Prevention (GPP5) and PPG1 Understanding your Environmental Responsibilities.
- Refuelling of all plant and equipment should be carried out at least 10m away from the beach.
- If any protected species are encountered during the works, all work in the vicinity should stop immediately and a suitably experienced ecologist contacted for advice on how to proceed.

4.5 Enhancement Measures

Enhancement measures will be investigated once the requisite details are available. These could include new habitat creation for *Sabellaria* reef and/or interpretation boards including biodiversity information.

¹² Wilson, D.P., 1970b. *The larvae of Sabellaria spinulosa and their settlement behaviour*. Journal of the Marine Biological Association of the United Kingdom, 50, 33-52.

¹³ Gibb, N., Tillin, H.M., Pearce, B. & Tyler-Walters, H., 2014. *Assessing the sensitivity of Sabellaria spinulosa reef biotopes to pressures associated with marine activities*. Joint Nature Conservation Committee, Peterborough, JNCC report No. 504, 67 pp

5 Conclusions

An Extended Phase 1 Habitat Survey was completed in relation to the proposed construction of a rock groyne at Penrhyn Bay.

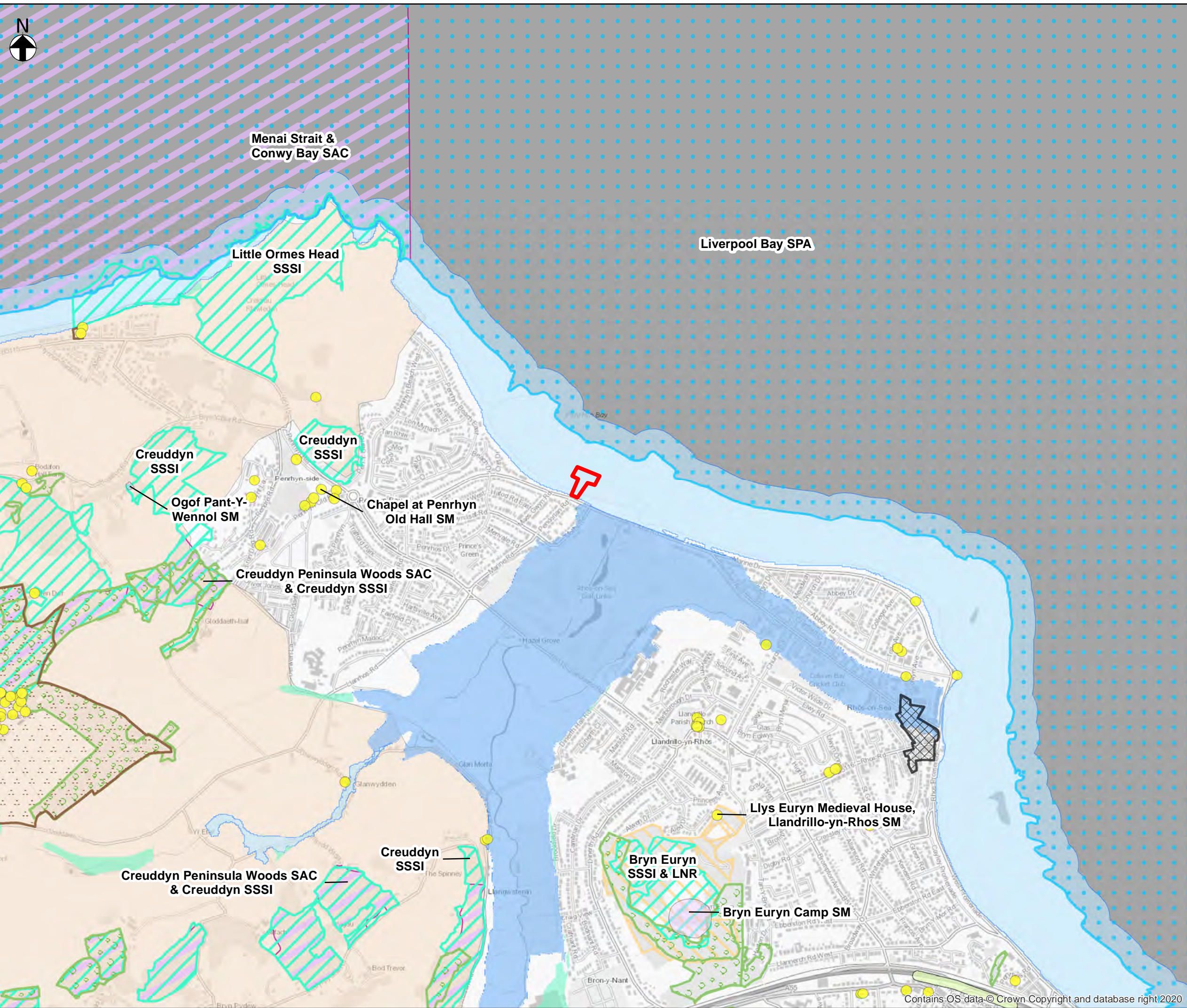
The site is located adjacent to Liverpool Bay SPA. It is considered highly unlikely that any significant impacts will occur in relation to this Natura 2000 site due to the location of protected features away from the coast and lack of suitable breeding habitat. Menai Strait and Conwy Bay SAC is present 0.8km from the site. One qualifying feature (reefs) of this Natura 2000 site was identified within the Site; due to the distance of the SAC from the site and the nature of the qualifying feature (sedentary) it is considered highly unlikely that this would be considered to be part of this Natura 2000 site. It is possible due to the proximity of these Natura 2000 sites that the competent authority may require HRA to fully assess potential effects to inform consenting.

Sabellaria alveolata reef is listed as a Priority Habitat under Section 7 of the Environment (Wales) Act 2016 within the category of 'Littoral Rock'. This habitat was present within the site and will be impacted by the project. Measures to remove or minimise impacts to this habitat should be investigated, and if no such measures are possible offsetting measures will be required.

This report has been written as the result of survey effort undertaken in December 2020. This report refers within the limitations stated, to the condition or proposed development of the Site at the time of inspections. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/re-survey. It is also advised that if there is a delay of over two years in undertaking the Proposed Works, an update survey may be required. No warranty is given as to the possibility of future changes in the condition of the Site.

This report is produced solely for the benefit of Conwy County Borough Council and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

Figures



LEGEND

- Proposed Improvements
- Conservation Area (CA)
- Scheduled Monument
- Registered Park & Garden
- Ancient Woodland
- Noise Priority Area (NPA)
- Special Protection Area (SPA)
- Sites of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- Special Area of Conservation (SAC)
- TAN15 Flood Zone C2
- TAN15 Flood Zone C1
- TAN15 Flood Zone B
- Historic Landscape
- Listed Buildings

0 100 200 400 600 800 Metres

P1	2020-12-14	IM	FOR INFORMATION	GM	RC	2020-12-16
Rev.	Date.	Drawn	Description.	Chkd.	Appd.	Date.

ARUP

Project Name: **PENRHYN BAY**

Drawing Title: **ENVIRONMENTAL CONSTRAINTS PLAN**

Suitability: **FOR INFORMATION** Suitability Code: **S1**

Originator	IM	Designer	GM	Date.	2020-12-14
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Internal Project Number	274649	Scale	1:15,000	Rev.	P1
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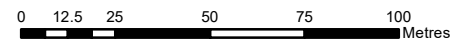
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LEGEND

-  Proposed Improvements (Indicative)
-  Beach Nourishment (Indicative)
-  Special Protection Area (SPA)
-  Mean High Water / Mean Low Water



P1	2021-01-04	IM	FOR INFORMATION	GM	RC	2021-01-05
Rev.	Date.	Drawn	Description.	Chkd.	Appd.	Date.

