

**Our ref: NI2422 Largs - EIA Screening**

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Date: 20 May 2021

Marine Scotland Licensing Operations Team  
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By Email: ms.marinelicensing@gov.scot

Dear Sir / Madam,

**Request for an EIA Screening Opinion under Regulation 10(1), Part 2 The Marine Works (EIA) (Scotland) Regulations 2017 (Further Information)**

**Proposal: Replacement Seawall, Largs Bay, Largs, North Ayrshire**

Further to your correspondence dated 9<sup>th</sup> December 2022, please find enclosed the additional information requested in support of the request for a formal screening opinion from Marine Scotland in respect of the above proposal.

In summary, North Ayrshire Council intend to replace the existing seawall in Largs, which runs along the northern seaward section of Largs Bay, for approximately 300m between Aubery Crescent and the existing RNLI slipway. The existing seawall structure is failing, with visible signs of corrosion, undermining of its toe, and unsafe stepped access in places.

The proposed design solution comprises the replacement/encapsulation of the existing 300m long seawall. Precast concrete caissons will be installed along the front of the existing seawall and backfilling with granular material between the new units and existing structure. This will be surfaced and tied into the existing promenade. Rock armour will be provided at the toe of the units as scour protection to the new structure, and new steps will be provided to facilitate access. Further detail on the proposal is provided in **Appendix A**.

The proposal will involve construction works within the marine area, below the Mean High Water Springs (MHWS), and a Marine License will be submitted to seek consent for these works. Construction works will also be required in the terrestrial area above Mean Low Water Springs (MLWS). A corresponding request for an EIA Screening Opinion has been issued to North Ayrshire Council Planning Department, under Regulation 8 of the Town and Country Planning (EIA) (Scotland) Regulations 2017.

The extent of the works within the marine and terrestrial areas is shown on **Drawing M0735-RPS-ML-XX-DR-C-0300 General Arrangement**, within **Appendix B**.

Following the Information Request, the following documents are also enclosed as supporting evidence:

- **Appendix C:** Further Information (Addendum) on Construction Methodology and Coastal Processes
- **Appendix D:** Marine Biodiversity Desktop Report
- **Appendix E:** Intertidal Survey and Report

Under Regulation 10(2) of the EIA Regulations, this request must include the following:

- a) A description of the location of the proposed works, including a site location drawing. This drawing is included in **Appendix B**.
- b) A description of the proposed works including:
  - i. A list of all regulated activities proposed.

## Our ref: NI2422 Largs - EIA Screening

- ii. A description of the physical characteristics of the proposed works
- iii. A description of the site location regarding the environmental sensitivity of the geographical areas likely to be affected.
- c) A description of the aspects of the environment likely to be significantly affected by the proposed works.
- d) A description of any likely significant effects of the proposed works on the environment, resulting from:
  - i. The expected residues and emissions and the production of waste, where relevant.
  - ii. The use of natural resources, in particular soil, land, water, and biodiversity.
- b) A description of any features of the proposed works or measures envisaged to avoid or prevent significant adverse effects on the environment.

This information is provided in Appendices A – E. It is considered that the proposed works do not constitute a Schedule 1 Development as defined in the Regulations. The proposed works fall under Schedule 2 Development under category 10 (m) *‘Coastal work to combat erosion and maritime works capable of altering the coast through the construction e.g., moles, dykes, jetties, and other sea defence works, excluding maintenance and reconstruction of such works.’* As such, further consideration of the proposal is required in respect of the criteria outlined in Schedule 3 of the EIA Regulations, namely:

- The characteristics of the works
- The location of the works
- Characteristics of the potential impact

It is concluded that the proposed works are of a scale, location and nature which are not likely to have a significant effect on the environment, and therefore an EIA is not required.

In accordance with Regulation 10, Part 2 of the EIA Regulations, we look forward to receiving the Screening Opinion within the allocated timeline (or as varied in writing). Should further information be required, please do not hesitate to contact me.

Yours sincerely,

for RPS Ireland Limited (NI)



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Appendix A



## 1 Site Location & Project Description

### 1.1 Site Location

The Largs Promenade extends from Largs Harbour at the south to the mouth of the Noddsdale Water at the north, with a wall along the seaward length of the promenade transitioning to a sea wall from the RNLI slipway for approximately 300m north. Largs is a coastal town, which is located due west of Glasgow, within North Ayrshire Council area. The general location of the proposed works is shown below, in Figure 1.



Figure 1: Location of proposed replacement of existing seawall, Largs Bay

### 1.2 Project Description

#### 1.2.1 The Existing Seawall Structure

The existing seawall at Largs retains the promenade and protects the shore side buildings and infrastructure from wave action and coastal erosion. It is c.300m in length, with the height varying along its length following the profile of the beach below. The retained height varies from approx. 1.0m to 4.0 m, and the top level of the seawall is approx. +5.16mCD along the full length. The public have access to the seawall and the beach below when the tide allows.

It was constructed from reinforced concrete in the 1970s as a replacement facing for the old seawall. This 1970s facing was covered in a gunite (sprayed concrete) facing in more recent years, but this has since failed and become detached from the 1970s concrete wall. The gunite was partially removed in 2018.

The images in Figures 2 and 3 show the existing seawall, and the different profiles along its length.





Recent surveys have indicated that the existing seawall structure is deteriorating in several ways:

**Concrete Deterioration:** There is clear deterioration of the gunite facing concrete, where it remains attached to the existing wall face. There are high levels of corrosion of the existing wall reinforcement, with patches of exposed reinforcement visible throughout the length of the wall. High levels of chloride ingress to the existing concrete wall have also been identified.

**Undermining:** The seawall is undermined along a section of wall (approx. 12m in length) where the toe is exposed, and no sheet piles were installed. This undermining is the likely cause of loss of material and subsidence of the promenade surface in recent years.

**Steps:** There are three sets of steps ranging in height from 1.8m to 3.1m located along the length of the seawall. These are unsafe for use and are currently fenced off.

### 1.2.2 Proposed Seawall Replacement Works

The proposed seawall replacement scheme comprises the replacement/encapsulation of the existing 300m long seawall. The preliminary proposal is outlined in detail on **Drawing MO735-RPS-ML-XX-DR-C-0300**, which is in **Appendix B**. It consists of the following main elements:

- Controlled removal of existing steps which are unsafe for use.
- Installation of precast concrete caissons along the front of the existing seawall to act as a foundation to facilitate the placement of precast concrete seawall units.



- Placement of granular infill in the concrete caisson units,
- The precast caisson base unit will be filled with granular material. The base will be topped with a mortar layer, with the concrete seawall units then installed (Example of proposed seawall units shown in Figure 4). The precast units will be shaped for them to interlock, then grouted and sealed to both sides, thus avoiding the requirement for dowels or protruding reinforcement
- Placing of granular backfill between the front face of the existing seawall structure, and the rear face of the new precast structure. Suitable drainage to be provided within the backfill. Surfacing of backfill with concrete or asphalt pavement to tie into existing promenade. New / reinstatement of handrail along the promenade.
- Placement of rock armour scour protection in-front of the new precast concrete seawall units to prevent undermining of the toe of the new structure.
- Installation of steps at required intervals along seawall structure.

The form of foundation and structure varies along the length of the seawall to account for the varying profiles of the existing seawall structure. The preliminary sketches in Figures 5 and 6 show indicative cross sections of the proposed construction<sup>1</sup>.



Figure 4: Example of proposed precast seawall units

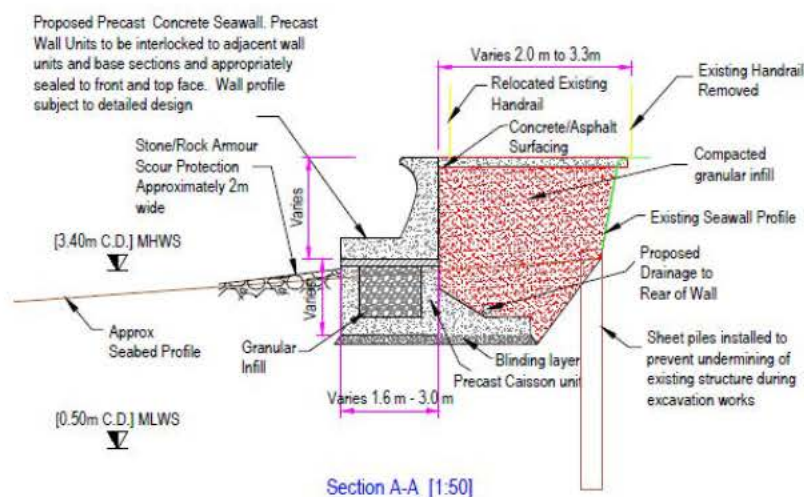
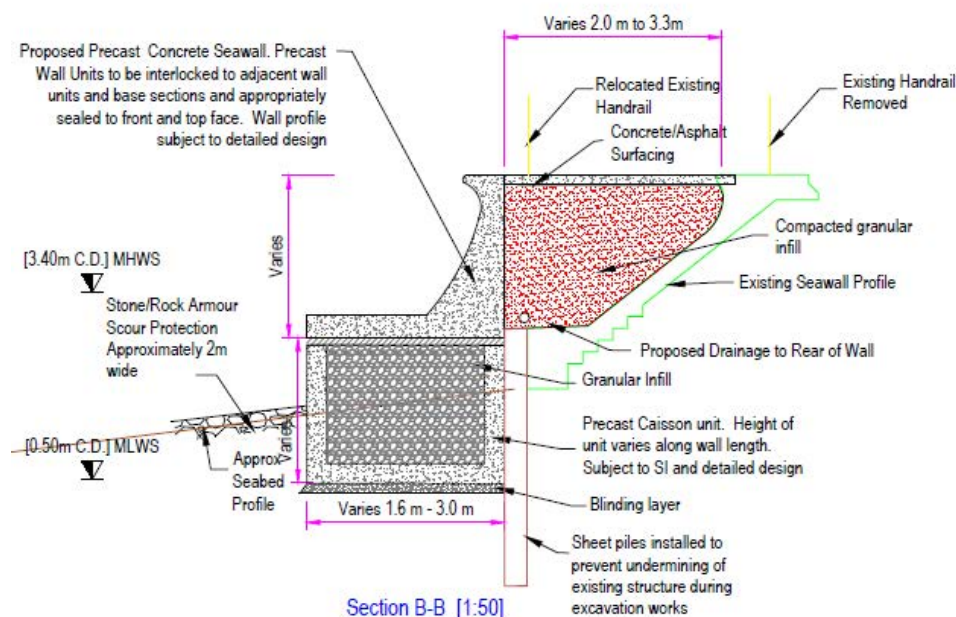


Figure 5: Proposed section for Northern and Southern Section of Seawall

<sup>1</sup> It should be noted that these designs are at a preliminary design stage only and will be subject to detailed design pending results of further investigation works.



**Figure 6: Proposed section for middle section of proposed Seawall**

The height of the replacement seawall structure will be as per the existing seawall (refer to Section 1.2.1). The length of the proposed seawall will be 300m, and the footprint of the structure covers 0.24ha / 2400 sqm.

The red line boundary of the proposed works identified on **Drawing MO735-RPS-ML-XX-DR-C-0300**, in **Appendix B** totals 0.3ha in area. The area of proposed terrestrial works above the Mean Low Water Springs (MLWS) is c.0.297ha, and the area of proposed marine works below the Mean High Water Springs (MHWS) is c.0.227ha.

### 1.2.3 Proposed Construction Methodology

A summary of the likely project phases is set out below<sup>2</sup>.

#### Demolition / Site Clearance

There will be a temporary site compound in the immediate vicinity of the site to support the proposed development during the construction period. The location of this has not yet been determined, however one option may be at the northern end of the seawall close to Aubrey Crescent. The area of works along the promenade and beach will be fenced off, and initial works will see the partial removal of the existing concrete steps with a rock breaker mounted on small excavator working from the beach. The existing handrail along the promenade will be removed and stored for reuse. This phase is likely to take approx. 3 weeks.

#### Protection Works for the Existing Seawall structure

Sheet piles will be installed to the front edge of the toe along the length of the existing wall to provide temporary protection against undermining whilst excavations are being carried out. These will be installed using a vibratory hammer where possible. This phase is likely to take approx. 3 weeks and would run concurrent to removal of the steps.

#### Excavation

<sup>2</sup> Note, this is based on the preliminary design and subject to change following the results of the site investigations.

Beach material will be excavated to facilitate the installation of the concrete caisson units using a small excavator working from the beach to prevent settlement into the sand. The material is likely to be taken offsite for disposal to a licenced facility or beneficially re-used (subject to testing to confirm suitability of material, and identification of a suitable receptor). This phase is likely to take c.9 weeks.

### **Seawall Installation**

The toe of the proposed replacement wall will be excavated to low water level with a small excavator working from the beach, and bedding material added (lean mix concrete). The caisson units will be installed on top of the material by a crane or telehandler on the promenade or beach and filled with granular material. The precast concrete seawall unit will be placed on top and grouted into place. The space between the replacement seawall unit and the face of the existing seawall will be backfilled and compacted by an excavator working from the promenade, then surfaced with asphalt / paving to tie into the existing promenade, with the existing handrail reinstated. Steps and a new handrail to be installed. The precast installation is likely to take c.9 weeks, with the backfilling and paving taking c.8 weeks.

Scour protection will be installed with suitably sized/graded rock placed in layers on the beach surface to the front of the precast concrete seawall, by an excavator working on the beach area. The timing of each phase of works will be subject to tidal restrictions on working.

## **2 Screening Information – Schedule 3 Criteria**

### **2.1 Characteristics of Works**

- **Size & Design of Proposed Works**

The size and design of the proposed works has been outlined in Section 1.2 of this Appendix. The size and design of the replacement seawall is similar to the existing structure, in terms of length, height, depth and material, and as such is considered proportionate and appropriate for the area. There is likely to be a slight loss of intertidal area immediately in front of the existing seawall, however this will not impact on coastal processes. When complete, the replacement seawall will optimise protection of the coastline and promenade against wave action. New steps to the beach / intertidal zone will enhance accessibility to this amenity area for visitors and residents of the area.

- **Cumulative Impacts**

In respect of potential cumulative impacts with other projects, a search was carried out on the Marine Scotland Marine License Portal and the North Ayrshire Council Planning Portal to identify consented projects and major planning applications. The following project was identified within a 5km radius, for the purposes of considering potential cumulative issues:

***Marine License Application 00000917: Removal & replacement of steel piles within the marina walls, Largs Marina (Applicant: Largs Yacht Haven Ltd). Although not consented yet, the documents indicate that the proposed works will be completed by May 2022.***

It is considered that the main potential for cumulative impact in the context of the proposed works, is with regards to noise during the construction period. Both projects involve piling over a short period of time during the construction process. However, given that the proposed pile replacement in Largs Marina is due for completion prior to summer 2022, this will be unlikely to coincide with the commencement of works for the proposed replacement seawall which is likely post-summer 2022 (subject to consenting). Therefore, no cumulative impacts are anticipated.

- **Use of Natural Resources**

Regarding the use of natural resources, the proposed works are located along the coastline, and will occupy a stretch of intertidal zone comprising water and beach sediment. There is no water requirement or abstraction required for the study, and the works will not impact on the hydrodynamic / coastal processes.