ARUP

Project Name: **PENRHYN BAY**

Drawing Title: **ENVIRONMENTAL CONSTRAINTS PLAN**

Suitability: **FOR INFORMATION** Suitability Code: **S1**

Originator	IM	Designer	GM	Date	2021-01-04
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Internal Project Number	274649	Scale	1:2,000	Rev.	P1
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Drawing Number: **003**

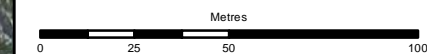
THIS MAP IS BASED UPON THE ORDNANCE SURVEY MATERIAL WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE. © CROWN COPYRIGHT 2015 LICENCE NUMBER: 1000274649-0014 Internal Project Data: 274649-0014 Map Document: ENV_EnvironmentPenrhyn_Env_Constraints_Map_Dec2020.mxd



TN Notes
 1 Intertidal Shingles/Cobbles
 2 Sabellaria alveolata (honeycomb worm) reef; Section 7 Habitat

- Legend**
- Proposed Improvements
 - H1.1 - Intertidal - mud/sand
 - H1.2 - Intertidal - shingles/cobbles
 - H1.3 - Intertidal - boulders/rocks
 - H1.3.3 - Intertidal - boulders/rocks - brown algal beds
 - J1.4 - Introduced shrub
 - J2.5 - Wall
 - J5 - Gravel/hard standing
 - TN - Target note

P0	2020-12-16	AK	GM	PC
Issue	Date	By	Chkd	Appd



ARUP

4 Pierhead Street
 Cardiff CF10 4QP
 Tel +44 29 2047 3727 Fax +44 29 2047 2277
 www.arup.com

Client
CONWY CBC

Job Title
PENRHYN BAY

Extended Phase 1 Habitat Survey

Scale at A3
1:2,000

Job No 274649	Drawing Status Preliminary
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Drawing No 001	Issue P0
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix A

Legislation

A1 A1 Legislative Context

A framework of international, European, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. This is described in the following sections. The reader will refer to the original legislation for the definitive interpretation.

A1.1 Statutory Designated Sites

A network of nationally designated sites has been established through the designation of Sites of Species Scientific Interest (SSSI) under the Wildlife and Countryside Act 1981 (as amended). The protection afforded by the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation¹⁴ (Natural Resources Wales).

The protection afforded to SSSIs is used to underpin the designation of areas at a European Level. European Sites comprise:

- Special Areas of Conservation (SAC) designated under the Conservation of Habitats and Species Regulations 2019 (Amendment) (EU Exit) (known as the Habitats Regulations);
- Special Protection Areas (SPA) designated under the Wildlife and Countryside Act.

Wetlands of International Importance (Ramsar sites) declared under the Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 are normally also notified as SSSIs but are only considered European Sites as a matter of UK and Local Government Policy.

The Habitats Regulations transpose the requirements of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) in to law within England and Wales, while the Wildlife and Countryside Act transposes Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive) in the law within England and Wales. Equivalent legislation exists to transpose these directives in the law within Scotland and Northern Ireland.

The Habitats Regulations require that consideration is given to the implications of plans and projects (developments) on European Sites are considered. Specifically, Regulation 61(1) states:

“A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which –

¹⁴ Section 28 of the Wildlife and Countryside Act 1981 (as substituted by Schedule 9 of the Countryside and Rights of Way Act 2000).

(a) is likely to have a significant effect on a European site or European marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications for that site in view of that site's conservation objectives.”

The formal consideration of effects on European Sites is therefore undertaken by the determining authority such as the Local Planning Authority.

Local Nature Reserves can be given protection against damaging operations through powers within the National Parks and Access to the Countryside Act 1949 (as amended). However, this protection is usually conveyed through inclusion of protection within local planning policy relating to these sites and other non-statutory sites such as sites of Importance for Nature Conservation.

A1.2 European Protected Species

The Habitats Regulations convey special protection to a number of species which are listed in schedule 2 of the Regulations and are referred to as European Protected Species (EPS):

- All UK resident bat species;
- All whale and dolphin species;
- Large blue butterfly (*Maculinea arion*);
- Common dormouse (*Muscardinus avellanarius*);
- Pool frog (*Rana lessonae*);
- Sand lizard (*Lacerta agilis*);
- Fisher's estuarine moth (*Gortyna borelii lunata*);
- Great crested newt (*Triturus cristatus*)
- European otter
- Wild cat (*Felis silvestris*);
- Lesser Whirlpool Ram's-horn Snail (*Anisus vorticulus*)
- Smooth snake (*Coronella austriaca*);
- Sturgeon (*Acipenser sturio*);
- Natterjack toad (*Bufo calamita*); and
- All marine turtles.

Regulation 41 makes it an offence to:

- a) Deliberately capture, injure or kill any wild animal of a EPS;
- b) Deliberately disturb wild animals of such a species;
- c) Deliberately takes or destroys the eggs of such a species;

d) Damages or destroys a breeding site or resting place of such an animal.

Disturbance in the context of the offences above is disturbance which is likely to impair the ability of the animals to survive, to breed or reproduce, to nurture their young, to hibernate, to migrate; or to affect significantly the local distribution of the species.

Licences can be granted by the relevant SNCO for developments (sometime referred to as EPS Licences or Derogation Licences) providing the purposes of the licence is for “*preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment*”.

A1.3 UK Protected Species

The Wildlife and Countryside Act 1981 provide protection to both EPSs and other species including wild birds, water voles and reptiles.

All wild birds, their nests and eggs are protected with some rare species afforded extra protection from disturbance during the breeding season (these species are listed in Schedule 1 of the Act). It is illegal to take any wild bird or damage or destroy the nests and eggs of breeding birds. There are certain exceptions to this in respect of wildfowl, game birds and certain species that may cause damage.

Water vole receive protection under the Wildlife and Countryside Act 1981 which prohibits the killing, injuring or taking by any method.

All native reptile species in the UK are subject to partial protection from intentional or reckless killing or injury only.

Badger and their setts are protected under the Protection of Badgers Act 1992 which makes it an offence to kill, injure or take a badger, or interfere with a sett.

The Salmon and Freshwater Fisheries Act 1975 and The Eels (England and Wales) Regulations 2009 list provisions such as maintaining fish passes where rivers may be obstructed by dams or weirs and the provision of screens on outlets to avoid entrapment of fish.

A1.4 Other Legislation Relating to Species

Section 6 of the Environment (Wales) Act 2016 includes a duty on all public authorities to “seek to maintain and enhance biodiversity” so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to “promote the resilience of ecosystems”. This duty applies to government bodies, local authorities and statutory undertakers.

To assist in complying with this duty, public authorities must have regard to relevant evidence provided in the State of Natural Resources Report and any relevant area statement for an area in which the authority exercises functions, as well as having regard to the list of living organisms and habitats published under Section 7 of the Act. Species and habitats listed on Section 7 are considered to be of Principal Importance for the conservation of biological diversity.

The Environment (Wales) Act 2016 replaces the NERC Act 2006; Section 6 replaces Section 40 of the NERC Act and Section 7 replaces the Section 42 list.

A1.5 Invasive Species

Schedule 9 of the Wildlife & Countryside Act 1981 (as amended) lists certain plants and animals that are not native to Great Britain and could pose a threat to our native species and habitats.




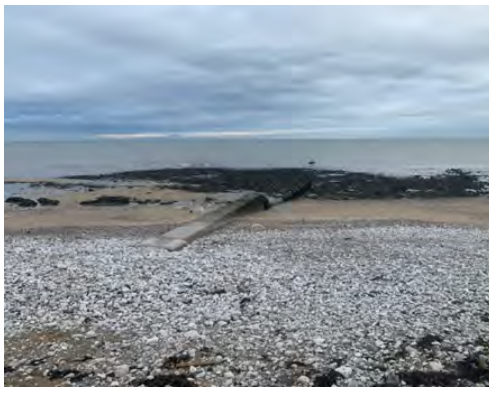

Under this legislation it is an offence to plant or otherwise causes to grow in the wild any plant which is included in Part II of Schedule 9. It is also an offence to sell or to release into the wild any plants or animals on the Schedule.

The Invasive Alien Species (Enforcement and Permitting) Order 2019 allows for the enforcement of the EU Invasive Alien Species Regulation 1143/2014 on the prevention and management of invasive alien plant and animal species in England and Wales, including the relevant licenses, permits and rules for keeping invasive alien species. Species on this list are no longer listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended).

Appendix B

Photographs

B1 Photographs of the Site

	
<p>Photograph 1. Intertidal sand (seawall and shingle/cobbles in foreground) in west of site</p>	<p>Photograph 2. Intertidal shingle/cobbles</p>
	
<p>Photograph 3. Sparse vegetation</p>	<p>Photograph 4. Brown algal beds associated with intertidal boulders/rocks in centre of site</p>
	
<p>Photograph 5. Approximate extent of <i>Sabellaria</i> sp. reef in the centre of the site</p>	



Photograph 6. *Sabellaria* sp. reef in the centre of the site



Photograph 7. Area of large boulders in east of site



Photograph 8. Ornamental memorial garden in west of site



Photograph 9. Sea wall



Photograph 10. Road/pavement on south of site



Photograph 10. Hardstanding in east of site

Appendix B

Legislation

B1 Legislation

A framework of international, European, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. This is described in the following sections. The reader will refer to the original legislation for the definitive interpretation.

B1.1 Statutory Designated Sites

A network of nationally designated sites has been established through the designation of Sites of Species Scientific Interest (SSSI) under the Wildlife and Countryside Act 1981 (as amended). The protection afforded by the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation²⁷ (Natural Resources Wales).

The protection afforded to SSSIs is used to underpin the designation of areas at a European Level. European Sites comprise:

- Special Areas of Conservation (SAC) designated under the Conservation of Habitats and Species Regulations 2019 (Amendment) (EU Exit) (known as the Habitats Regulations);
- Special Protection Areas (SPA) designated under the Wildlife and Countryside Act.

Wetlands of International Importance (Ramsar sites) declared under the Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 are normally also notified as SSSIs but are only considered European Sites as a matter of UK and Local Government Policy.

The Habitats Regulations transpose the requirements of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) in to law within England and Wales, while the Wildlife and Countryside Act transposes Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive) in the law within England and Wales. Equivalent legislation exists to transpose these directives in the law within Scotland and Northern Ireland.

The Habitats Regulations require that consideration is given to the implications of plans and projects (developments) on European Sites are considered. Specifically, Regulation 61(1) states:

“A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which –

²⁷ Section 28 of the Wildlife and Countryside Act 1981 (as substituted by Schedule 9 of the Countryside and Rights of Way Act 2000).

(a) is likely to have a significant effect on a European site or European marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications for that site in view of that site's conservation objectives.”

The formal consideration of effects on European Sites is therefore undertaken by the determining authority such as the Local Planning Authority.

Local Nature Reserves can be given protection against damaging operations through powers within the National Parks and Access to the Countryside Act 1949 (as amended). However, this protection is usually conveyed through inclusion of protection within local planning policy relating to these sites and other non-statutory sites such as sites of Importance for Nature Conservation.

B1.2 European Protected Species

The Habitats Regulations convey special protection to a number of species which are listed in schedule 2 of the Regulations and are referred to as European Protected Species (EPS):

- All UK resident bat species;
- All whale and dolphin species;
- Large blue butterfly (*Maculinea arion*);
- Common dormouse (*Muscardinus avellanarius*);
- Pool frog (*Rana lessonae*);
- Sand lizard (*Lacerta agilis*);
- Fisher's estuarine moth (*Gortyna borelii lunata*);
- Great crested newt (*Triturus cristatus*)
- European otter
- Wild cat (*Felis silvestris*);
- Lesser Whirlpool Ram's-horn Snail (*Anisus vorticulus*)
- Smooth snake (*Coronella austriaca*);
- Sturgeon (*Acipenser sturio*);
- Natterjack toad (*Bufo calamita*); and
- All marine turtles.

Regulation 41 makes it an offence to:

- a) Deliberately capture, injure or kill any wild animal of a EPS;
- b) Deliberately disturb wild animals of such a species;
- c) Deliberately takes or destroys the eggs of such a species;

d) Damages or destroys a breeding site or resting place of such an animal.

Disturbance in the context of the offences above is disturbance which is likely to impair the ability of the animals to survive, to breed or reproduce, to nurture their young, to hibernate, to migrate; or to affect significantly the local distribution of the species.

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Appendix C

Intertidal Biotope Survey

C1 Intertidal Biotope Survey

Conwy County Borough Council
**Penrhyn Bay Coastal Defence
Improvements**
Intertidal Biotope Survey Report

For issue | 12 October 2021

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 282129-50

Ove Arup & Partners Ltd
4 Pierhead Street
Capital Waterside
Cardiff CF10 4QP
United Kingdom
www.arup.com

ARUP

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Appendices

Appendix A

Intertidal Biotope Plan

Appendix B

Intertidal Biotope Survey Photographs

1 Introduction

Conwy County Borough Council (CCBC) commissioned Ove Arup and Partners Limited (Arup) to undertake an Ecological Impact Assessment (EclA). Surveys to inform the EclA, included an Extended Phase 1 Habitat Survey and Intertidal Biotope Survey as part of the Penrhyn Bay Coastal Defence Improvements Scheme.

The proposed works are located with Penrhyn Bay adjacent to existing sea defences and bounded on either side by rocky promontories. The surveys will identify the principal habitats and key species, likely environmental constraints and initial recommendations for mitigation measures that may need to be taken into account in the development of the preferred solution(s) and potential opportunities for enhancement.

The Study Area extends from Mean High Water Springs (MHWS) down to Mean Low Water Springs (MLWS) delineating by a breakwater to the west (NGR: SH 82431 81981) and a smaller breakwater to the east (SH 82966 81587); refer to Appendix A Figure 1: Intertidal Biotope Plan. The Intertidal Biotope Survey was undertaken on the 25th June 2021 to target lower tides enabling survey of a greater extent of eulittoral (lower shore) habitats; low water was at 05:58 (BST) with a low water level of 0.44m above Chart Datum [Llandudno]. Marine Habitat (Biotope) photos are provided in Appendix B.