The natural resources to be used in the proposed works are granular fill material of various sizes, rock, and concrete (cement, water and aggregates of sand, gravel and stone). These will be sourced from authorised quarries and transported to the site by road.

In terms of biodiversity, it is not anticipated that there will be significant impacts on the terrestrial ecology or ornithology (based on the bird surveys carried out summer 2021). Regarding marine biodiversity, there is limited information available on the ecology of this intertidal and supralittoral shoreline, and as such, potential



impacts on intertidal habitats is unknown at this stage. It is proposed to carry out an intertidal benthic ecology survey and associated Preliminary Ecological Appraisal to explore this further.

- **Production of Waste**

The proposed works will generate waste during the construction phase. Beach material will be excavated to facilitate the installation of the concrete caisson units using a small excavator working from the beach to prevent settlement into the sand. The material is likely to be taken offsite for disposal to a licenced facility. However, consideration will be given to the potential beneficial reuse of this material within a suitable scheme, for example beach renourishment. However, this is subject to the results of the sediment testing (site investigation works) to confirm suitability of material, and the identification of a suitable receptor.

There will also be small amounts of construction and demolition waste material generated from the removal existing sea wall and its steps. This will be removed by a licensed contractor to an authorised facility. A site waste management plan (SWMP) will be produced to assist with the sustainable disposal bulk waste materials which cannot be reused as aggregate. This plan would be based on the principles of the waste hierarchy of the reduction, reuse, recycling and disposal of waste, in that order of preference. Except for self-contained toilet units during construction, within the site compound, no other wastes will be generated.

- **Pollution & Nuisances**

There may be the potential for short term and localised impacts during the construction period in terms of noise nuisance, dust, and traffic movements. In regard to noise, there are sensitive residential receptors within the surrounding built up urban areas, immediately adjacent to the proposed works (within 150m), which could be impacted during the construction phase. The pilling and demolition activities will be temporary, over a short period of time, whilst the use of plant and machinery during the construction period may create noise nuisance. A noise impact assessment will be carried out to explore the likely effects further, and any mitigation measures identified will be incorporated into the Construction Environmental Management Plan.

Construction activities can generate significant quantities of airborne particulate matter as a result of vehicle movements and internal site manoeuvres, movement and tipping of material, breaking up of materials, use of fine grained materials as well as from the exhaust of diesel-powered machinery. These activities have the potential to cause dust to settle on local properties and vehicles. It is also recognised that along the coastline in Largs, salt spray can give rise to elevated levels of fine particulate matter (PM<sub>10</sub>). Given this, there is potential for construction works to exacerbate dust impacts. A construction dust assessment will be undertaken to explore these impacts further, and any mitigation measures identified will be incorporated into the Construction Environmental Management Plan.

There will be additional traffic movements to facilitate the import of the precast concrete units, and the removal of the beach sediment. These will be limited to short term impacts within the construction period and carefully planned to ensure minimal impacts on the surrounding network.

The proposed works will take place within the intertidal zone, and there is the potential for pollution impacts on the water environment, for example with refuelling areas, light emissions, dust etc. However, these impacts will be reduced through aligning practices with well-established working practices and procedures for working in / close to marine environments including PPG6, BS5228 1:2009, C584, GPP8, PPG3, GPP2. A key best practice document will be Engineering in the Water Environment Good Practice Guides published by SEPA,

Due to the sensitivity of the environment, the appointed Contractor will be required to prepare a Construction Environmental Management Plan (CEMP) as indicated above. This Plan will provide sufficient measures and controls to ensure full environmental protection during the works.

- **Major Accidents and/or Disasters**

The risks of major accidents or disasters in respect of the proposed works are not considered significant.

- **Risks to Human Health**

The proposed works are likely to cause temporary disturbances to residents, visitors, local businesses, beach goers, and recreational users of the immediately adjacent marine area. However, the works are necessary for the long term use and enjoyment of the Largs promenade. Except for the temporary disturbance during the construction works, there will be no social changes or changes in demographics, traditional lifestyle, and employment.

## 2.2 Location of Works & Environmental Sensitivity

- **Land Use**

The proposed works are located along a small section of the eastern Scottish coastline at Largs in North Ayrshire. The site is located within the heart of the town centre and incorporates a strip of beach along the intertidal zone, as well as the existing seawall and steps.

The existing seawall supports a popular pedestrian promenade which runs alongside it in parallel, separated only by a handrail. This space is paved / hard surfaced, and is interspersed with amenity grassed areas, and is well used by residents and tourists alike. There are buildings and properties, including residential, commercial and community uses within 300m of the site location. The RNLI slipway is located at the southern end of the replacement wall, which will not be impacted by the proposed works.

The proposed use does not conflict with or impact any land use planning or marine planning uses and is considered an established use within this area. The introduction of new safer steps from the promenade down to the beach, enhancing accessibility is a positive benefit to the area.

- **Natural resources**

The proposed works comprise a replacement seawall along the Largs promenade. As a seawall is already present on the site, the replacement structure of similar materials and specification will not impact the absorption capacity of the natural environment, or the quality / regenerative capacity of the area. Further surveys of the intertidal zone will be undertaken to identify the nature and value of any ecological habitat which will be impacted by the project.

- **Landscape & Visual Resources**

In regard to landscape, Largs promenade is an important seafront amenity, with car parks, walks, green amenity space, and recreational areas, along with other man-made features along the coastline (including marinas, jetties, slipway and buildings).

Largs Bay is located within the Firth of Clyde Seascape, and provides an important setting for the town. Great Cumbrae is dominant within seaward views, as well as Arran and the Isle of Bute which is located further west. The proposal is located in the raised beach coast landscape character area, along the developed coastline.

The steep topography of the North Ayrshire Hills forms the backdrop to the town. There are various local landscape character areas identifiable throughout the surrounding landscape, namely the Estate Landscape, Pastoral Glen, Lowland Hill. Views to / from Knock Castle are important. The landscape strategy identified in the Local Development Plan recommends the preservation of the rural landscape setting.

- **Environmental Designations**

The site location is within a coastal zone, which defines the edge of the populated urban area of Largs Town. It straddles both the terrestrial and marine environment. A review of all statutory designations within 5km was undertaken to understand the sensitivity of the immediate environments.

- Largs Coast SSSI: Non marine Devonian intertidal rock exposure; 2km northwards
- Largs Coast Geological Conservation Review Site
- Southannan Sands SSSI: Intertidal marine habitats and saline lagoons: Sandflats 5.5km southwards
- Ballochmartin SSSI: Coastland habitat, 2km southwest
- Kames Bay SSSI: Coastland habitat, 6km south west
- Renfrewshire Heights Special Protection Area: Designated for the Hen Harrier
- Renfrewshire Heights SSSI: Designated for the Hen Harrier
- Inner Clyde SPA: Designated for the Hen Harrier
- Clyde Muirshiel Regional Park: 1km eastwards

There are two Nature Conservation Marine Protected Areas (MPAs):

- South Arran: Designated for various marine habitats 30km southwards
- Upper Loch Fyne & Loch Goil: Designated for various marine habitats 30km northwards

## Our ref: NI2422 Largs - EIA Screening

The proposed works are not located within or close to active aquaculture or shellfish farms, with the nearest c.3km away.

- Ornithology**

There are several statutory and non-statutory environmental designations close to the proposed works, which are designated for various birds and seabirds. To examine the potential impacts on the bird population, monthly intertidal and nearshore bird surveys were carried out between April – September 2021 covering the intertidal and nearshore area adjacent to the proposed replacement sea wall with a 500m buffer either side.

The surveys covered a range of different tidal conditions (high, low and mid-tide; spring and neap tides) throughout the survey programme, with the surveyor using the high tide (core count) methodology of the BTO/JNCC/RSPB/WWT WeBS scheme. The survey confirmed the following species:

| Species                  | Conservation status |
|--------------------------|---------------------|
| Black-headed Gull        | Amber; SBL          |
| Cormorant                |                     |
| Canada Goose             |                     |
| Common Gull              | Amber               |
| Eider                    | Amber               |
| Great Black-backed Gull  | Amber               |
| Goosander                |                     |
| Greylag Goose            | Amber               |
| Common Guillemot         | Amber               |
| Gannet                   | Amber               |
| Grey Heron               |                     |
| Herring Gull             | Red; SBL            |
| Lesser Black-backed Gull | Amber               |
| Mallard                  | Amber               |
| Mute Swan                | Amber               |
| Manx Shearwater          | Amber; SBL          |
| Oystercatcher            | Amber               |
| Red-breasted Merganser   |                     |
| Ringed Plover            | Red                 |
| Shag                     | Red                 |
| Shelduck                 | Amber               |
| Black Guillemot          | Amber               |

SBL - Scottish Biodiversity List species,

Red, Amber - Red or Amber listed on the UK Birds of Conservation Concern List

There are no Local Nature Reserves or National Nature Reserves within 5 km of the proposal.

- Cultural Heritage**

Largs is a coastal town with a variety of heritage features throughout the urban area. The Historic Environment Scotland Portal was examined to determine the location of any valuable heritage features were located in proximity to the site location. The following features were identified:

| Address  | Heritage Features                   |
|--|-------------------------------------|
| 8-22 Aubery Crescent Carlton Terrace (Even No's) | LB37149 Category B Listed Buildings |
| Aubery Crescent St Columbas Episcopal Church     | LB37148 Category B Listed Buildings |

There are no Conservation Areas, Scheduled Monuments or Historic Marine Protected Areas within or adjacent to the works.



- **Flood Risk**

The SEPA flood risk maps indicate that the location of the proposed works is susceptible to a medium - high likelihood of coastal flooding each year. This is confirmed in a recent Coastal Flood Risk Appraisal (RPS, 2020) which found this section of the coastline to be at significant risk from tidal inundation. It noted that the existing promenade has been inundated on no less than seven occasions between 1991 and 2020 due to the low lying nature of the promenade. A recent feasibility study by RPS identified that the most sustainable flood protection solution identified for this section was the construction of flood defences further inland in the form of a low lying wall (or similar). Given that the replacement seawall is similar in terms of its size, height and spec, it is not predicted to increase the existing level of flood risk.

## **2.3 Characteristics of the potential impact**

### **2.3.1 Human Environment**

The proposed works to repair the existing coastal protection features may cause a temporary disturbance to the closest residents, beach-goers, and local business users. However, the works are necessary to avoid erosion, protect the coastline, and loss of the coastal promenade amenity. There will be temporary disturbances for a duration of approximately 4-5 months, yet the works will result in the long-term positive benefits to the enjoyment of the promenade.

Sections of the promenade are likely to be closed or restricted during the construction period, however pedestrian access will be maintained where possible. Following construction, beach accessibility will be improved with the inclusion of new safe access from the promenade to the beach / intertidal zone.

There will be short term impacts on humans for the duration of the construction works. A number of mitigation measures will be put in place by the Contractor such as working times, control of dust and noise and general nuisance arising from the works.

### **2.3.2 Noise**

There will be temporary nuisance/disturbance noise and vibration impacts upon people and their properties during the proposed works, in particular the demolition and removal of the seawall steps, and the piling activities required to construct the replacement structure. & construction of the Sea Defence. There is potential for noise levels to be elevated during the daytime period at some locations during certain stages of the construction programme. A Noise and Vibration assessment will be completed to determine the likely noise and vibration impacts from the construction of the proposed development at the nearest noise sensitive receptors, with reference to BS 5228 Noise and Vibration Control on Construction and Open Sites.

As part of this, a detailed baseline noise monitoring survey will be completed to determine the noise environment in the vicinity of the proposed development. This will be used as a basis for determining the applicable construction limit and likely noise impact associated with the proposed development. Surveys will include daytime and night time monitoring at a number of residential receptor locations which will be agreed in advance with the Council. Baseline noise measurements will be made at a height of 1.2 – 1.5m above ground level. The weather conditions will be accordance with the requirements of BS7445: Description and Measurement of Environmental Noise and ISO 1996: Acoustics - Description, Measurement and Assessment of Environmental Noise. The parameters that will be recorded during each noise monitoring period include  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$ ,  $L_{A10}$  and  $L_{A90}$ .

Construction noise levels from the proposed works will be predicted and assessed in line with applicable noise limits as outlined in the relevant noise guidance documents. The likely construction activities to be assessed will include

- reference of the type of machinery and associated reference material.
- construction programme and phasing including locations in proximity to identified receptor locations.
- construction, including demolition activities duration including daytime and nighttime;
- construction traffic including HGVs throughout the construction programme

For the most part, noise generated through construction activities is likely to be continuous and low frequency but temporary and short term in nature. Whilst all care can be taken to reduce the negative impacts/disruption that works may have to the surrounding area and the people who live in it, completely eliminating all disruption is unlikely. The assessment will likely identify and recommend implementation of appropriate mitigation measures, during the construction phase and incorporated into the CEMP.

## Our ref: NI2422 Largs - EIA Screening

Further information in relation to noise associated with impact piling is provided in **Appendices C and D**.

### 2.3.3 Climate/Greenhouse Gases (GHGs)

GHG emissions may arise during the construction stage of the proposed works due to the following factors:

- vehicle movements arising from the delivery of materials to site.
- use of construction equipment and plant; and
- embodied carbon of the materials used to construct the proposed development.

A site waste management plan (SWMP) will be produced to assist with the sustainable disposal bulk waste materials. Construction and operational emissions of GHGs from the proposed development are temporary and not predicted to be significant.

### 2.3.4 Waste & Sustainability

The proposed development will create waste arising from construction activities, the demolition of the existing sea wall steps and removal of materials. A site waste management plan (SWMP) will be produced to assist with the sustainable disposal bulk waste materials including dismantled of hardstand, handrails and demolition concrete where this is not able to be reused as aggregate. This plan would be based on the principles of the waste hierarchy of the reduction, reuse, recycling and disposal of waste, in that order of preference.

Waste that is recyclable will be sorted on site. All waste materials to be either placed into the relevant storage disposal container situated within the main site compound or removed from site by the individual sub-contractor and disposed of in the appropriate manner. Significant effects on waste are not predicted.

### 2.3.5 Air Pollution & Dust

During the construction phase of the proposed works, potential short term temporary impacts arising from the proposed works are predicted. Construction activities can generate significant quantities of airborne particulate matter as a result of vehicle movements and internal site manoeuvres, movement and tipping of material, breaking up of materials, use of fine grained materials as well as from the exhaust of diesel-powered machinery. These activities have the potential to cause dust to settle on local properties and vehicles. It is also recognised that in coastal areas such as Largs, salt spray gives rise to elevated levels of fine particulate matter (PM10). Given this, there is potential for construction works to exacerbate dust impacts.

A construction dust assessment will be undertaken using the *“Guidance on the assessment of dust from demolition and construction”*, published by The Institute of Air Quality Management (IAQM) in February 2014, to conduct a construction dust risk assessment, to determine whether air quality impacts are likely to arise from the construction of the proposed development. Under the IAQM guidance, since there are existing human receptors within 350m of the boundary of the site boundary and within 50m of the route used by construction on the public highway, a detailed assessment will identify potential dust impacts.

The assessment will determine the magnitude of the anticipated works for each of the four main dust creating activities on-site – demolition, earthworks, construction and construction vehicle tracking out of the site. The approach taken to the assessment of dust impacts is a risk assessment with best practicable means recommended where risk of soiling from dust is identified. Any mitigation measures arising from this assessment will be incorporated into the CEMP. No pollution and / or nuisances are expected during the operational phases.