The purpose of this report is to provide baseline information on intertidal habitats to inform the detailed design stage of the project and provide the requisite information as referenced in the NRW EIA Screening Opinion.

Arup submitted Environmental Impact Assessment (EIA) Screening Opinion Requests to CCBC under the Town & Country Planning (EIA) (Wales) Regulations 2017 and to Natural Resources Wales (NRW): Marine Licensing Team (MLT) under the Marine Works (EIA) Regulations 2007 (as amended) in December 2020. NRW MLT subsequently issued a Screening Opinion [Ref SC2007] on 29th March 2021. In Section 4.1.2: *Marine and Intertidal Ecology*, NRW provided comments reproduced below.

'Sabellaria alveolata (honeycomb worm) reef is listed as a Priority Habitat under Section 7 of the Environment (Wales) Act 2016 within the category of 'Littoral Rock'. This habitat is present within the site and is likely to be affected by the project. We recognise that measures for this habitat have been proposed to be investigated further as part of the detailed design stage and that these will be informed by a site-specific intertidal biotope survey, which will enable the S. alveolata reef location and extent to be mapped. NRW TE confirm an intertidal biotope surveys would be required along with discussion with NRW TE with regard to the approach of the design in avoidance or mitigation of any effects.'

2 Project Background

Penrhyn Bay is a coastal embayment in the county of Conwy, North Wales. The Shoreline Management Plan states that the policy for Penrhyn Bay is to ‘Hold the Line’; whilst the Conwy Local Development Plan (LDP) emphasises the importance of preserving the county’s unique natural beauty, safeguarding public rights of way and allowing tourism to continue to make a vital contribution to the economy.

The existing defences provide coastal erosion and tidal flooding protection to over 300 residential and commercial properties, utilities infrastructure (including a Dŵr Cymru Welsh Water (DCWW) pumping station, a Wastewater Treatment Works (WwTW) sea outfall and SP Energy Networks assets), the adjacent promenade, A547 highway, Wales Coast Path, National Cycle Route, and the Rhos-on-Sea Golf Club. The present beach and promenade also form a key part of the local community’s well-being and recreation space, whilst adding to the area’s wider tourist attractions.

In the absence of the continuing beach management works, regularly undertaken by CCBC, the sea wall and revetment are highly likely to fail through the on-going drawdown of the foreshore exposing the corroded and structurally weak sheet piled toe foundations.

The present regime of maintenance activities is unsustainable and is likely to increase in frequency over time, as the mobility of the beach increases due to the beach material particle attrition and the increasing severity of storm events and sea level rise associated with climate change.

The objectives for the project are to:

1. Manage the effects of flood risk and coastal erosion to people and property.
2. Reduce the on-going capital maintenance costs experienced as part of the present beach maintenance regime to safeguard the public backshore assets.
3. Meet the objectives of the Shoreline Management Plan (SMP2) for Penrhyn Bay, which include:
 - Hold the Line.
 - Maintaining and widening the beach.
 - Acting in an environmentally acceptable way.
4. Incorporate wider benefits and added amenity value into project design and construction (including consideration of Welsh Government’s Community Benefits Policy and the Well-Being of Future Generations (Wales) Act 2015). To maintain and, where possible, enhance the natural environment.
5. Maintain and improve the local area – with an awareness of the amenity value presently provided by Colwyn Bay and Llandudno (neighbouring towns).

3 Project Description

To achieve the above objectives, a T-shaped rock groyne and associated beach nourishment (cobbles) are proposed.

The rock groyne is approx. 100m long by 90m in width. The rock groyne is suited to the local area, which already comprises a number of rock groynes and the beach nourishment will comprise similar material to existing beach deposits.

The planned shape of the capital beach nourishment was determined from numerical modelling as the equilibrium position resulting from the incident wave direction and wave diffraction behind the groyne structure.

The minimum beach width is 10m, the crest level is between +5mODN and +6mODN, to be confirmed, and the beach nourishment slope is proposed at (V:H) 1:8. These design parameters are discussed further in the following sections of the report.

Figure 1 shows an indicative plan of the proposed works in Penrhyn Bay at a high tide (Figure 1a) and outline at low tide (Figure 1b).



Figure 1a – Plan of Proposed Works (High Tide)



Figure 1b – Plan of Proposed Works (Low Tide).

A limited degree of flexibility exists in the location of the rock groyne to achieve the requisite design parameters and project objectives. The baseline data presented within this report will inform potential intertidal biodiversity constraints that may facilitate micro-siting of the proposed coastal defences.

4 Methodology

4.1 Intertidal Biotope Survey

An Intertidal Biotope Survey was undertaken by an experienced marine ecologist on 25th June 2021 between a Study Area delineating by two breakwaters (NGR: SH 82431 81981 to SH 82966 81587); refer to Figure 1. Survey also comprised the potential access point at SH 82941 81468 and the habitats above MHWS, including habitats to the rear of the cobble ridge (SH 82880 81493) that forms part of the North Wales Coast Important Bird Area¹. At this location the area is an important breeding area for ringed plover (*Charadrius hiaticula*); three individuals were present foraging on the adjacent foreshore and alighting atop the cobble ridge during the survey.

The survey was undertaken in accordance with the Marine Nature Conservation Review (MNCR) Intermediate Level survey for rapid biotope assessment comprising broad biotope appraisal and identification of conspicuous flora and fauna. The survey was timed to target spring tides at low water to maximise the extent of accessible intertidal habitat. The Intertidal Biotope Survey was undertaken one hour either side of low water, which occurred at 05:58 BST at a tidal height of 0.44m Above Chart Datum [Llandudno].

The survey was undertaken in accordance with the JNCC's Marine Nature Conservation Review (MNCR) methodology, which was developed to provide a comprehensive baseline of information on marine habitats and species, to aid coastal zone and marine management and to contribute to the identification of areas of marine natural heritage importance throughout Great Britain. MNCR focussed on benthic habitats and their associated communities, which together are described as 'biotopes' in inshore areas. The MNCR developed methods for survey, assessment and recording to enable systematic and consistent descriptions of the character of habitats present and the abundance of species in them so that comparisons between sites could be undertaken. The MNCR survey methodology was employed for the intertidal survey.

In accordance with MNCR guidance an intermediate-level survey was considered appropriate to describe baseline conditions. This enabled a rapid assessment of habitats and conspicuous fauna, between MHWS and MLWS, in addition to physical characteristics of the site and potential modifiers. Quadrat survey, core sampling, sieving and sediment size analysis were not considered necessary to inform this assessment. Abundances are described according to the MNCR SACFOR scale, which in summary is as follows: Superabundant (>80%), Abundant (40-79%), Common (20-39%), Frequent (10-19%), Occasional (5-9%), Rare (1-5%) and Present (<1%).

¹ CCBC Barbara Owsianka / Kate Surry [County Ecologists] pers. comms.20210628.

4.2 Limitations

The survey was undertaken within the recommended months of April to October. The advisory survey period typically permits suitable daylight hours around spring tides, better weather and greater floristic density and diversity. At the time of survey (25th June 2021) the weather was warm (11°C) and overcast with moderately heavy rain. The survey was timed to take advantage of lower tides (0.44m) with the biotopes in the vicinity of MLWS assessed at low tide (05:58 BST). Access to the full extent of the eulittoral to MLWS was not possible due to the tidal state; however, the majority of habitats were accessible at the time of survey. It is therefore considered that the biotopes and species identified are representative.

5 Results

5.1 Marine Desk Study

Mussel beds (presumed *Mytilus edulis*), a WFD Higher Sensitivity Habitat, are recorded over much of Penrhyn Bay on the MAGIC website. However, during the biotope survey no evidence of mussel beds were noted along the foreshore; neither in-situ nor washed up in the strandline. No further higher sensitivity WFD habitats are recorded within the study area; however, kelp beds are recorded at and below MLWS to the west and east of the site respectively.

The MAGIC records for WFD Lower Sensitivity Habitat are relatively consistent with habitats observed on site: intertidal soft sediment (sand and muddy sand), a cobble bank at MWHS and intertidal rocky habitats.

The MAGIC website does not have any records for Shellfish Areas or Classified Bivalve Mollusc Harvesting Areas within Penrhyn Bay; however, the Rhos-on-Sea Shellfish Area is located to the east of Penrhyn Bay and may coincide with potential access modifications.

5.2 Priority Habitats

The following Priority Habitats listed under Section 7 of the Environment (Wales) Act (2016) are present within the site.

- Intertidal boulder communities.
- *Sabellaria alveolata* (honeycomb worm) reefs.

It should be noted that, whilst *Sabellaria alveolata* have been identified within the proposed works area, the status of 'reefs' remains to be determined.

5.3 Intertidal Biotope Survey

5.3.1 Upper Shore Habitats

The promenade parallels the sea defences comprising parking areas, pedestrian access via the Wales Coast Path and the National Cycle Route No. 5 with accesses to the beach at intervals, seating and bike storage. Above the sea defence, coastal flora are influenced by their location within the 'splash zone' [Supralittoral Fringe], comprising a variety of coastal halophytic plants including: sea thrift (*Armeria maritima*), red valerian (*Cetranthus ruber*), red fescue (*Festuca rubra*), seaside daisy / seaside fleabane (*Erigeron glaucus*), sea campion (*Silene uniflora*) and sea beet (*Beta vulgaris*).

The beach is backed by a concrete sea defence with a wave return wall and stepped access down to the beach. In certain locations, erosion has resulted in a drop in levels and a fall risk from the lowest step to the beach. The seawall and concrete steps are inundated at high water; the former colonised by *Verrucaria maura* (tar lichen) and with grey / yellow lichens sporadic along the wave return

wall, whilst the concrete steps are colonised by patches of green alga (indet.), particularly adjacent to highway drainage outfalls.

Further westwards, sections of locally managed (residential) sea defences are present lacking the wave return wall or stepped concrete toe and comprise vertical bricked / concrete walls. To the east, the sea defence is enveloped by a cobble ridge that protects the defences in this location adjacent to the flood gate and highway access (proposed construction access) through the defence from Glan-y-Mor Road / Marine Drive. The rear of the cobble ridge is populated with sea beet, accompanied by yellow-horned poppy (*Glaucium flavum*), tree mallow (*Lavatera arborea*), wild carrot (*Daucus carota*), sea campion and red valerian. The main hardstanding on the shore side of the main flood gate is relatively devoid of mature flora.

5.3.2 Lower Shore (Beach) Habitats

The upper beach comprises a circa 5m wide shallow layer of shingle / cobble with scattered boulders and a sparse strandline. Below this much of the beach is dominated by fine to medium coarse sand with a predominantly deep anoxic layer with locally abundant *Lanice conchilega* (sand mason) and *Arenicola marina* (lugworm).

To the east of the bay, an above ground sewerage outfall extends halfway down the beach from the sea defence equidistant between MHWS and MLWS. Cracks in the pipework reflect changes in biodiversity as freshwater inputs create local variations. Further down the pipeline, the assemblage resembles the adjacent boulders, but with lower densities of *Sabellaria* and higher furoid abundance.

A large extent of intertidal boulders with intermittent sand and rockpools create habitat complexity and increased biodiversity in the mid- to lower eulittoral. Much of the cobble area is stabilised by aggregations of tube-building polychaete worms: *Sabellaria alveolata* (honeycomb worm - hereafter referred to as 'Sabellaria') that may denote presence of Section 7 Priority Habitat. A general distribution of *Sabellaria* was noted (refer to Table 1 and Figure 1 within Appendix A), whereby the westernmost c. 50m width of boulder habitat is devoid of *Sabellaria*. In general, the southerly limit extends to c. 120m northwards of the sea defence (approximate northerly extent of the rock groyne); however, an outlier is present as indicated in Table 1 [see Ref. 5], where a narrow band of *Sabellaria* extends further south and overlaps with the proposed groyne footprint.

Isolated boulders recorded aggregations of *Sabellaria*, whereas 'crusts' of more extensive *Sabellaria* were recorded where larger substrate was denser forming a conglomerate of biogenic reef comprised of clusters of polychaete tubes that create a complex structure for other organisms to adhere to, creating a localised biodiversity 'hot spot'. Noting the importance of the 'reefs' as supportive of wider biodiversity, *Sabellaria* spp. reefs are listed as 'Biogenic Reefs', a sub-category of the 'Reefs' feature under Annex I of the Habitats Directive. *Sabellaria alveolata* reefs are also a Priority Habitat in Wales; listed under Section 7 of the Environment (Wales) Act 2016.

Sabellaria quality is much higher in the eastern boulder habitat nearer to the pipeline and more so inshore. Here a dense thick crust has developed and may be reflective of previous extent and quality across the area. The *Sabellaria* is so extensive that it forms the predominant habitat having enveloped most of the underlying boulders and stabilising the habitat. Further west, and to a degree seaward, the quality of the *Sabellaria* decreases. Here much of the *Sabellaria* is eroded with only the underlying cementation obvious, tubes have broken off or been worn down, tube margins absent, open opercula limited and no indication of recent larval settlement.

Good quality aggregations were recorded on the eastern breakwater amongst the rock armour; and to a lesser extent at the western breakwater. The location of these aggregations suggests that exposure is a limiting factor at Penrhyn Bay and may account for the absence on the western boulder area and poorer quality *Sabellaria* westwards and seaward. *Sabellaria* is dependent on a degree of exposure to maintain planktonic food supply and sediment supply to enable tube building. However, overly exposed habitats risk erosion. Erosion of the *Sabellaria* crusts and aggregations may be due to both natural (erosion by smothering, storm damage, cobble movements, etc.) and potentially by anthropogenic factors (trampling).

Table 1: Southerly extent of *Sabellaria alveolata*; refer to Figure 1 in Appendix A (southerly extent mapped to reflect potential overlap with proposed groyne).