### 2.3.6 Biodiversity – Terrestrial Ecology

Terrestrial habitats within the footprint of the landward elements of the proposed works are limited to areas of amenity grass and street trees, set amongst the paved promenade. These are of limited ecological value and provide limited habitat potential for protected species. As such, significant environmental effects on terrestrial habitats and species of the area are not anticipated to occur.

### 2.3.7 Biodiversity – Ornithology

The surveys revealed relatively low numbers of birds present on the open water in front of the proposed works, with species present being relatively common birds. The only location where birds were consistently clustered

## Our ref: NI2422 Largs - EIA Screening

was the mouth of the Gogo Brun, on the inter-tidal habitat. Although this location is relatively close to the proposed works, and some birds may be disturbed, given the current background levels of traffic and other activity along the seafront, disturbance is not considered likely to be significant in the long term. Gulls were the most numerous species group, with herring gull present in largest numbers.

Black guillemots were recorded during the surveys confirming their presence in the area. As this species is known to nest within sea wall structures, a key recommendation is that pre-construction surveys should be carried out before the construction takes place to avoid infringement of the Wildlife and Countryside Act.

The hen harrier is the qualifying species of the Renfrewshire Heights Special Protection Area (SPA), which lies almost 5km from the study area. The Arran Moors SPA is located approximately 22km from the study area, and its qualifying feature is also the Hen Harrier. The study area does not provide a suitable habitat for this species, and as such no likely significant effects on these SPAs are anticipated.

Redshank is the qualifying feature of the Inner Clyde Special Protection Area (SPA). However, it is considered sufficiently distant from the study area with no connectivity, and as such, there are no likely significant effects anticipated on the SPA because of the proposed works.

### 2.3.8 Biodiversity – Marine Ecology

The works are proposed to be located on an area of intertidal and supralittoral shoreline immediately adjacent to the existing seawall. This area is not part of any site designated for its nature conservation value in the Local Development Plan for North Ayrshire or Scotland's National Marine Plan. Limited information on the benthic ecology within the area means that the sensitivity of these intertidal habitats is unknown, however the habitat is likely to be disturbed due to normal amenity and recreational activities. In the absence of any survey information to discount the presence of a Priority Marine Feature (PMF), it is possible that a small amount of permanent habitat loss of the upper shoreline could occur in a PMF and as such, an intertidal benthic ecology survey and associated Preliminary Ecological Appraisal will be undertaken, to address the requirements of Policy GEN 9, National Marine Plan.

Please refer to **Appendices C, D and E** for further information on this aspect.

The waters around Largs and more widely in the Firth of Clyde are utilised by numerous marine mammal species, including both cetaceans and seals, marine mammals are protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Common and grey seals, harbour porpoise, and both common and bottlenose dolphin are known to occur in the Firth of Clyde. Given however that the works are proposed to be undertaken during states of the tide when the beach is accessible (i.e., at low tide), it is not anticipated that significant underwater noise will be generated as the medium of seawater will largely be absent to transmit sound to deeper waters. As such, significant environmental effects on the marine mammals (and natural fish populations) of the area are not anticipated to occur.

In relation to Habitats Regulations Appraisal (HRA), the proposed works must be screened for appropriate assessment to determine whether likely significant effects on SACs, SPAs or Ramsar sites as part of the UK national site network can be excluded in the absence of mitigation measures. A report to inform screening for HRA shall be prepared and submitted with the applications for consents.

### 2.3.9 Coastal Processes

There will be no impact on the coastal processes of the area from the proposed seawall replacement works. There are currently hard defences along this section of the Largs coastline and the proposed replacement is of similar construction, levels, and wave reflective properties. Given that the replacement seawall will be placed immediately in front of the existing seawall, this new construction will not change any of the wave, tide, or sediment transport regime along this section of the coast. As such, no likely significant effects on coastal processes in the area are anticipated, as a result of the proposed works.

Please refer to **Appendix C** for further information on this aspect.

### 2.3.10 Flood Risk

The location of the proposed works along the coastline within Largs Bay is already protected by an existing similar seawall defence. The SEPA flood maps indicate the area is susceptible to a medium-high risk of coastal flooding. Previous studies have indicated that the area is regularly inundated due to the low lying nature of the promenade. However, North Ayrshire Council are currently undertaking feasibility studies to examine in



## **Our ref: NI2422 Largs - EIA Screening**

detail the nature and extent of flood risk, with a view to implementing an appropriate flood defence system. Initial options indicate that the most sustainable flood protection solution identified for this section was likely to be the construction of flood defences further inland in the form of a low lying wall (or similar). This scheme will be taken forward in the future as a separate project.

The proposed works is of similar construction, dimension and height as the existing seawall structure, and will not change the level of flood risk to the surrounding area from tidal inundation. It will not impact on the design of any future flood defence further inland. As such, significant effects on flood risk are not anticipated.

### **2.3.11 Water**

There is no significant risk of affecting water quality as the proposed works are located within the intertidal zone and will be undertaken at appropriate times, taking the tide into consideration (i.e. at low tide). The caisson units and seawall units are precast and contained. Any grouting or concreting to be carried out would contain Super - Plasticiser / Anti Segregation / Anti Wash Out admixtures in the concrete specification to ensure no leakage.

A site specific Construction Environmental Management Plan (CEMP) will address the storage of oil/diesel, protection of water courses, use of concrete etc. at the sites. The works should be undertaken in accordance with the CIRIA (2003) Guidance No C584 "Coastal and Marine Environmental Site Guide". The CEMP will incorporate well-established working practices and procedures for working in / close to marine environments including PPG6, BS5228 1:2009, C584, GPP8, PPG3, GPP2, providing sufficient measures and controls to ensure full environmental protection during the works

### **2.3.12 Traffic**

There is the potential for impacts on the traffic and transportation network during the construction period, in respect of increase volumes and disruption to traffic flows. However, the construction phase is temporary, short term, and localised. Delivery of products and collection of waste materials will be carried out in a structured manner with appropriate signage, to ensure minimal impact on the transport networks and surrounding residents and businesses. Likely significant effects are not anticipated.

### **2.3.13 Landscape & Visual Resources**

The proposed works are a replacement for an existing similar structure, with similar dimensions, therefore significant impacts are not predicted. There will be short term temporary impacts during the construction phase, however none predicted during the operational phase. The seaward views to Arran, Isle of Bute or Great Cumbrae will be impacted. Similarly, the proposal will not impact on views to / from Knock Castle.

### **2.3.14 Summary of Potential Impacts**

#### **Extent of the Impact**

The extent of the impact of the proposed works will be limited to the areas of the existing coastal protection works, the intertidal area immediately adjacent, and coastal promenade. A temporary impact will occur with construction vehicles and services entering the site but this will be temporary and not significant.

There will temporary disturbances during the construction for residents, beach goers as well as local businesses. There will also be a temporary effect on the promenade, due to the requirement for a temporary compound and the delivery route for materials, as well as the removal of the handrail. The contractor will ensure that adequate hoarding is in place to prevent access to the site by the public and to ensure that all health and safety requirements are adhered to.

#### **Transboundary**

Potential transboundary impacts could arise in the event of pollution of coastal waters, however with careful mitigation in place, supported by a robust CEMP, this is highly unlikely. Adherence to best practice guidelines will be a core tenet of the construction stage.

### Intensity, Complexity & Probability of the Impact

With the use of best practice guidelines, standards and procedures, to prepare a robust Construction Environmental Management Plan, potential impacts can be ruled out. The probability of impacts that could result in significant environmental effects is minimal.

### Duration and Frequency of Impact

The construction works to deliver the essential repair works to the existing coastal defence system will take circa 4-6 months. Once the works are complete, they will remain permanently to protect the coastline and Largs promenade.

## 2.4 Conclusion

The proposed works constitute essential repair works to the existing sea defence system within Largs Bay, which is not currently providing adequate support or protection to the coastline or Largs Promenade.

In respect of the Marine Works (EIA) (Scotland) Regulations 2017, the proposed works fall under Schedule 2 Development under category 10 (m) *'Coastal work to combat erosion and maritime works capable of altering the coast through the construction e.g., moles, dykes, jetties, and other sea defence works, excluding maintenance and reconstruction of such works.'*

As such, further consideration of the proposal has been undertaken in respect of the criteria outlined in Schedule 3 of the EIA Regulations, namely:

- The characteristics of the works
- The location of the works
- Characteristics of the potential impact

All potential impacts were considered within this evaluation to develop a comprehensive understanding of the potential significant effects. From an assessment of the types and characteristics of the potential impacts likely to arise from the proposed, **it is considered that the proposed works do not constitute EIA development.**

Potential impacts on human beings will be short-term and not significant and there will be mitigation measures in place to control noise, and dust. Impacts on coastal processes, including sediment movement/transport are not significant. The site location area does not provide suitable habitat for any bird species, and an intertidal survey will be undertaken to explore and assess any potential impacts and effects. There are no expected significant effects on water since the works will be undertaken at low tide.

Most of the potential impacts will be mitigated by the preparation of a Construction Environmental Management Plan (CEMP) that should be agreed upon by all parties before the commencement of the works – this will draw together all the mitigation measures proposed in the Noise and Dust Impact Assessments, as well as any measures evolving from the Intertidal survey. With adherence to best practices such as those outlined in the Engineering in the Water Environment Good Practice Guides published by SEPA, few impacts are anticipated to arise. Interaction between the potential effects to the environment are not likely to be significant, therefore, an EIA will not be required for this project.

## **Appendix B: Proposed General Arrangement and Cross-Section Drawings**



- NOTES
1. Verifying Dimensions.  
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.

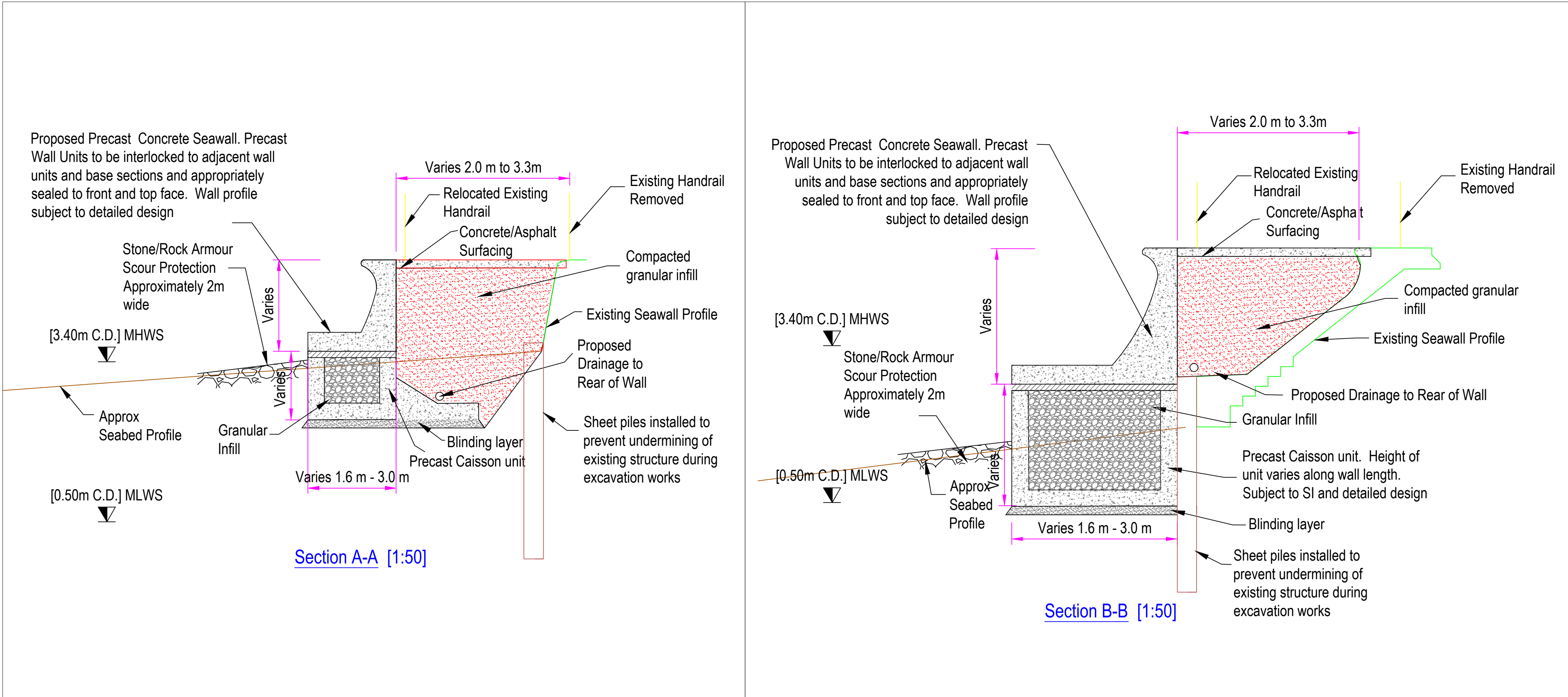
2. Existing Services.  
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.