Ref.	Latitude / Longitude	National Grid Reference (NGR)	Eastings / Northings
1	53.320572, -3.763149	SH 82652 81855	282652 / 381855
2	53.319501, -3.761922	SH 82731 81734	282731 / 381734
3	53.319356, -3.761664	SH 82747 81717	282747 / 381717
4	53.319324, -3.761511	SH 82758 81713	282758 / 381713
5	53.318897, -3.7613861	SH 82765 81666	282765 / 381666
6	53.318808, -3.7613278	SH 82768 81656	282768 / 381656
7	53.318667, -3.761525	SH 82755 81640	282755 / 381640
8	53.318996, -3.761618	SH 82750 81677	282750 / 381677
9	53.318583, -3.7614056	SH 82763 81631	282763 / 381631
10	53.318764, -3.7611389	SH 82781 81651	282781 / 381651

Ref.	Latitude / Longitude	National Grid Reference (NGR)	Eastings / Northings
11	53.318557, -3.761677	SH 82744 81628	282744 / 381628
12	53.318752, -3.760881	SH 82798 81649	282798 / 381649

A relatively broad range of commonly occurring species were observed; including the following, SACFOR abundance denoted as [#]:

Algae – Chlorophyta (green seaweeds): *Ulva lactuca* [C] (sea lettuce), *Ulva intestinalis* (gutweed) [C].

Algae – Ochrophyta: Phaeophyceae (brown seaweeds): *Fucus serratus* [C] (serrated wrack), *Fucus spiralis* [C] (spiral wrack), *Saccharina latissima* (sugar kelp) [R], *Laminaria digitata* [P] (oarweed).

Algae – Rhodophyta (red seaweeds): *Porphyra* sp. [C] (laver), *Mastocarpus stellatus* [F] (grape-pip weed), *Corallina officinalis* [R] (coral weed), encrusting Rhodophycota (indet.) (*Lithothamnia* or similar) [R], *Palmaria palmata* [P] (dulse).

Bryozoa – *Flustra foliacea* (hornwrack) [P], epiphytic bryozoa (indet. on *F. serratus*) [P].

Cnidaria – *Actinia equina* [R] (beadlet anemone), *Urticina felina* (Dahlia anemone) [R].

Chordata: Aves (birds) - *Charadrius hiaticula* (ringed plover), *Larus argentatus* (herring gull), *Larus marinus* (great black-backed gull), oystercatcher (*Haematopus ostralegus*). **Pisces: Osteichthyes (fish) – *Lipophrys pholis*** (shanny), *Gaidropsarus mediterraneus* (shore rockling).

Crustacea: *Semibalanus balanoides* [C] (acorn barnacle), *Chthamalus* sp. [R] (stellate barnacle), *Porcellana platycheles* (broad-clawed porcelain crab), *Carcinus maenas* (green shore crab).

Mollusca: *Littorina littorea* [O] (common periwinkle), *Nucella lapillus* [O] (dog whelk), *Steromphala umbilicalis*² (flat top shell) [O], *Patella depressa* [O] (black-footed limpet), *Patella vulgata* [R] (common limpet), *Steromphala cineraria* (grey top shell) [R], *Littorina obtusata* (flat periwinkle) [P].

Polychaeta (worms): *Sabellaria alveolata* [O] (honeycomb worm), *Lanice conchilega* (sand mason) [F], *Arenicola marina* (lugworm) [F], *Spirorbinae* (tube worms) [O], *Spionidae* (*Pygospio elegans* [?]) / juv. *L. conchilega* [O].

Porifera (sponge): Porifera sp. (indet. sponge) [P].

² *Steromphala* previously *Gibbula*.

5.3.3 Western Breakwater

In the lee of the western breakwater, muddy sand dominates with a freshwater inflow at low water that carves sections of the sand revealing *Lanice conchilega* (sand mason) tubes. The muddy sand is predominantly anoxic and also maintains a covering of algal ‘flotsam’. *Arenicola marina* (lugworm) still persist in the muddy sand with patches of green alga (*Ulva intestinalis* – gutweed).

The western breakwater maintains a typical seaweed zonation from *Ascophyllum nodosum* (egg wrack) at the base, *Fucus spiralis* (spiral wrack) above and *Pelvetia canaliculata* (channelled wrack) at the top. In the more exposed sections, *Fucus serratus* (serrated wrack) takes over from *F. spiralis*, amongst small crusts and colonies of *Sabellaria alveolata* (honeycomb worm), occasional *Laminaria digitata* (kelp - oarweed), in a complex of red and green seaweeds: *Porphyra umbilicalis* (laver), *Ulva lactuca* (sea lettuce), *U. intestinalis*, etc. Juvenile *Lanice* occur in high abundance in discrete locations. A generally higher biodiversity is encountered at the breakwater.

5.3.4 Eastern Breakwater

The rock armour of the eastern breakwater appears to be at a lower elevation than the western breakwater and maintains a more eulittoral community than the zonation present in the former. Fucooids, red and green algae cover all aspects and elevations of the rock armour, comprising *F. serratus*, *U. lactuca*, *U. intestinalis*, *P. umbilicalis* and *P. palmata*, most likely obscuring assemblages of cryptic fauna. In the more sheltered sections between rock armour units, *Sabellaria* colonies have grown to decent size and remain in good quality with crisp and open apertures. The smaller boulders are largely dominated by *Ulva* spp., whilst a strandline of detached seaweed lies amongst and below the smaller rock units. Beyond this and between the eastern breakwater and the DCWW pipeline is fine to medium sand with *Arenicola marina* and foraging ringed plover.

5.3.5 Intertidal Biotopes

Species zonation, distribution and abundance varied throughout the Study Area. The key biotopes have been identified in Table 2 below. No marine Invasive and Non-Native Species (INNS) were recorded during the survey.

Table 2: Intertidal Biotopes Recorded

Zonation	Biotope Code	Biotope	Locality
Supralittoral Fringe	LS.LCS.Sh	Shingle (pebble) and gravel shores	Cobble ridge
Supralittoral Fringe	LR.FLR.Lic.YG	Yellow and grey lichens on supralittoral rock	Wave return wall and vertical concrete surfaces.
Upper Littoral Fringe	LR.FLR.Lic.Ver.Ver	<i>Verrucaria maura</i> on littoral fringe rock	Concrete sea defence wall.
Upper Littoral Fringe	LR.FLR.Eph.Ent	<i>Ulva</i> [<i>Enteromorpha</i>] spp. on freshwater-influenced and/or unstable upper eulittoral rock	Concrete stepped access; locally abundant in vicinity of surface water outfalls.
Lower Littoral Fringe	LS.LSa.Mo.Sa.BarSa	Barren Littoral Coarse Sand	Upper shore adjacent to sea defences.
Lower Littoral Fringe	LR.MLR.BF.PeIB	<i>Pelvetia canaliculata</i> and barnacles on moderately exposed littoral fringe rock	Upper elevations of western breakwater
Upper- / Mid-Eulittoral	LR.LLR.F.Asc.FS	<i>Ascophyllum nodosum</i> on full salinity mid eulittoral rock	Lower elevations of western breakwater
Mid-Eulittoral	LS.LSa.MuSa.MacAre	<i>Macoma balthica</i> and <i>Arenicola marina</i> in littoral muddy sand	Sheltered lee of western breakwater
Mid-Eulittoral	LR.LLR.F.Fspi	<i>Fucus spiralis</i> on moderately exposed to very sheltered upper eulittoral rock	South-western boulder habitats devoid of <i>Sabellaria</i> .
Mid- / Lower Eulittoral	LS.LSa.MuSa.Lan	<i>Lanice conchilega</i> in Littoral Sand	Sandy areas throughout Study Area.

Zonation	Biotope Code	Biotope	Locality
Lower Eulittoral	LR.MLR.BF.Fser.Bo	<i>Fucus serratus</i> and under-boulder fauna on lower eulittoral boulders	North-western boulder habitats devoid of <i>Sabellaria</i> / eastern breakwater.
Mid- / Lower-Eulittoral	LS.LBR.Sab	Littoral <i>Sabellaria</i> honeycomb worm reefs	Intertidal boulder habitat – eastern and northern sections. Lower elevations of western and eastern breakwaters.

6 Impact Assessment

Broadly, the marine habitats and species present are commonly occurring and of lower importance; however, intertidal reefs of encrusting worm tubes (*Sabellaria alveolata* reefs) and intertidal boulder communities comprise Priority Habitats in Wales. Regardless, measures should be adopted to avoid direct and indirect effects, e.g. pollution incidents, on all intertidal habitats throughout the development area.

6.1 Direct Effects

Sabellaria alveolata colonies are listed as a Priority Habitat and will require sensitive consideration as the key intertidal feature during detailed design and integration of mitigation and enhancement measures. *Sabellaria* colonies are ephemeral features, as such their distribution can change markedly from year to year resulting from natural and / or anthropogenic impacts. *Sabellaria* are resilient to inundation by sand for short to medium periods or annual decimation by winter storms. As an R-selected species³ that relies on reproduction and larval settlement to maintain populations, significant losses naturally occur with often rapid recruitment to re-establish local populations⁴.

The extent of the *Sabellaria alveolata* reef at Penrhyn Bay confers high value, considered to be of County importance for its own inherent value and the benefits it provides in stabilising habitat, creating habitat complexes and locally increasing diversity.

The modelled groyne design (refer to Figure 1b and Appendix A) encroaches on circa 0.5ha of intertidal boulder habitat. Approximately 0.15ha is considered to encroach on the *Sabellaria* biotope.

Consideration had been given to modelling a westward shift of the structure by 20m. A shift of the structure west to reduce direct impact on *Sabellaria* area means that additional volume of beach nourishment is required in the western embayment to maintain a stable beach against predominant wave conditions. The predominant wave conditions determine the shape of the beach.

Repositioning the groyne 15-20m west has little impact on the *Sabellaria* habitat loss, reducing footprint overlap by only 0.03ha; i.e. a 0.12ha overlap remains. The additional beach nourishment material required to maintain a stable beach is estimated at 10,000m³ and would cover an additional 0.12ha of sandy beach amenity. This change would increase the overall cost by £400,000 making it unviable. Shifting the groyne structure 40m west to reduce almost entirely the direct impact on *Sabellaria* would likely result in more than twice the additional

³ Typical characteristics of an 'r-selected' species include: rapid reproduction, short lifespan and high dispersal potential (Krönke, 1990; Niermann et al., 1990). 'r-selected species', also called r-strategist, species whose populations are governed by their biotic potential (maximum reproductive capacity, r). The production of numerous small offspring followed by exponential population growth is the defining characteristic of r-selected species.

⁴ JNCC, 2016. UK Biodiversity Action Plan Priority Habitat Descriptions. *Sabellaria alveolata* Reefs

volume of beach nourishment and cost, but more importantly would not be effective as coastal defence and not achieve the necessary objectives.

Considering *Sabellaria* density and quality is poorer in the affected location, a significant impact on the population of the species is not considered likely. Furthermore, the best quality habitats to the east of the boulder habitats will remain unaffected by direct effects of the scheme.

No *Sabellaria* will be affected by the proposed beach nourishment as this activity is proposed beyond the southerly limit of *Sabellaria*. Commonly occurring species will be affected by the beach nourishment; an estimated 4,000m² of habitat may be lost to beach nourishment.

6.2 Indirect Effects

The risk of a pollution incident during construction will require mitigation and integration into the appointed Contractor's Construction Environmental Management Plan (CEMP). Similarly, measures will be required to prevent the tracking of vehicles or storage of materials on or near sensitive habitats.

Changes to coastal process following installation of the groyne are considered to be beneficial in managing existing sediment budgets and reducing the exposed nature of the site, which is considered will support more robust growth of *Sabellaria* through reduced erosion. During the operational phase, trampling, littering and fouling effects would need to be addressed to avoid increased visitor numbers leading to a deterioration in habitat quality.

7 Preliminary Mitigation

7.1 Direct Effects

Noting the inclusion of *Sabellaria* on the Priority Habitats list, and the duties imposed on CCBC to conserve and enhance biodiversity, impacts on *Sabellaria alveolata* are to be mitigated in accordance with the mitigation hierarchy: avoid, cancel, reduce or offset adverse effects.

It was apparent that rock armour (eastern and western breakwaters) provides suitable attachment material and hydrological conditions to support the active growth of *Sabellaria alveolata* colonies. The breakwaters were also observed to support better quality aggregations than the more exposed boulder area. The addition of hard substrate in the form of the extant breakwaters has already increased local biodiversity and actively manage local coastal processes to favour increased intertidal biodiversity.

Direct loss of *Sabellaria* and Intertidal Boulder Habitat is considered to be directly offset by the provision of the rock armour units which create new attachment substrate for colonisation with similar habitat complexity. Without mobility, reduced exposure, abrasion and smothering risk, the rock armour habitat is likely to lead to enhanced abundance and support the growth of robust and healthy *Sabellaria* aggregations that will increase local fecundity, supporting natural regeneration of *Sabellaria* in locations benefiting from the improved coastal processes delivered by the groyne. In time, the cobbles installed as beach nourishment may support further colonisation by *Sabellaria*, extending the reach of the boulder habitat.

Given the ephemeral nature of *Sabellaria* colonies, a pre-construction condition survey is advised prior to construction (including temporary works) to enable pre- and post-construction monitoring of *Sabellaria* extent and condition, in addition to wider biotopes, to inform subsequent coastal defence schemes.

7.2 Indirect Effects

Adherence to the Guidelines for Pollution Prevention⁵ will be essential to avoid impacts on sensitive marine habitats in the event of a pollution incident. Mitigation measures are also recommended to avoid access to sensitive habitats where trafficking of vehicles may directly impact *Sabellaria alveolata* colonies or the Intertidal Boulder communities; consideration of appropriate fencing may be required pending design details.

A Coastal Water Framework Directive (WFD) Compliance Assessment will be undertaken to confirm the design and construction methods will not lead to a deterioration in WFD status or prolong the attainment of targeted objectives.

⁵ <http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/>

Operationally, information boards are recommended to inform local residents and visitors of the presence, importance and fragile nature of the *Sabellaria alveolata* reefs. Education should reduce trampling effects and combined with the provision of additional refuse (including dog waste) and recycling bins, will support an improvement of local habitat quality.

Since works are proposed within the marine environment, it is recommended that a Biosecurity Risk Assessment is prepared in advance to avoid the risk of introduction of marine INNS.

A section of the North Wales Important Bird Area is located behind the existing cobble ridge. Temporary hoarding is recommended during any construction works required between the ringed plover breeding season of May – August inclusive to avoid disturbance. Where practicable, all activities required in the vicinity of the breeding area are to be scheduled outside the breeding season. Permanent screening is recommended to be integrated into the scheme design to avoid disturbance from promenade users, and appropriate exclusion and signage on the beach-side breeding area. Enhancement of the breeding habitat should be integrated into the design and landscaping solutions following advice from an experienced ornithologist.

7.3 Enhancement

It is strongly recommended that enhancement measures are considered for integration into the detailed design.