3. Issue of Drawings.  
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

4. Datum.

5. Please Refer to drawing M0735-RPS-ML-XX-DR-C-0300 for section locations

6. Dimensions are approximate, and will be confirmed by Detailed Design.



|     |                            |       |            |
|-----|----------------------------|-------|------------|
| D02 | Minor Amendment            | JR    | 26.05.2022 |
| D01 | Dimensions and notes added | EC    | 18.05.2022 |
| rev | amendments                 | check | date       |

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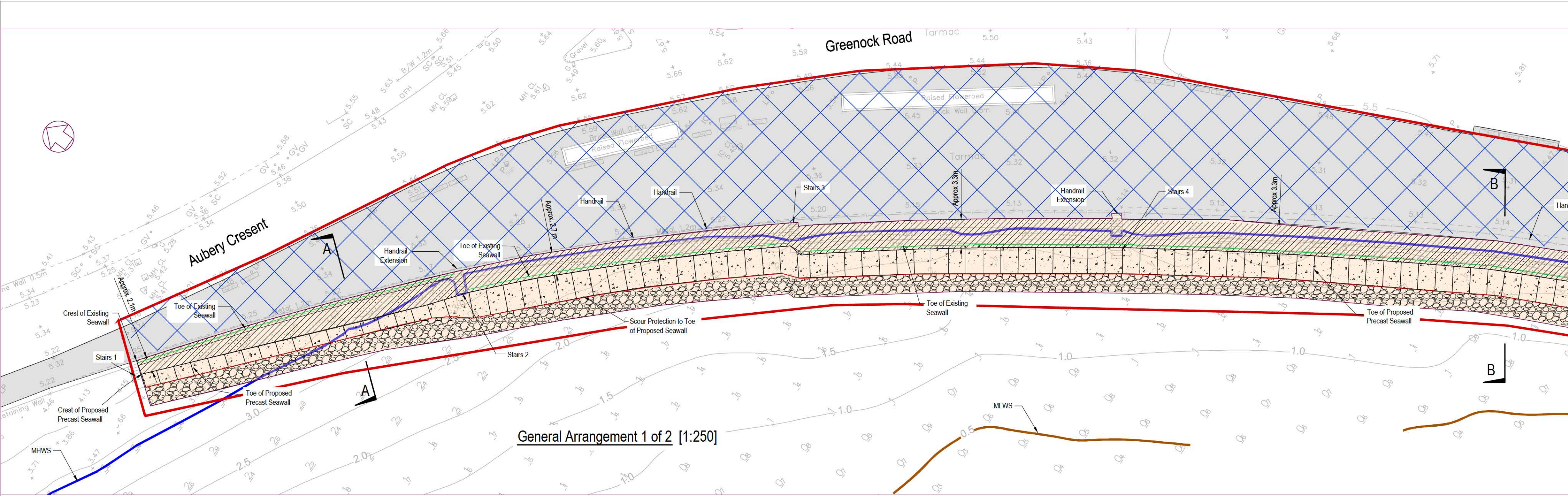
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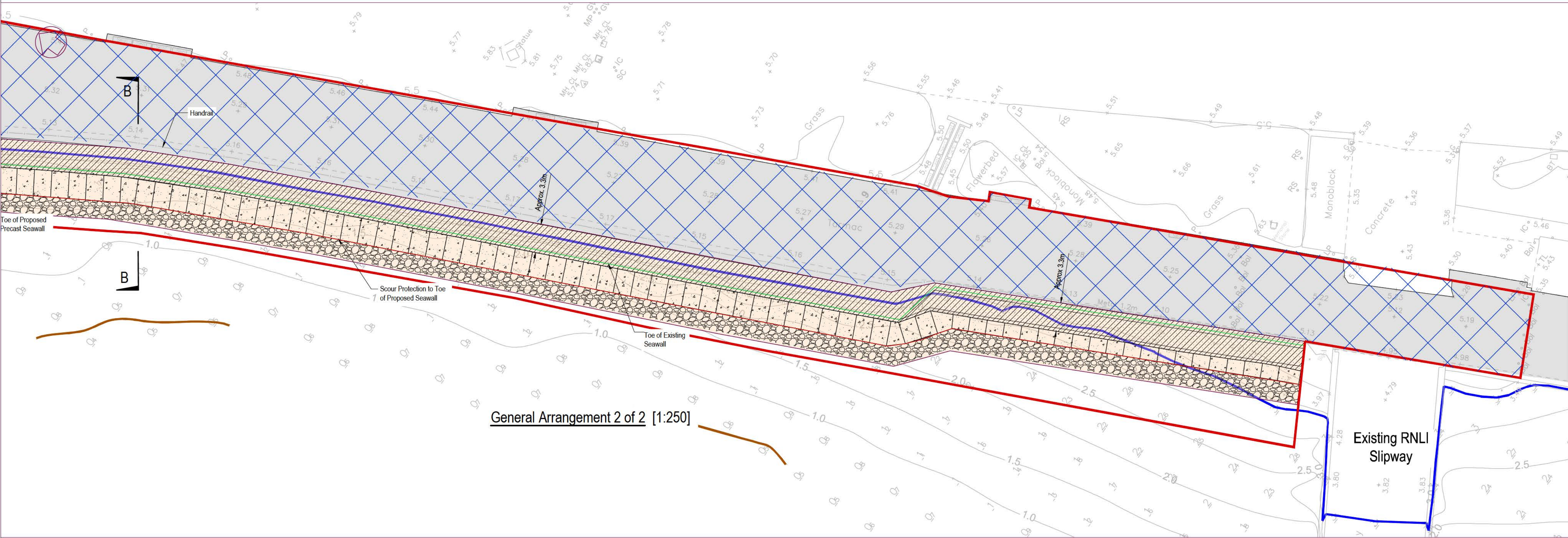
ireland@rpsgroup.com

|                                |             |               |
|--------------------------------|-------------|---------------|
| Client                         |             |               |
| North Ayrshire Council         |             |               |
| Project                        |             |               |
| Largs Seawall Replacement      |             |               |
| Title                          |             |               |
| Replacement Seawall - Sections |             |               |
| Project Number                 | Sheet Size  | Drawing Scale |
| IBM0735                        | A1          | 1:50          |
| Drawing Number                 |             |               |
| M0735-RPS-ML-XX-DR-0301        |             |               |
| Drawn By                       | Status      | Revision      |
| EC                             | S3          | D02           |
| Checked By                     | Approved By | Date          |
| -                              | SH          | 17/01/2022    |

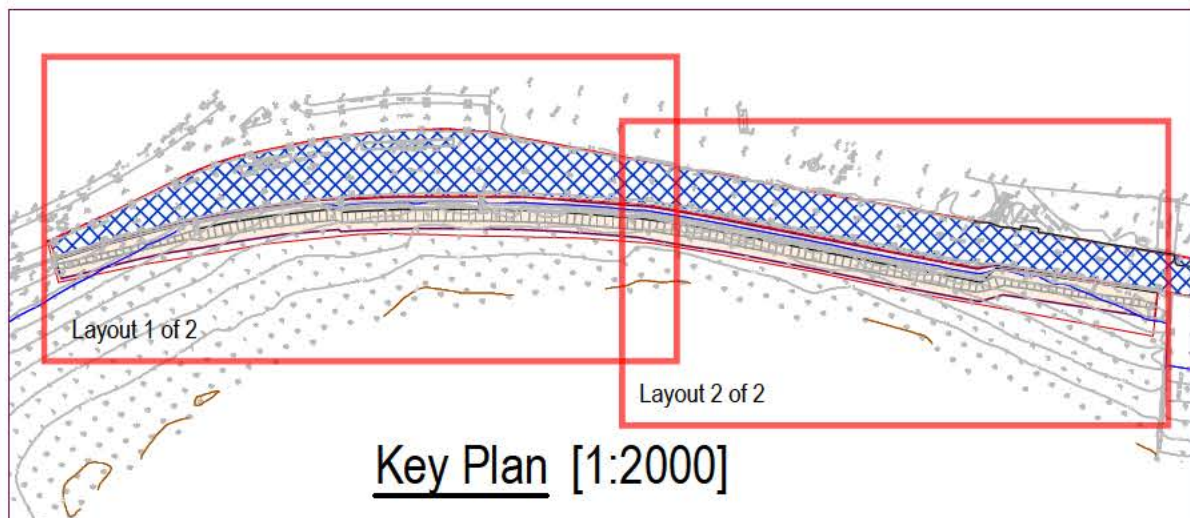




General Arrangement 1 of 2 [1:250]



General Arrangement 2 of 2 [1:250]



Key Plan [1:2000]

## NOTES

1. Verifying Dimensions.  
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. Existing Services.  
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
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| Chart Datum |          |       |        |
|-------------|----------|-------|--------|
| 5. CONCRETE | MIX TYPE | COVER | FINISH |
|             |          |       |        |
|             |          |       |        |
|             |          |       |        |

| Key |                              |
|-----|------------------------------|
|     | Proposed Sea Wall            |
|     | Proposed Site Boundary       |
|     | MHWS                         |
|     | MLWS                         |
|     | Existing Asphalt Promenade   |
|     | Proposed Area of Resurfacing |

|     |                  |       |            |
|-----|------------------|-------|------------|
| D03 | Minor Amendments | J.R.  | 26/05/2022 |
| D02 | Dimensions Added | E.C.  | 20/05/2022 |
| D01 | Outline Updated  | E.C.  | 17/01/2022 |
| rev | amendments       | check | date       |

|            |   |  |
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| Client                    |             |               |
| North Ayrshire Council    |             |               |
| Project                   |             |               |
| Largs Seawall Replacement |             |               |
| Title                     |             |               |
| General Arrangement       |             |               |
| Project Number            | Sheet Size  | Drawing Scale |
| IBM0735                   | A1          | 1:250         |
| Drawing Number            |             |               |
| M0735-RPS-ML-XX-DR-C-0300 |             |               |
| Drawn By                  | Status      | Revision      |
| J.R.                      | S3          | D03           |
| Checked By                | Approved By | Date          |
| E.C.                      | S.H.        | 09/11/2021    |



## Appendix C: Further Information Requested

**Marine Scotland** requested further information in relation to the proposed development, under The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('The Regulations') section 10, paragraph 7, to enable an opinion to be provided. This information is provided in the proceeding paragraphs, and should be read in conjunction with the information provided in Appendix A.

**i) Clarification on Proposed Construction Methodology**

***The Proposed Construction Methodology in Section 1.2.3 of the report states that sheet piles will be installed in front of the existing seawall using a vibratory hammer where possible. What alternative method will be used if this is not possible? If the alternative method is impact piling, consideration should be given to this throughout the screening report and potential impacts of this method should be noted.***

The proposed methodology outlined in the EIA Screening Report (**Appendix A**) indicates that sheet piles will be installed to the front edge of the toe along the length of the existing wall to provide temporary protection against undermining whilst excavations are being carried out. These will be installed using a vibratory hammer where possible. This phase is likely to take approx. 3 weeks and will run concurrent to removal of the steps.

The method of piling will be confirmed, following clarification on the type of soils and ground conditions present within the proposed development area. It appears that the upper layers of sediment in this location are loose sand and gravel, and in this context, vibratory hammer piling is the most suitable method. The nature and extent of the deeper layers of sediment are unclear and a site investigation is underway to determine this detail. It is unlikely that the sheet piles will need to be installed any deeper than 4m in depth (however this will be determined by the site investigation).

In the scenario where the deeper layers of sediment comprise denser sands or clay / larger cobbles are encountered and vibratory piling is not considered suitable, impact piling will be the alternate method of installing the sheet piles. This impact hammer would be fitted to an excavator (likely the same plant utilised for the vibratory hammer), and if required along the full length of the seawall, installation may take up to approximately 4.5 weeks (as opposed to 3 weeks).

The potential impacts and effects relating to impact piling have been considered in respect of the Schedule 3 Criteria, and in this context, the conclusions in respect of the relevant topics considered in the EIA Screening (Appendix A) remain applicable and relevant. The potential impacts and effects in relation to noise and marine ecology have been highlighted in the proceeding paragraphs.

It is anticipated that there will be potential impacts in relation to **pollution** and **nuisances** during the construction period from impact piling, upon people and their properties above the Mean High Water Springs (MHWS). Noise levels will be marginally greater over a slightly longer period (circa.1.5 weeks) during the daytime. However, the potential impacts on human beings during the construction phase are still considered to be short-term, temporary in nature, and not significant, and will not result in significant impacts and/or residual impacts during the operational phase. The conclusions outlined in respect of **Noise** in the EIA Screening Request (**Appendix A**) remain applicable.

In respect of the potential impacts on biodiversity (marine ecology), the use of impact piling has the potential to generate underwater noise. However, the works will be carried out at low-tide in the dry when there is no water on the beach – as such, there is no medium through which underwater noise may be propagated to the marine environment such that would represent a risk of injury or disturbance to fish, shellfish, and marine mammals. The conclusions outlined in the EIA Screening (**Appendix A**) and Marine Diversity Desktop Review (**Appendix D**) remain relevant in the context of impact piling.

**ii) Clarification on potential impacts on Coastal Processes**

***Section 2.3.9 states that the proposed works will have no impact on coastal processes. Please provide evidence of the modelling which supports this, including information as to how wide the replacement wall concrete sections are to be and approximately how wide the area of scour protection installed at the base of the new wall is to be. This element of the report requires to be detailed and robust as the proposed works are being screened under Section 10(m) of Schedule 2 of The Regulations which is the section referring to projects which may be capable of altering the coast.***

There will be no impact on the coastal processes of the area from the proposed seawall replacement works. There are currently hard defences along this section of the Largs coastline and the proposed replacement is of similar construction, levels, and wave reflective properties.



The dimensions of the proposed concrete wall sections and the scour protection have been added to the Cross-Section drawings, which are enclosed at **Appendix B**. The potential impacts on the various constituents of the coastal process regime in the area are considered in further detail below.

- **Waves:**

Both the existing and the proposed replacement seawall have the same structural form, i.e., they are concrete structures with similar wave reflection properties and the same crest levels. Thus, the characteristics of the wave reflections from the existing and proposed sea wall are the same. Hence the proposed replacement sea wall will not impact either the incoming or the reflected wave climate along the frontage.

- **Tidal and Littoral Currents:**

The proposed replacement sea wall is only 2-3 metres in front of the existing structure thus the replacement sea wall will not measurably alter either the tidal or littoral current field along the Largs frontage. Coastal process models typically have grid sizes ranging from 250m to 10m and even along the sea wall the finest model grid size are at least 6m. Thus, the proposed replacement sea wall will be in the same model cell as the existing sea wall and therefore the modelled tidal and littoral current velocities will be the same for both the existing and proposed sea wall.

- **Bed Sediment:**

The existing seabed at Largs comprises a widely graded cohesion-less material with a grain sizes ranging from a silt fraction to a large cobble size. The finer fractions of the bed sediment have been removed from the surface of the beach due to storm activity over a number of years resulting in the surface layer being naturally armoured by the large cobble sized material. During construction of the replacement wall, it is possible that that this naturally occurring cobble layer will be disturbed in the immediate proximity of the wall. The proposed development therefore includes a scour protection layer which will comprise a layer of cobbles to reinstate the natural cobble layer in the beach. As a consequence of this there will be no change in the natural beach surface material as a result of the proposed works and no change in the sediment transport along the beach.

As outlined above there will be no changes to any of the constituents of the coastal process regime in the Largs area or further afield as a result of the construction of the proposed replacement sea wall along the section of the Largs frontage. The change in alignment of the sea wall is less than the finest grid size of the coastal process models and hence the results of the modelling simulations for both the existing and the proposed replacement sea wall will have the same values for all the coastal process constituents. Hence the proposed replacement sea wall will have no measurable impact of the coastal processes of the area. No likely significant effects on coastal processes in the area are anticipated as a result of the proposed works.

**iii) Clarification on potential impacts on marine ecology**

***Section 2.3.8 discusses potential impacts on marine ecology and mentions that a study shall be conducted into the benthic ecology present in the area. The report states that the focus of this study is to determine the presence of Priority Marine Features (PMFs) which may be impacted by the Proposed Works. As well as considering the presence of PMFs in the area, it should also include details of the more general surveys of the intertidal zone discussed in section 2.2, the aims of which are to identify the nature and value of ecological habitat which may be impacted by the project. This should also include discussion of the potential impact the proposed works may have on ornithological interests in terms of loss of feeding area.***

***Please provide this study [or a desk top study, email dated 9.12.2021] to Marine Scotland in order that it may be considered in determining a screening opinion.***

A comprehensive and robust desktop study of the marine ecology in the area has been undertaken and is enclosed at **Appendix D**

As part of the preparation of the Marine Biodiversity Appraisal highlighted in Appendix A, a site specific Intertidal Survey of the study area was carried out in April 2022 to provide data on the species present. The results of this survey are included at **Appendix E** as supporting information. It is worth noting that the survey has not identified the presence of any Priority Marine Features (PMFs) within the study area, and as such, no impacts or effects are predicted.

**iv) Clarification on the potential impacts associated with invasive non-native species.**

***It has been noted that there are invasive non-native species present in the marine environment in the vicinity of the Proposed Works. Please include a section in the screening report detailing consideration***

**Our ref: NI2422 Largs - EIA Screening**

***of the impact these works may have on the risk of spreading these species and proposing any mitigation strategies to prevent such spread.***

Consideration of the potential impacts associated with invasive non-native species in the marine environment is included within the desktop study of the marine ecology in the area (as above), and enclosed in **Appendix D**.

## **Appendix D: Marine Biodiversity Desktop Study**

# REPLACEMENT SEA WALL, LARGS

## Marine Biodiversity Desktop Literature Review



EOME0507  
Marine Biodiversity Desktop  
Literature Review

Rev02  
31 March 2022



## REPORT

### Document status

| Version | Purpose of document            | Authored by            | Reviewed by | Approved by | Review date |
|---------|--------------------------------|------------------------|-------------|-------------|-------------|
| 00      | Draft for Internal Review      | A Crowther & E Goodman | K Linnane   | K Linnane   | 15/03/2022  |
| 01      | Draft Issued for Client Review | E Goodman              | K Linnane   | K Linnane   | 18/03/2022  |
| 02      | Client Comments Incorporated   | E Goodman              | K Linnane   | K Linnane   | 31/03/2022  |

### Approval for issue

K Linnane

31 March 2022

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## Contents

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>INTRODUCTION .....</b>                          | <b>1</b>  |
| <b>2</b> | <b>PROJECT DESCRIPTION .....</b>                   | <b>4</b>  |
| 2.1      | Background .....                                   | 4         |
| 2.2      | Methodology .....                                  | 4         |
| 2.2.1    | Sea wall Replacement Works .....                   | 4         |
| 2.2.2    | Construction Method .....                          | 5         |
| 2.2.3    | Materials .....                                    | 6         |
| 2.3      | Licensable Marine Activities .....                 | 7         |
| 2.4      | Embedded Mitigation Measures .....                 | 7         |
| 2.5      | Timescales and Duration .....                      | 8         |
| <b>3</b> | <b>APPROACH TO CONSENT .....</b>                   | <b>9</b>  |
| 3.1      | Consenting Regimes .....                           | 9         |
| 3.2      | Consideration of the Need for EIA .....            | 9         |
| 3.2.1    | Characteristics of the Proposal .....              | 9         |
| 3.2.2    | Location of the Proposal .....                     | 11        |
| 3.2.3    | Characteristics of the potential impact .....      | 11        |
| 3.2.4    | Conclusion .....                                   | 12        |
| <b>4</b> | <b>INITIAL MARINE BIODIVERSITY APPRAISAL .....</b> | <b>14</b> |
| 4.1      | Baseline Environment .....                         | 14        |
| 4.1.1    | Benthic .....                                      | 14        |
| 4.1.2    | Fish and Shellfish .....                           | 16        |
| 4.1.3    | Marine Mammals .....                               | 16        |
| 4.1.4    | Ornithology .....                                  | 17        |
| 4.1.5    | Invasive Non-Native Species .....                  | 18        |
| 4.1.6    | Designated Sites .....                             | 19        |
| 4.2      | Approach to Marine Biodiversity Appraisal .....    | 20        |
| 4.2.1    | Overview .....                                     | 20        |
| 4.2.2    | Data Sources .....                                 | 21        |
| 4.2.3    | Benthic Ecology .....                              | 21        |
| 4.2.4    | Fish and Shellfish .....                           | 22        |
| 4.2.5    | Marine Mammals .....                               | 23        |
| 4.2.6    | Marine and Intertidal Ornithology .....            | 23        |
| 4.3      | Cumulative Effects .....                           | 23        |
| <b>5</b> | <b>REFERENCES .....</b>                            | <b>25</b> |
|          | <b>Appendix A – Plant and Materials .....</b>      | <b>27</b> |
|          | <b>Appendix B – Design Drawings .....</b>          | <b>28</b> |

## Tables

|  |    |
|--|----|
| Table 2.1: Details on the construction materials that will be used for the proposal. ....                                      | 6  |
| Table 2.2: Licensable activities .....   | 7  |
| Table 4.1: INNS in the Firth of Clyde region (Firth of Clyde Forum, 2016) .....  | 18 |
| Table 4.2: INNS Procedure .....  | 18 |
| Table 4.3: MPAs and designated sites relevant to the proposal. ....  | 19 |
| Table 4.4: Summary of receptor topics included for further consideration (see sections 4.2.3 - 4.2.6 for further detail). .... | 20 |

## Plates

|   |    |
|---|----|
| Plate 1: Southern end of the sea wall.....  | 4  |
| Plate 2: Northern end of the sea wall. ....   | 4  |
| Plate 3: Example units.....   | 5  |
| Plate 4: Excavator unloading from dump truck.....                                       | 27 |
| Plate 5: HGV lorries for delivery of locally sourced rock armour.....                   | 27 |
| Plate 6: Loading shovel/telehandler. ....   | 27 |
| Plate 7: a crane for lifting units/armour into place or clearing existing sea wall..... | 27 |
| Plate 8: Concrete wagon. ....   | 27 |
| Plate 9: Articulated Dumper Truck.....  | 27 |

## Figures

|   |    |
|---|----|
| Figure 1.1: Location of the proposed project.....                                     | 3  |
| Figure 4.1: Seabed habitats in the vicinity of the project (from EMODNet, 2022) ..... | 15 |
| Figure 5.1: Proposed layout of the sea wall replacement. ....                         | 28 |

# 1 INTRODUCTION

The town of Largs is located within the Firth of Clyde in North Ayrshire, Scotland, and is a popular seaside resort. The town is protected by a sea wall located on the Largs Promenade which extends from the mouth of the Noddsdale Water southwards to Largs Harbour. The sea wall is located across a 300m stretch of beach north of the RNLI slipway. The location of the sea wall is shown in Figure 1.1.

Recent surveys have indicated that the existing sea wall structure is deteriorating. Specifically, there is clear deterioration of the gunite facing concrete, where it remains attached to the existing wall face and high levels of corrosion of the existing wall reinforcement. The sea wall is also undermined along a section of wall (approx. 12m in length) where the toe is exposed and no sheet piles were installed. There is also deterioration to three sets of steps ranging in height from 1.8m to 3.1m located along the length of the sea wall.

On this basis there is a need for the proposed sea wall replacement scheme which comprises the replacement/encapsulation of the existing 300m long sea wall. The work will comprise of the following main activities:

- Demolition / Site Clearance, to include the partial removal of the existing concrete steps with a rock breaker mounted on small excavator working from the beach;
- Protection Works for the Existing Sea wall structure to include the installation of sheet piles to provide temporary protection against undermining whilst excavations are being carried out. Sheet piles will be installed with a vibratory hammer where possible;
- Excavation, beach material will be excavated to facilitate the installation of the concrete caisson units using a small excavator working from the beach to prevent settlement into the sand; and
- Sea wall Installation, and scour protection.

RPS prepared an EIA Screening to determine whether an EIA would be required to support the marine license application and submitted this to Marine Scotland Licensing Operations Team (MS-LOT). MS-LOT indicated that a desk top study of the marine ecology in the area may be adequate to assist with the decision making in regards to the requirements of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regs).

This Marine Biodiversity Desktop Literature Review has been developed to describe North Ayrshire Council's intended approach for preparing a Marine Licence application for the Proposal and the level of information to be included in the Marine Biodiversity Assessment to accompany the subsequent Marine Licence Application. The purpose of the document is as follows:

1. To set out and justify the consenting approach, with reference to the requirements of The Marine (Scotland) Act 2010, The Marine Works (Environmental Impact Assessment) Regulations 2007 and the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013; and
2. To present additional information with regards to baseline Marine Ecology in the vicinity of the project to support the EIA screening and consenting process;
3. To set out the proposed approach to the supporting Marine Biodiversity Report to be submitted to MS-LOT and their advisors as part of the marine licence application.

The structure of this document is as follows:

- **Section 2, Project Description:** this section provides a description of the proposal's method and the licensable activities that will be the subject of the application, and sets out a summary of the designed-in mitigation measures;
- **Section 3, Approach to Consent:** this section sets out the overarching approach and programme for the consenting process, including consideration of the need for EIA and Pre Application Consultation (PAC); and



- **Section 4, Marine Biodiversity:** this section provides details of the baseline environment in the vicinity of the project with regards to marine ecology. This also outlines the information to be included in the Marine Biodiversity Report that will accompany the Marine Licence application, including the data sources to be utilised, the receptors to be considered, and the potential impacts to be assessed, including cumulative effects.

North Ayrshire Council is seeking confirmation from MS-LOT that the approach as set out in this document, is sufficient to enable the required Marine Licence to be determined once the application is submitted.

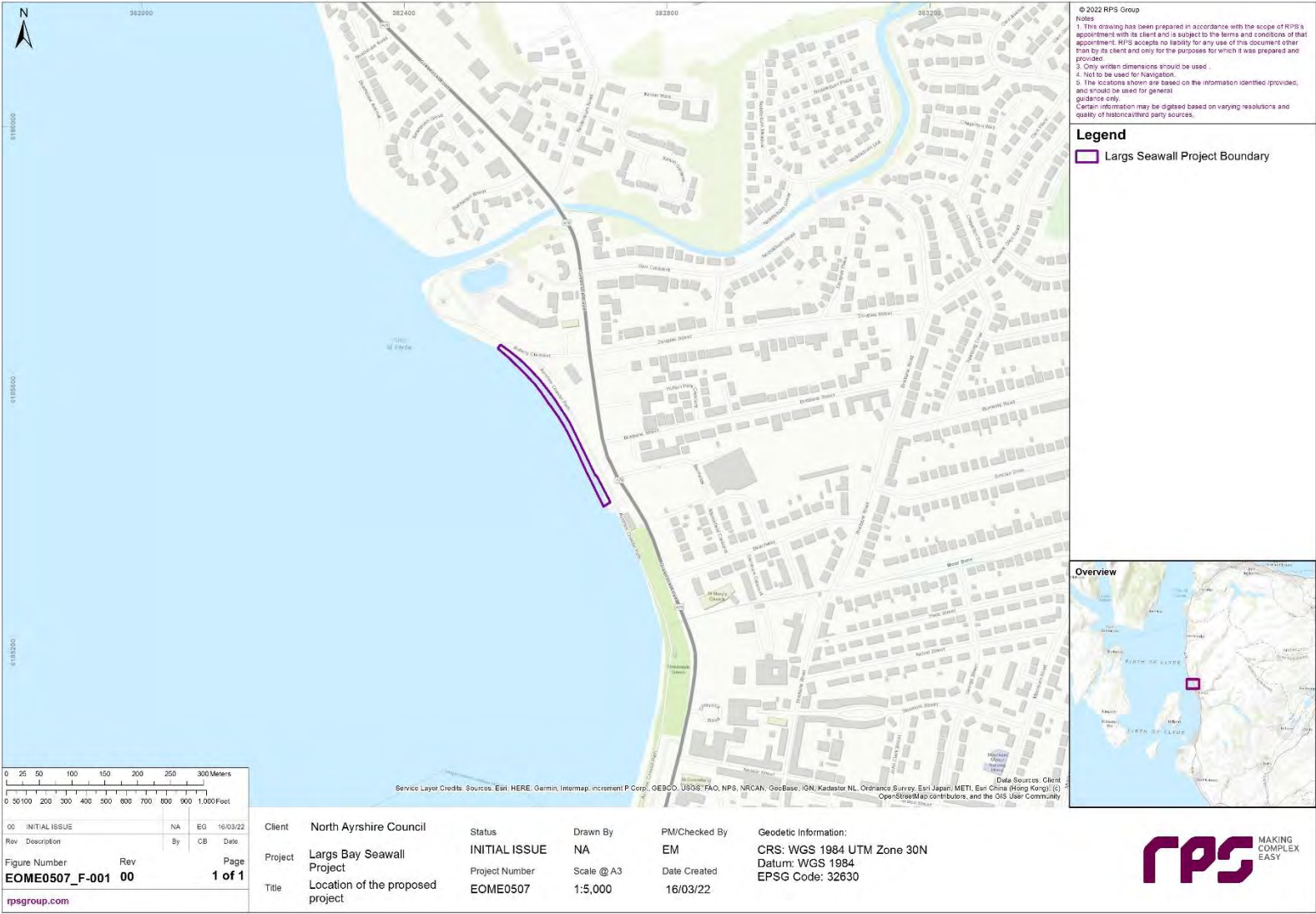


Figure 1.1: Location of the proposed project.

## 2 PROJECT DESCRIPTION

### 2.1 Background

The Largs Promenade extends from Largs Harbour at the south to the mouth of the Noddsdale Water at the north, with a wall along the seaward length of the promenade transitioning to a sea wall from the RNLI slipway for approximately 300m north. Largs is a coastal town, which is located due west of Glasgow, within North Ayrshire Council area. The general location of the proposed works is shown above, in Figure 1.1.

The existing sea wall at Largs retains the promenade and protects the shore side buildings and infrastructure from wave action and coastal erosion. It is c.300m in length, with the height varying along its length following the profile of the beach below. The retained height varies from approx. 1.0m to 4.0 m, and the top level of the sea wall is approx. +5.16mCD along the full length. The public have access to the sea wall and the beach below.

It was constructed from reinforced concrete in the 1970s as a replacement facing for the old sea wall. This 1970s facing was covered in a gunite (sprayed concrete) facing in more recent years, but this has since failed and become detached from the 1970s concrete wall. The gunite was partially removed in 2018.

The images in Plate 1 and Plate 2 show the existing sea wall, and the different profiles along its length.



**Plate 1: Southern end of the sea wall.**



**Plate 2: Northern end of the sea wall.**

Recent surveys have indicated that the existing sea wall structure is deteriorating in several ways:

**Concrete Deterioration:** There is clear deterioration of the gunite facing concrete, where it remains attached to the existing wall face. There are high levels of corrosion of the existing wall reinforcement, with patches of exposed reinforcement visible throughout the length of the wall. High levels of chloride ingress to the existing concrete wall have also been identified.

**Undermining:** The sea wall is undermined along a section of wall (approx. 12m in length) where the toe is exposed, and no sheet piles were installed. This undermining is the likely cause of loss of material and subsidence of the promenade surface in recent years.

**Steps:** There are three sets of steps ranging in height from 1.8m to 3.1m located along the length of the length of the sea wall. These are unsafe for use and are currently fenced off.

### 2.2 Methodology

#### 2.2.1 Sea wall Replacement Works

The proposed sea wall replacement scheme comprises the replacement/encapsulation of the existing 300m long sea wall. The proposal is outlined in detail in Appendix B. It consists of the following main elements:

- Controlled removal of existing steps which are unsafe for use.

- Installation of precast concrete caissons along the front of the existing sea wall to act as a foundation to facilitate the placement of precast concrete sea wall units.
- The precast caisson base units will be filled with granular material. The base units will be topped with a mortar layer, with the precast concrete sea wall units then installed (example of proposed sea wall units shown in Plate 3). The precast units will be shaped to facilitate interlock between units, then grouted and sealed to both sides, thus avoiding the requirement for dowels or protruding reinforcement
- Placing of granular backfill between the front face of the existing sea wall structure, and the rear face of the new precast structure. Suitable drainage to be provided within the backfill. Surfacing of backfill with concrete or asphalt pavement to tie into existing promenade. New / reinstatement of handrail along the promenade.
- Placement of rock armour scour protection in-front of the new precast concrete sea wall units to prevent undermining of the toe of the new structure.
- Installation of steps at required intervals along sea wall structure.