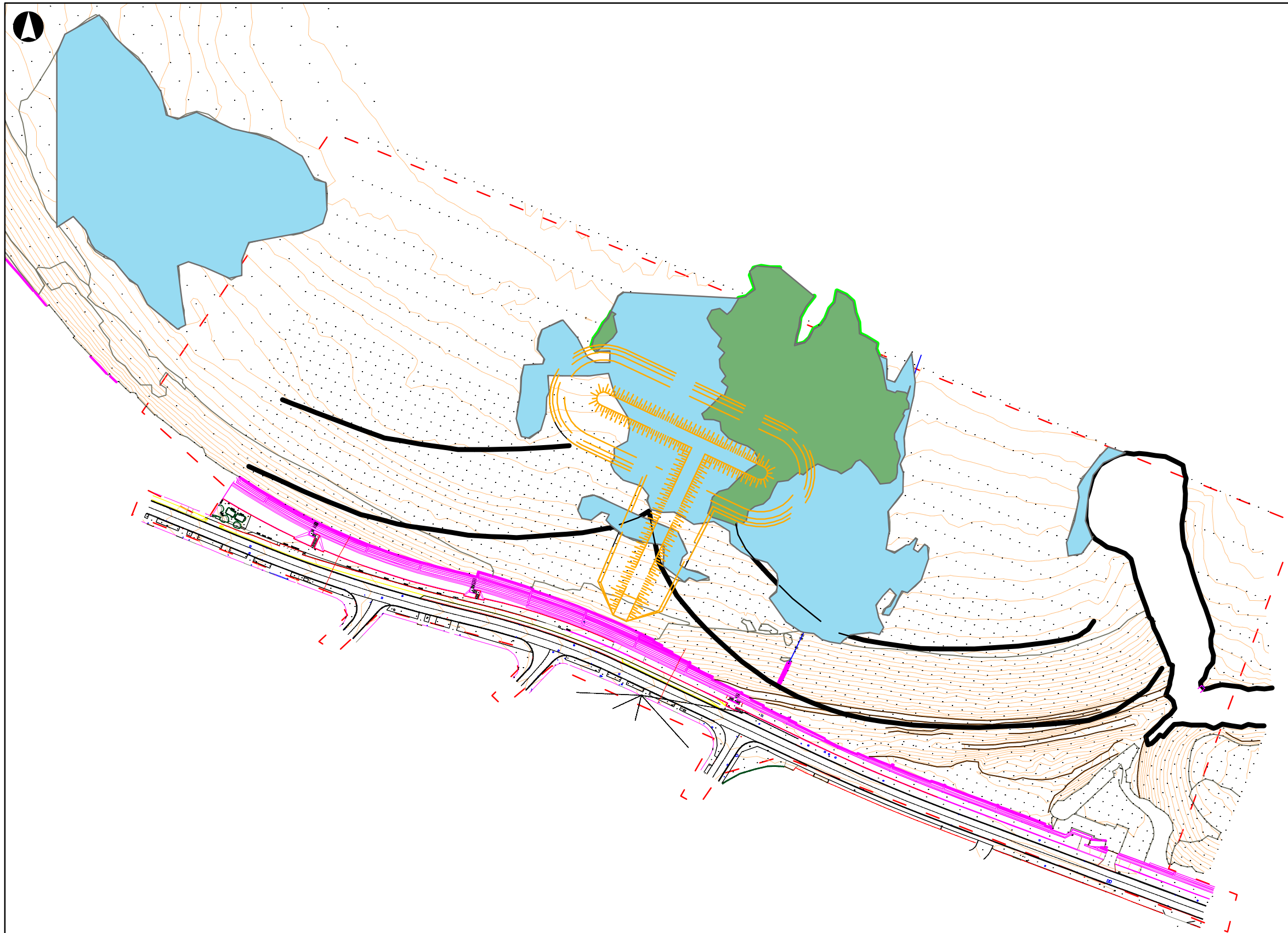
Six tidal pools are to be created at the toe of the groyne at the low tide area. These concrete tidal pools will retain water at low tide and improve the biodiversity of the groyne through an increase in habitat heterogeneity. Integration of units such as Econcrete: Tide Pool Armour or similar are recommended as they can be integrated into the detailed design whilst concomitantly delivering marine biodiversity enhancement. Should beach nourishment levels allow, installation of Vertipools (or similar) on the front face of the stepped concrete revetment would provide additional offsetting / enhancement. Installation in groups of five spaced at c. 50m intervals would provide clusters of biodiversity enhancement further up the beach and provide an educational interest and resource for beach users.

Whilst operational impacts are scoped out from this assessment, noting that no maintenance activities are proposed, it is worth noting that changes to coastal process following installation of the groyne are considered to be beneficial in managing existing sediment budgets and reducing the exposed nature of the site, which is considered will support more robust growth of *Sabellaria* through reduced erosion.

Appendix A

Intertidal Biotope Plan

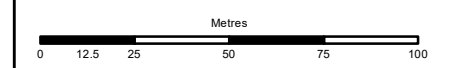
A1 *Sabellaria alveolata* and Intertidal Boulder Biotope Plan



- Legend
- Proposed Groyne Outline
 - Proposed Beach Nourishment Outline
 - COVER
 - Sabellaria alveolata (honeycomb worm) reefs
 - Intertidal boulder communities
 - - - Works Area

001	2021-09-21	VS	SC	GM
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Issue	Date	By	Chkd	Appd
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ARUP

4 Pierhead Street
Cardiff CF10 4QP
Tel +44 29 2047 3727 Fax +44 29 2047 2277
www.arup.com

Client
CONWY COUNTY BOROUGH COUNCIL

Job Title
PENRHYN BAY COASTAL DEFENCE IMPROVEMENTS

SABELLARIA ALVEOLATA & INTERTIDAL BOULDER COMMUNITIES, PENRHYN BAY

Scale at A3
1:2,000

Job No 282129-50	Drawing Status FINAL
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Drawing No 001	Issue 001
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Appendix B

Intertidal Biotope Survey Photographs



Figure 1: Top Left: Sea defence and wave return wall; view west. Top Right: Sea defence and wave return wall; view east. Bottom Left: Core scheme area, boulder habitat (darker habitat) seaward. Bottom Right: Intertidal boulder habitat with *Sabellaria* crust; beyond groyne footprint, view east.



Figure 2: Top Left: Intertidal boulder habitat with *Sabellaria*; beyond groyne footprint, view south. Top Right: Intertidal Boulder habitat; main area of groyne encroachment (not foreground), largely devoid of *Sabellaria* except for narrow band north to south. Bottom Left: Sewerage Pipeline / Outfall. Bottom Right: Eastern extent of rock groyne.



Figure 3: Eroded *Sabellaria alveolata* aggregations.



Figure 4: Higher Quality *Sabellaria alveolata* aggregations eastwards. Top Left: Eastern Boulder Area adjacent to pipeline. Top Right: Quality colonies in lee of pipeline. Bottom Left: Encrusted Boulder. Bottom Right: Aggregations in Eastern Breakwater rock armour.



Figure 5: Top Left: Important Bird Area – Breeding Ringed Plover. Bottom Left: Ringed Plover Foraging. Top Right: Main access via Glan-y-Mor Road / Marine Drive. Bottom Right: Likely construction access route to beach.