**Plate 3: Example units.**

The height of the replacement sea wall structure will be as per the existing sea wall. The length of the proposed sea wall will be 300m, and the footprint of the structure covers 2,400m<sup>2</sup>. The form of foundation and structure varies along the length of the sea wall to account for the varying profiles of the existing sea wall structure, the preliminary sketches in Appendix B show indicative cross sections of the proposed construction<sup>1</sup>.

The red line boundary of the proposed works identified in Appendix B totals 3,000m<sup>2</sup> in area extending from the terrestrial environment (above the Mean Low Water Springs (MLWS)) onto the foreshore (i.e. below the Mean High-Water Springs (MHWS))

### 2.2.2 Construction Method

This section outlines the construction methodology for the sea wall replacement works. Examples of plant and equipment can be found in Appendix A.

#### 2.2.2.1 Demolition & Site Clearance

There will be a temporary site compound in the immediate vicinity of the site to support the proposed development during the construction period. The location of this has not yet been determined, but will be in an onshore location, so is not relevant for marine licensing. The area of works along the promenade and beach will be fenced off, and initial works will see the partial removal of the existing concrete steps with a rock breaker mounted on small excavator working from the beach. The existing handrail along the promenade will be removed and stored for reuse. This phase is likely to take approx. 3 weeks.

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<sup>1</sup> It should be noted that these designs are at a preliminary design stage only and will be subject to detailed design pending results of further investigation works.



### 2.2.2.2 Protection Works for the Existing Sea wall structure

Sheet piles will be installed to the front edge of the toe along the length of the existing wall (where there are no existing sheet piles) to provide temporary protection against undermining whilst excavations are being carried out for the caisson unit installation. These sheet piles will be installed using a vibratory hammer where possible. This phase is likely to take approx. 3 weeks and would run concurrent to removal of the steps.

### 2.2.2.3 Excavation

Beach material will be excavated to facilitate the installation of the concrete caisson units using a small excavator working from the beach to prevent settlement into the sand. The material is likely to be taken offsite for disposal to a licenced facility or beneficially re-used (subject to testing to confirm suitability of material, and identification of a suitable receptor). This phase is likely to take c.9 weeks.

### 2.2.2.4 Sea wall Installation

Bedding material (lean mix concrete) will be placed in the excavation to form a level foundation for the placement of the caisson units. The caisson units will be installed on top of the material by a crane or telehandler on the promenade or beach and filled with granular material. The precast concrete sea wall unit will be placed on top and grouted into place. The space between the replacement sea wall unit and the face of the existing sea wall will be backfilled and compacted by an excavator working from the promenade, then surfaced with asphalt / paving to tie into the existing promenade, with the existing handrail reinstated. Steps and a new handrail to be installed. The precast installation is likely to take c.9 weeks, with the backfilling and paving taking c.8 weeks.

A suitably sized and graded rock armour will be placed in layers on the beach in front of the new precast concrete sea wall to act as scour protection. This rock armour will be placed by an excavator working on the beach area. The timing of each phase of works will possibly be subject to tidal restrictions on working.

## 2.2.3 Materials

The types of construction material that will be used as part of the proposed permanent works below MHWS includes precast concrete caissons, precast concrete sea wall units, granular infill, mortar layer, sealant, granular backfill, bedding material and rock armour scour protection. Temporary works include the installation of the sheet piles, however, the requirement for these to remain as part of the permanent works will be determined during the detailed design stage.

Table 2.1 provides details of the type, volume and descriptions/assumptions. Note, all materials are expected to be sourced locally, regionally or within the UK and brought to site via road.

**Table 2.1: Details on the construction materials that will be used for the proposal.**

| Type                            | Volume below MHWS (m <sup>3</sup> ) | Units | Description/assumptions  |
|---------------------------------|-------------------------------------|-------|--|
| Precast Concrete Caissons       | 585                                 | 150   | Concrete caissons are 2m long; smaller caisson ( top of caisson level with MHWS); larger caisson (top of caisson below MHWS); volume assumed for concrete units alone. |
| Precast Concrete Sea Wall Units | 305                                 | 108   | Concrete wall sections are 2m long; smaller type all above MHWS; larger type extend to below MHWS.   |
| Granular Infill                 | 1000                                | N/A   | Coarse gravel infill material to caissons.   |
| Mortar layer                    | 3.0                                 | N/A   | Layer assumed to be 50 mm thick.   |
| Grout                           | 3.0                                 | N/A   | Assume 20 mm grout between each unit.  |
| Sealant                         | 0.23                                | N/A   | Typically measured in linear m of 20mm x 20mm.   |
| Granular Backfill               | 325                                 | N/A   | Class 6A/6N material to be used.   |
| Handrail                        | N/A                                 | 5m    | Assumes reuse of existing handrails.   |

| Type                         | Volume below MHWS (m³) | Units | Description/assumptions  |
|------------------------------|------------------------|-------|--|
| Rock Armour Scour Protection | 900                    | N/A   | Rock armour/scour protection expected to be relatively small – approximately 100kg from UK quarries.         |
| Bedding material             | 45                     | N/A   | Blinding concrete material.  |
| Sheet Piles                  | m²                     | 483m² | Measured as the face area of the sheet pile (assumed piles required over a 160m length of existing seawall). |

## 2.3 Licensable Marine Activities

The majority of the works associated with the Proposal are below MHWS and these are licensable under the Marine (Scotland) Act 2010. These activities will form the focus of the Marine Biodiversity Assessment to be submitted in support of the Marine Licence application. However as certain non-licensable activities can increase the duration and extent of the impact (e.g. use of plant and presence of human activity during surveys leading to disturbance effects), these wider activities will also be considered in the overall assessment to be presented in the Marine Biodiversity Report (where relevant).

A summary of licensable activities are described in Table 2.2

**Table 2.2: Licensable activities**

| Licensable Activity  | Description  |
|--|--|
| Removal of sediment  | The proposed works include removal of beach material from the intertidal zone to facilitate the installation of the concrete caissons. The sediment will be removed by excavator positioned on the beach.  |
| Removal of substances and objects from the intertidal zone | Removal of concrete steps and pre-cast concrete blocks as part of re-profiling of the existing sea wall.   |
| Deposits in the sea or on/under the intertidal zone        | <p>Placement of rock protection along the toe of the sea wall on the intertidal zone.</p> <p>Installation of sheet piles along the front edge of the sea wall to prevent undermining.</p> <p>Lean mix concrete added to the toe trench as bedding material.</p> <p>Placement of concrete caissons via telehandler or crane and filled with granular infill material.</p> <p>Placement of precast concrete sea wall units and grouted into place.</p> <p>Granular backfill poured behind the concrete sea wall units, with drainage, and surfaced with concrete or asphalt.</p> <p>Reinstallation of existing (or new) handrails.</p> |

## 2.4 Embedded Mitigation Measures

A number of embedded mitigation measures relevant to Marine Biodiversity are proposed to be incorporated into the design and construction method to manage the risk on the environment. These include:

1. Disturbance of intertidal zone outside existing sea wall footprint to be minimised where possible.
2. Rock will be washed down off site prior to installation.
3. Prior to construction a Construction Environmental Management Plan (CEMP) will be produced by the appointed Contractor and submitted to Marine Scotland for approval.
4. Adoption by the Contractor of Largs Yacht Haven's existing Oil Spill Contingency Plan (potentially as part of the EMP).
5. Sheet piling will be carried out in accordance with best practice guidance, and the use of vibratory pile installation will be maximised where possible.
6. Adoption of measures to minimise risks of spread and/or introduction of invasive non-native species (INNS; see section 4.2.3 for further detail).

7. Potential appointment of an appropriately qualified Environmental Clerk of Works with intertidal environmental experience, if deemed necessary by MS-LOT.

## 2.5 Timescales and Duration

The proposed works are anticipated to be completed over a period of 30 weeks.

Preparation, mobilisation and site clearance will take approximately 4 weeks. Protection works for the existing sea wall units, 3 weeks. Excavation of the footings, 7 weeks. Sea wall installation works, 21 weeks, with time for finalising (snagging), demobilisation and contingency, 5 weeks.

## 3 APPROACH TO CONSENT

### 3.1 Consenting Regimes

The Proposal is sited along c.300m of existing sea wall footprint, from the RNLI Slipway heading north to the Aubery Crescent with an area of proposed marine works below the MHWS. Based on the proposed location and description of the Proposal the following consenting regimes applies:

For all works below MHWS, a marine licence application is required and will be submitted to MS-LOT and assessed against the following legislation:

1. The Marine (Scotland) Act 2010;
2. The Marine Works (Environmental Impact Assessment) Regulations 2017; and
3. The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013

For all works above MHWS a separate planning application is required under the following key legislation.

1. Town and Country Planning (Scotland) Act 1997
2. Planning (Scotland) Act 2019 All works above MHWS have not been considered as they are outside the scope of this document and are not licensable under the identified The Marine (Scotland) Act, 2010.

### 3.2 Consideration of the Need for EIA

North Ayrshire Council is seeking a formal screening opinion from Marine Scotland under Regulation 10 (1) Part 2, The Marine Works (EIA)(Scotland) Regulations 2017 in respect of the works proposed below the MHWS. As part of their consideration, Marine Scotland has sought further information on the nature and extent of the potential impacts on marine ecology.

The EIA Regulations specify that in reaching a conclusion as to whether or not an Annex 2 project is likely to have significant effects on the environment, the criteria set out in Schedule 3 of the EIA Regulations must be considered. The criteria set out in Schedule 3 have been considered specifically with regard to marine ecology receptors in the vicinity of Largs Bay in the following sections. These criteria cover the characteristics of the proposal (section 3.2.1), the location of the proposal (section 3.2.2) and the characteristics of the potential impact (section 3.2.3).

#### 3.2.1 Characteristics of the Proposal

The 2017 EIA Regulations specify that the following characteristics must be considered to determine the requirement for EIA:

- The size and design of the Proposal;
- Cumulation with other existing works and/or approved works;
- The use of natural resources, in particular land, soil, water and biodiversity;
- The production of waste;
- Pollution and nuisances;
- The risk of major accidents and/or disasters which are relevant to the proposal concerned, including those caused by climate change, in accordance with scientific knowledge; and
- The risks to human health (for example due to water contamination or air pollution).

Details of the Proposal with respect to each item have been provided below.



### **3.2.1.1 The size and design of the Proposal**

The Proposal will aim modify the existing sea wall structure. Given the Proposal will be largely within the existing sea wall footprint, the size of the project is not considered large enough to result in significant effects to the environment.

### **3.2.1.2 Cumulation with other existing works and/or approved works**

Other proposed plans/projects most relevant to the Proposal would be ongoing operational activities, including recreational vessel movements, and maintenance dredging associated with Largs Harbour which have been considered as part of the baseline. No other projects are currently being planned or being undertaken and therefore there will be no significant cumulative effects on the environment.

### **3.2.1.3 The use of natural resources, in particular land, soil, water and biodiversity**

The Proposal will require the use of 2,225m<sup>3</sup> of rock material (granular fill and rock armour) below MHWS that will be quarried from local licensed quarries. Beach material will be excavated from the intertidal zone to form the toe trench. This material likely to be taken offsite for disposal to a licenced facility or beneficially re-used (subject to testing to confirm suitability of material, and identification of a suitable receptor). No other natural resources are predicted to be used as part of the proposed works. Excavation of the toe trench will allow placement of caissons, sea wall units and rock armour that will provide suitable habitat for colonisation of species associated with the existing sea wall. Given that the net loss of biodiversity is likely to be minor (discussed further in section 4), or potentially positive as a greater heterogeneity of habitat is being created, significant effects from the use of natural resources are not predicted.

### **3.2.1.4 The production of waste, pollution and nuisances**

Minimal waste is predicted from the proposed project and will be typical of consumables generated during earth moving construction activities. All wastes will be managed in line with the EMP which will include waste management measures to minimise, recycle, reuse and dispose of waste streams in compliance with relevant waste legislation. Marine pollution prevention and contingency planning measures will be in accordance with Largs Yacht Haven's existing Oil Spill Contingency Plan (OSCP). Nuisance will be controlled by conditions through the submission and approval of the EMP which must contain proposed measures for the mitigation of construction noise and vibration, and dust. Due to the measures in place to control and/or manage waste, pollution and nuisance, as secured by the terrestrial and marine consent conditions, significant effects on the environment are not predicted.

### **3.2.1.5 The risk of major accidents and/or disasters which are relevant to the proposal including risks**

North Ayrshire Council requires all key Contractors and subcontractors to have completed adequate risk assessments for all aspects of construction through implementation of the EMP and adherence to OSCP. Activities are also considered typical of a marine construction project. Due to the measures in place to control and/or manage waste, pollution and nuisance, as secured by the terrestrial and marine consent conditions, significant effects on the environment are not predicted.

### **3.2.1.6 The risks to human health**

North Ayrshire Council requires all key Contractors and subcontractors to have completed adequate risk assessments for all aspects of construction. North Ayrshire Council will require compliance with the Control of Substances Hazardous to Health Regulations 2002 (COSHH Regulations) in ensuring that the risk to health from workplace exposure to hazardous substances is appropriately assessed and that exposure is prevented or, where this is not reasonably practicable, adequate controls are implemented and exposure monitored and managed to within acceptable levels in line with relevant regulations and the EMP.

### **3.2.2 Location of the Proposal**

The 2017 EIA Regulations specify that the environmental sensitivity of geographical areas likely to be affected by works must be considered having regard to the following:

- The existing and approved land use;
- The relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;
- The absorption capacity of the natural environment, paying particular attention to the following areas:
  - Wetlands, riparian areas, river mouths;
  - Coastal zones and the marine environment;
  - Mountain and forest areas;
  - Nature reserves and parks;
  - European sites and other areas classified or protected under national legislation;
  - Areas in which there has already been a failure to meet the environmental quality standards, laid down in union legislation and relevant to the proposal, or in which it is considered that there is such a failure;
  - Densely populated areas;
  - Landscapes and sites of historical, cultural or archaeological significance.

The proposed activities set out in section 2 will be undertaken in the dry and within the existing sea wall footprint, with an area of proposed marine works below the Mean High-Water Springs (MHWS). Materials for the Proposal will be transported from quarries via road.

Further details on the existing baseline environment in the vicinity of the proposal are set out in section 4. The initial desktop literature review in section 4 has not identified any specific environmental sensitivities in the vicinity of the project (e.g. protected species, habitats, or communities) such that may lead to significant effects, which would require the need for an EIA.

### **3.2.3 Characteristics of the potential impact**

The 2017 EIA Regulations specify that the likely significant effects of the Proposal on the environment must be considered with regard to the impact of the Proposal taking into account the following:

- The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
- The nature of the impact;
- The transboundary nature of the impact;
- The intensity and complexity of the impact;
- The probability of the impact;
- The expected onset, duration, frequency and reversibility of the impact;
- The cumulation of the impact with the impact of other existing and/or approved works;
- The possibility of effectively reducing the impact.

The potential environmental impacts associated with the proposed project include:

- Changes to coastal processes from modification of the coastline associated with the proposed works;

- Changes to water quality from increases in suspended sediment concentrations from release of fine particles attached to rock material following placement below MHWS and during excavation of beach material; and
- Removal and disturbance of benthic habitats through placement of rock material outside the existing sea wall.

Some small, localised increases in suspended sediment concentrations may occur following placement of the rock material below MHWS. Increases in suspended sediment concentrations will be of a short duration and of small magnitude due to the low volume of fine sediments associated with quarried rocks and increased dilution effects associated with the exposed environment in which the sea wall will be constructed. Effects from placement of rock leading to increases in suspended sediment concentrations are therefore not considered significant.

Some increases in suspended sediment could also result from excavation of beach material prior to sea wall installation the trench. Sediments are likely to consist of sand, gravel and cobbles which are unlikely to become readily mobilised, as works are expected to be undertaken in the dry and should these become mobilised, will rapidly fall out of suspension within short distances following disturbance. Effects from excavation of the trench leading to increases in suspended sediment is therefore not considered significant.

It is predicted that an area of the foreshore will be disturbed by the Proposal through beach excavation and placement of rock within the construction footprint. Benthic species colonising these areas would initially be removed, however, following placement of rock material, recolonisation of similar species would likely to occur. Limited literature on the biotopes found within Largs Bay and on the foreshore is available, however a site specific intertidal survey to support the Marine Biodiversity Appraisal will provide data on species present. Given the highly localised area affected by construction operations and the relatively common species composition of benthic communities expected in the area (see section 4), these activities are not likely to result in significant effects on marine biodiversity receptors.

Some disturbance effects to behaviour of fish and marine mammal species are possible from noise/vibration generated by mechanical rock breaking as part of preparation of the construction area. No blasting will be undertaken as part of proposal activities. In addition, noise levels are unlikely to reach levels that could cause injury or disturbance to fish and marine mammals due to the majority of works being undertaken in dry conditions within the intertidal zone, above MHWS and over a short duration. In addition, marine mammals are not predicted to occur in large numbers within the vicinity of the proposed project other than occasional bottlenose whale, killer whale, Risso's dolphin, minke whale and harbour porpoise individuals which may be present in the wider Firth of Clyde area. Should these species occur in close proximity to the proposed works, there is potential for very localised disturbance due to elevated noise/vibration from onshore works. However these would be highly limited in extent (i.e. in the immediate vicinity of Largs Bay), temporary and highly reversible, should any disturbance reactions occur at all. No significant impacts from noise/vibration emissions from the Proposal on marine mammal populations are therefore predicted.

While the proposed project does not lie within a protected area, a review of the features associated with protected areas in the region has identified potential connectivity for salmon and bottlenose dolphin features due to the distances in which they travel to forage or migrate. Salmon populations are only likely to migrate in proximity to the proposed development over relatively short period of time as smolts migrating from the rivers to the sea and as adults returning to rivers to spawn. Potential noise/vibration emissions from rock breaking as part of preparation of the sea wall associated with trench formation will be completed intermittently over relatively short period of time, 4 weeks as part of demolition phase and expected to be undertaken in the dry. As outlined above, there is no potential for injury to these species and behavioural disturbance is highly unlikely, and should it occur at all, will be highly limited in extent, temporary and reversible. Therefore, no significant impacts, including barrier effects due to the location of the proposal, are predicted.

### 3.2.4 Conclusion

In summary, having considered the matters outlined in Schedule 1 of the EIA Regulations in terms of the characteristics of the Proposal, the location of the Proposal and the characteristics of the potential impacts

from the proposal, North Ayrshire Council has determined that the Proposal is not likely to have significant effects on the environment, and therefore an EIA is not required. Further information can be found in section 4.2 which includes a summary of the project activities and associated potential effects which will be considered in the Marine Biodiversity Appraisal (and justification for which activities will not be subject to further consideration).



## 4 INITIAL MARINE BIODIVERSITY APPRAISAL

### 4.1 Baseline Environment

#### 4.1.1 Benthic

##### 4.1.1.1 Intertidal

The proposed works including the existing sea wall, are characterised by a foreshore dominated by sand, shingle and cobbles, with strandline characterised by washed up seaweeds. Biotopes associated with these habitats area likely to support few species. The existing sea walls are likely to have limited flora and fauna (from review of photos; see Plate 1 and Plate 2 and aerial imagery), although may be characterised by Fucoids and *Ulva* spp. and barnacle mosaics.

Site specific surveys, undertaken for the Millport Coastal Protection Scheme, located approximately 6 km to the south west and has a similar geology, indicated that hard structures were dominated by pattern of yellow and grey lichens communities on the upper shore *Verrucaria maura* and sparse barnacles on upper and mid shore and barnacle dominated communities with limpets and littorinids on the mid to lower shore. The more mobile sand, shingle and cobbles are likely to be characterised by amphipods and polychaetes typical of an intertidal sand and shingle shore.

A widespread benthic survey was undertaken in 1979 by Paisley College of Technology (Connor, 1991). The survey found sheltered areas of the Clyde such as Loch Fyne, Striven and Gareloch to have the richest sediment shores hosting high diversity and biomass of benthic species. Whereas more exposed areas of Ayrshire (e.g. settings similar to Largs Bay) such as the Kintyre peninsula and the coast of Arran hosted fewer individuals and less species diversity. Connor (1991) reported intertidal species present such as the bivalves *Angulus tenuis* and *Cerastoderma edule*, the amphipod *bathyporeia* sp. and polychaetes *Scoloplos armiger*, *Pygospio elegans*, *Arenicola marina* and *N. cirrosa*. Intertidal fauna of sandy beaches in the Firth of Clyde was also studied by Eleftheriou and McIntyre (1976). Exposed shores were found to be dominated by crustaceans and polychaetes and the bivalve *Angulus tenuis*. Whilst more sheltered beaches were found to have a high biomass of bivalves and fewer crustaceans.

##### 4.1.1.2 Subtidal

There are three sea pen species which occur in Scottish waters: *Funiculina quadrangularis*, *Virgularia mirabilis* and *Pennatula phosphorea*. Seapens are associated with sheltered areas of high salinity and are often found in sandy, muddy sediments, sheltered areas of the Firth of Clyde Sea are considered a likely habitat (Scottish Government, 2021).

Various studies have reported maerl beds within the Clyde (Kamenos *et al.*, 2004; Hall-Spencer, 1995; Hall-Spencer and Moore, 2000). Of the maerl beds reported some have been living whilst others heavily impacted scallop dredging or dead.

Broadscale subtidal habitats are shown in Figure 4.1. Noting that these data (from EMODNet) are very broadscale datasets, these suggest that subtidal areas of Largs Bay are characterised by high to moderate energy circalittoral and infralittoral seabed, with predominantly mud habitat further offshore areas. Areas of subtidal rocky habitats are also potentially present closer to shore. Due to limited primary and secondary literature within this area, further site-specific Phase 1 intertidal walkover survey will be undertaken, with data incorporated into the Marine Biodiversity Appraisal.

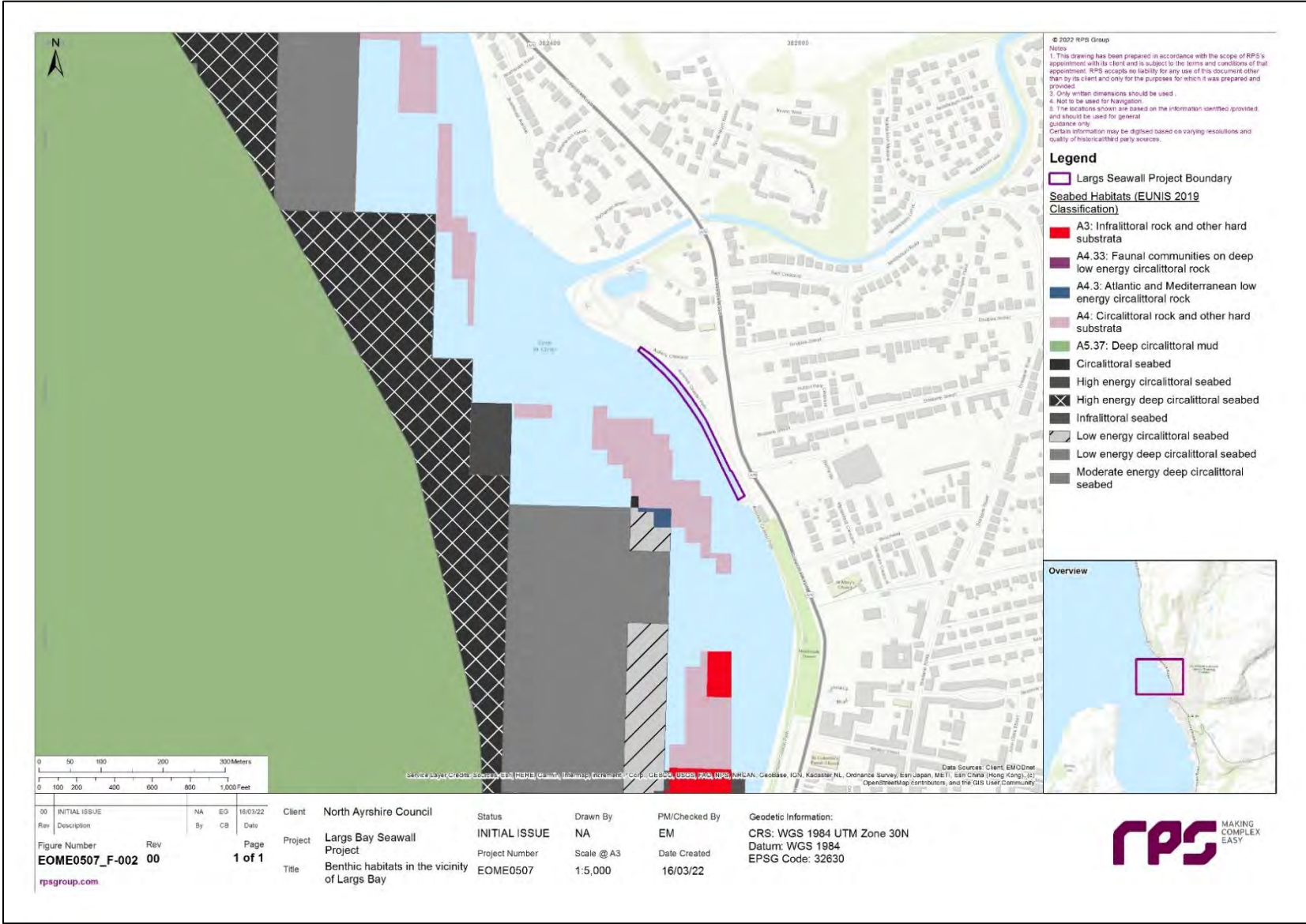


Figure 4.1: Seabed habitats in the vicinity of the project (from EMODNet, 2022)

### 4.1.2 Fish and Shellfish

Data on fish communities has been provided from the Millport Coastal Protection Scheme with sampling at Kames Bay, located 6 km from Largs Bay and therefore likely to be representative of those communities in Largs Bay. The area is used during the summer months for juvenile feeding grounds for flatfish, dogfish, wrasse species and numerous other intertidal species common to the West coast of Scotland including the intertidal goby and blenny species, butterfly and scorpion fish. There are spawning grounds for sandeel *Ammodytes marinus* and *Ammodytes tobianus*, European sprat *Sprattus sprattus* and Nephrops within the vicinity of Largs Bay (noting that these datasets are very broadscale) (Marine Scotland, 2019). Similarly, the region has been identified as a nursery ground for the following species: whiting *Merlangius merlangus*, sandeel, saithe *Pollachius virens*, plaice *Pleuronectes platessa*, herring *Clupea harengus* and Nephrops (Marine Scotland, 2019). A long term demersal fish survey was conducted in the Firth of Clyde by Health and Speirs (2011). Common species recorded in the survey included: hake *Merluccius merluccius*, long rough dab *Hippoglossoides platessoides*, cod *Gadus morhua*, whiting. Pelagic species also recorded were: herring *Clupea harengus* and sprat *Sprattus sprattus*.

Atlantic salmon *Salmo salar* have been found within the river directly to the north of the Proposal, the River Noddsdale Water, and are also likely to be present in the River Gogo Water, directly south. The Endrick Water SAC is located 37 km to the north east of Largs Bay and is designated for migratory Atlantic salmon, brook lamprey *Lampetra planeri*, and river lamprey *Lampetra fluviatilis*. The river Ayr is also located 32 km to the south of the project and contains populations of Atlantic salmon *Salmo salar*, brown trout *Salmo trutta*, grayling *Thymallus thymallus*, European eel *Anguilla anguilla*, stickleback, minnow *Phoxinus phoxinus* and stone loach *Barbatula barbatula*.

Also of note, there have been regular sightings of basking shark *Cetorhinus maximus* around the Firth of Clyde coinciding with plankton-rich waters (Speedie *et al.*, 2019) and the Isle of Arran is considered a particular 'hotspot' for basking shark sightings (McIntyre *et al.*, 2015). The coast around Largs Bay lies within the ICES rectangle 40E5. ICES landing data, indicates that the landings of *Nephrops*, scallops, queen scallops and whelks.

### 4.1.3 Marine Mammals

The most common cetacean species in Scotland's nearshore waters (within 60 km of the coast) are the harbour porpoise *Phocoena phocoena* and bottlenose dolphin *Tursiops truncatus* followed by minke whale *Balaenoptera acutorostrata* and white beaked dolphin *Lagenorhynchus albirostris*. Several species of marine mammal have been recorded in and around the Firth of Clyde. Species that have recently been reported include northern bottlenose whale *Hyperoodon ampullatus*, killer whale *Orcinus orca*, Risso's dolphin *Grampus griseus*, minke whale and harbour porpoise, although it should be noted that all were reported in relatively low numbers (SeaWatch Foundation, 2020). Largs Bay is located within Survey Block G surveyed during SCANS III, during surveys the following species were observed harbour porpoise (density of 0.336 individuals/km<sup>2</sup>), bottlenose dolphin (0.1206 /km<sup>2</sup>), minke whale (0.0271/km<sup>2</sup>) (Hammond *et al.*, 2016).

Grey and harbour seals are both resident in Scottish waters. Both species use coastal sites for breeding/pupping and hauling out, and feed in inshore and offshore waters. Under the Marine Scotland Act, Marine Scotland has designated 194 coastal sites around Scotland as seal haul-out sites. Three sites occur within 50 km from the project site, the closest being approximately 30 km to the south (Marine Scotland, 2019). Low densities of harbour seal are expected within the proposed works area, at sea usage was determined to be low – medium (SMFS *et al.*, 2020), informed by data from (Carter *et al.* in prep) and (Russell *et al.*, 2017). However, grey seal density is considered to be between 50 and 100 animals per 25 km<sup>2</sup>. At sea usage was determined to be medium - high (SMFS *et al.*, 2020), informed by data from Carter *et al.* (in prep) and Russell *et al.* (2017).

## 4.1.4 Ornithology

### 4.1.4.1 Intertidal

The Inner Clyde SSSI is located approximately 19 km from the project site. The Sites of Special Scientific Interest (SSSI) hosts extensive saltmarsh habitats and is therefore important for over-wintering bird species. The assemblage includes the following species of national or international importance: cormorant, eider, goldeneye, oystercatcher, red-breasted merganser, red-throated diver and redshank (Scottish Natural Heritage, 2010). The invertebrate fauna of the mudflats, sandflats and saltmarsh habitats provide ideal foraging opportunities for the intertidal bird species with high abundances of ragworms, sandhoppers, molluscs, dwarf eelgrass and seaweed. Species such as cormorant, red-breasted merganser and red-throated diver primarily forage further out into coastal waters targeting flatfish and eels and sticklebacks, respectively. Wading birds and waterbirds identified during surveys for the Millport Coastal protection scheme (located 6km from project site) included: grey heron *Ardea cinerea*, mute swan *Cygnus olor*, wigeon *Mareca penelope*, mallard *Anas platyrhynchos*, eider *Somateria mollissima*, oystercatcher *Haematopus ostralegus*, turnstone *Arenaria interpres*, purple sandpiper *Calidris maritima*, dunlin *Calidris alpina*, curlew *Numenius arquata* (Royal Haskoning, 2018). It is worth noting, that the project site does not encompass the invertebrate rich saltmarsh/mudflat habitats (see section 4.1.1.1, Plate 1 and Plate 2) as outlined above and therefore there is likely to be lower abundances of intertidal birds than other sites in the region due to the presence of habitats with lower foraging opportunity.

Intertidal and nearshore ornithology surveys were conducted by RPS to identify areas which support significant numbers of qualifying species of designated sites and any areas which are important for large assemblages of birds. Surveys were conducted between April and July 2021 with surveys covering a range of tidal conditions. The surveys noted that relatively low numbers of birds were present on the water located in front of the sea wall. Most birds present in surveys were also deemed to be common. Aggregations of birds were identified at the mouth of the Gogo Brun intertidal habitat. This is located near to the project works however it was deemed that due to the background levels of traffic and other activity in the area, disturbance to these species would not be significant.

Gulls were the most numerous species group identified during the surveys, with herring gull present in the largest numbers. The survey area was therefore considered of local importance for this species only. For all other species recorded, the Survey Area is of limited local importance, given the number of birds observed. Black guillemot were also recorded during the surveys confirming their presence in the area. This species is known to nest within sea wall structures, it has therefore been recommended the pre-construction surveys should be carried out before the construction takes place to avoid infringement of the Wildlife and Countryside Act 1981 (as amended). If any breeding birds are found, then advice of the Ecological Clerk of Works would need to be followed on site. However, given the nature of the current shoreline, the likelihood of nesting black guillemot is considered relatively low. For more information, see Intertidal and Nearshore Ornithology Surveys Report, presented alongside EIA screening.

### 4.1.4.2 Offshore

The primary seabird colonies are located off the Ayrshire Coast at Alisa Craig and the southeast coast of Kintyre at Sanda Island. These are both designated SSSIs for the protection of breeding seabirds. The cliffs and rocky shore of Alisa Craig are home to >10,000 pairs of breeding seabirds, including razorbill *Alca torda*, guillemot *Uria aalge*, kittiwake *Rissa tridactyla*, herring gull *Larus argentatus*, lesser black backed gull *Larus fuscus* and gannet *Morus bassanus*. The gannet colony at the site contributes to 10% of the British population (Scottish Natural Heritage, 2008). The Sanda Island SSSI is designated for following breeding seabird species: Black guillemot *Cephus grille*, Cormorant *Phalacrocorax carbo*, Fulmar *Fulmarus glacialis*, Great black-backed gull *Larus marinus*, Guillemot *Uria aalge*, Kittiwake *Rissa tridactyla*, Manx shearwater *Puffinus puffinus*, Puffin *Fratercula arctica*, Razorbill *Alca torda*, Shag *Phalacrocorax aristotelis*, Storm petrel *Hydrobates pelagicus*. The site hosts internationally important numbers of shag and razorbill (Scottish Natural Heritage, 2011). However, it is likely that a very limited number of species and individuals will be present within the



project area due to the absence of suitable nesting habitat. Works will be conducted in the intertidal zone at low tide and will not interact with seabirds foraging at sea

#### 4.1.5 Invasive Non-Native Species

Introduction of Invasive Non-Native Species (INNS) for marine species occurs predominantly through shipping and the aquaculture industry. McIntyre *et al.* (2012) reported presence of cord-grass *Spartina anglica* which colonises shallow mudflats and competes with the native seagrass *Zostera noltii* within the Firth of Clyde. Furthermore, The Scottish Government (2020) report on Non-native species (NNS) reported Carpet sea squirt *Didemnum vexillum*, Leathery sea squirt *Styela clava* and common cord-grass within the Clyde region of assessment.

The Firth of Clyde Biosecurity Plan 2012 – 2016 (Firth of Clyde Forum, 2016) details further INNS known to be established within the Firth of Clyde. These INNS are outlined in Table 4.1 below.

**Table 4.1: INNS in the Firth of Clyde region (Firth of Clyde Forum, 2016)**

| INNS Species   | Environmental Risk |
|--|--------------------|
| A bryozoan (no common name) <i>Tricellaria inopinata</i>                 | Medium             |
| A hydroid (no common name) <i>Cordylophora caspia</i>                    | Low                |
| Acorn barnacle <i>Elminius modestus</i>                                  | Low                |
| An orange sheath tunicate (no common name) <i>Botrylloides violaceus</i> | Low                |
| Carpet sea squirt <i>Didemnum vexillum</i>                               | High               |
| Common cord-grass <i>Spartina anglica</i>                                | Medium             |
| Green sea fingers <i>Codium fragile</i>                                  | Low                |
| Japanese skeleton shrimp <i>Caprella mutica</i>                          | Medium             |
| Leathery sea squirt <i>Styela clava</i>                                  | Low                |
| Orange tipped sea squirt <i>Corella eumyota</i>                          | Low                |
| Wireweed <i>Sargassum muticum</i>  | Medium             |

In order to limit spread of INNS, contractors will comply with the relevant Code of Practice and legislation. In addition to embedded mitigation measures outlined in section 2.4 further actions to prevent the spread of INNS will include:

- The 'check , clean, dry method' for all marine equipment and clothing between use;
- Reporting any sightings of carpet sea squirt to the non-native species secretariat via: [http://www.brc.ac.uk/risc/alert.php?species=carpet\\_seasquirt](http://www.brc.ac.uk/risc/alert.php?species=carpet_seasquirt); and;
- The procedure for addressing identified carpet sea squirt within the area of the works (outlined below in Table 4.2; noting that in this part of the intertidal the risk of this species being recorded is low).

**Table 4.2: INNS Procedure**

| Action  | Responsibility  |
|---|---|
| <b>Stage One – Suspected arrival of high alert species</b>  |   |
| Take photographs of sample and collect sample in a plastic bag.   | Designated biosecurity officer, site manager, Ecological Clerk of Works (ECOW), or any member of staff. |
| Check organism against identification sheet (available at <a href="http://www.nonnativespecies.org/index.cfm?sectionid=47">http://www.nonnativespecies.org/index.cfm?sectionid=47</a> ) | Designated biosecurity officer, site manager, Ecological Clerk of Works (ECOW), or any member of staff. |
| Phone the GB Non-Native Species Secretariat (NNSS) Hotline: 0845 1306 229,  |   |

| Action  | Responsibility  |
|---|---|
| Email <a href="mailto:alertnonnative@ceh.ac.uk">alertnonnative@ceh.ac.uk</a> for further information on sending sample and photographs. |   |
| Inform site users and mark the area (e.g. buoys or marker tape).  | Designated biosecurity officer, site manager, Ecological Clerk of Works (ECOW). |
| <b>Stage Two – Presence of high alert species confirmed</b>   |   |
| Initiate immediate containment measures, including restricted machinery/materials movements.  | Designated biosecurity officer, site manager, Ecological Clerk of Works (ECOW). |
| Carry out wider survey of machinery and structures.   | Designated biosecurity officer, qualified ecologist.                            |
| <b>Stage Three – Eradication/employ long-term control measures</b>  |   |
| Seek advice from NNSS on appropriate eradication and long-term control measures.  | Designated biosecurity officer, site manager.                                   |

#### 4.1.6 Designated Sites

The Proposal is not located within a Marine Protected Area (MPA) or designated site. The nearest MPA is the South Arran MPA, located approximately 26 km to the south west of the Proposal and is designated for the protection of kelp and seaweed communities on sublittoral sediment and burrowed mud.

The nearest designated terrestrial site under the EU Habitats Directive is the Renfrewshire Heights SPA which is 4 km from the project site. The nearest marine site European site is the Inner Clyde Estuary SPA located 23 km to the north east of the Proposal which is designated for seabird species and assemblages. Other designated sites that are located within a 50 km range of the proposal are listed in Table 4.3.

Table 4.3 provides a summary list of identified designated sites, distance from project and qualifying features associated with each site.

**Table 4.3: MPAs and designated sites relevant to the proposal.**

| Protected Area                    | Distance and Direction from Project | Qualifying Features   |
|-----------------------------------|-------------------------------------|---|
| Renfrewshire Heights SPA          | 4 km                                | Hen harrier <i>Circus cyaneus</i>   |
| Central Lochs, Bute SSSI          | 11km                                | Greylag goose   |
| Castle Semple and Barr Lochs SSSI | 15 km                               | Breeding bird assemblage:<br>Great crested Grebe <i>Podiceps cristatus</i> ,<br>Tufted duck <i>Aythya Fuliga</i> ,<br>Water rail <i>Rallus Aquaticus</i> ,<br>Sedge warbler <i>Acrocephalus Schoenobaenus</i> ,<br>Reed bunting <i>Emberiza Schoeniclus</i>   |
| Inner Clyde Estuary SPA           | 19 km                               | Cormorant <i>Phalacrocorax carbo</i><br>Goldeneye <i>Bucephala clangula</i><br>Eider <i>Somateria mollissima</i><br>Oystercatcher <i>Haematopus ostralegus</i><br>Red-breasted merganser <i>Mergus serrator</i><br>Redshank <i>Tringa totanu</i><br>Red-throated diver <i>Gavia stellata</i><br>Saltmarsh |

| Protected Area                         | Distance and Direction from Project | Qualifying Features  |
|--|-------------------------------------|--|
| Arran Moors SPA                        | 23 km                               | Hen harrier <i>Circus cyaneus</i>  |
| Endrick Water SAC                      | 37 km                               | Atlantic salmon<br>Brook lamprey <i>Lampetra planeri</i><br>River lamprey <i>Lampetra fluviatilis</i> .  |
| Muirkirk and North Lowther Uplands SPA | 42 km                               | Golden plover <i>Pluvialis apricaria</i><br>Hen harrier <i>Circus cyaneus</i><br>Hen harrier <i>Circus cyaneus</i><br>Merlin <i>Falco columbarius</i><br>Peregrine <i>Falco peregrinus</i><br>Short-eared owl <i>Asio flammeus</i> |
| South Arran MPA                        | 43 km                               | Burrowed Mud<br>Kelp and Seaweed Communities   |
| Buchan Ness to Collieston Coast SPA    | 23 km                               | Seabird Assemblage and Seabird Species   |
| Loch Lomond SPA                        | 35 km                               | Greenland white-fronted goose <i>Anser albifrons flavirostris</i>  |
| Inner Hebrides and the Minches SAC     | 40 km                               | Harbour Porpoise <i>Phocoena phocoena</i>  |
| Sound of Gigha pSPA                    | 46 km                               | Common eider <i>Somateria mollissima</i><br>Great northern diver <i>Gavia immer</i><br>Red-breasted merganser <i>Mergus serrator</i>   |
| Moin Mhor                              | 50 km                               | Otter <i>Lutra lutra</i><br>Atlantic salt meadows<br>Mudflats and sandflats not covered by seawater at low tide  |
| Taynish and Knapdale Woods             | 50 km                               | Otter <i>Lutra lutra</i>   |

## 4.2 Approach to Marine Biodiversity Appraisal

### 4.2.1 Overview

As noted in the previous sections, North Ayrshire Council proposes that the Marine Licence application for the Proposal is accompanied by a concise environmental assessment, presented in a Marine Biodiversity Appraisal.

Table 4.4 below provides a summary of the receptor topics which will be subject to further consideration as part of the Marine Biodiversity Appraisal.

Data sources that will be used to inform the Marine Biodiversity Appraisal are provided below in section 4.2.2. Effects that have been identified for each receptor topic that have been included for further consideration are discussed in sections 4.2.3 - 4.2.6. Activities that have been discounted from further consideration for each receptor topic are also presented, with an appropriate justification.

**Table 4.4: Summary of receptor topics included for further consideration (see sections 4.2.3 - 4.2.6 for further detail).**

| Receptor Topic                    | Justification  |
|-----------------------------------|--|
| Benthic ecology                   | Removal of benthic habitat within the footprint from placement of rock material and caissons, and excavation of the toe trench.<br>Introduction of INNS. |
| Fish and Shellfish                | Potential loss of feeding grounds through the removal of permanent habitat.<br>Introduction of INNS.   |
| Marine and Intertidal Ornithology | Potential loss of feeding grounds through the removal of permanent habitat.  |

## 4.2.2 Data Sources

The following data sources will be utilised to inform the receptor topics assessments considered in the Marine Biodiversity Appraisal:

- A site-specific Phase 1 intertidal survey will be undertaken following best practice guidelines (Wyn *et al.*, 2001). This will map all habitats within the vicinity of the project to ensure an up to date and robust characterisation of the habitats in the vicinity of the sea wall.
- Millport Coastal Flood Protection Scheme: Environmental Statement.
- Marine Scotland (2019). MAPS NMPi. <https://marinescotland.atkinsgeospatial.com/nmpi/>.
- Scottish Natural Heritage (2019). <https://sitelink.nature.scot/site/8207>
- Scotland's Marine Atlas (Baxter *et al.*, 2011);

## 4.2.3 Benthic Ecology

### 4.2.3.1 Effects considered in Marine Biodiversity Appraisal

The Marine Biodiversity Appraisal will contain an assessment of the following potential activities with respect to benthic ecology:

- **Project design footprint leading to removal/disturbance of intertidal benthic habitats.**

This has been included for further consideration in the Marine Biodiversity Appraisal as the proposal will result in removal or disturbance to benthic intertidal habitats located outside the existing sea wall boundary.

- **Introduction of Invasive Non-Native Species (INNS).**

This has been included for further consideration in the Marine Biodiversity Appraisal as the proposal has the potential to introduce or spread INNS. There is the potential for the introduction/spread of INNS through project machinery and materials.

### 4.2.3.2 Effects not considered in Marine Biodiversity Appraisal

The following activities and effects on benthic ecology will not be considered further in the Marine Biodiversity Appraisal, with justifications noted below:

- **Preparation of the toe trench and placement of rock may cause an increase in suspended sediment concentrations and associated sediment deposition.**

Activities will be undertaken in the dry at low-tide, therefore there is no pathway for this to affect benthic intertidal habitats, species or communities.

- **Placement of rock may cause a temporary increase in SSC and associated sediment deposition.**

Activities will be undertaken in the dry at low-tide, therefore there is no pathway for this to affect benthic intertidal habitats, species or communities.

- **Sediment disturbances leading to the release of sediment contaminants and consequent toxic effects on benthic species.**

The material to be removed from the toe trench will likely consist of coarse sediments and rock which do not have affinity to bond with contaminants, unlike clay and silt sediments. Further, all materials placed during construction are inert and will not result in release of contaminants into the water column. Given the volume of material to be removed, low levels of contaminants likely contained within the material and that all works will be undertaken in the dry, there is no pathway for this to affect benthic intertidal habitats, species or communities.



- **Project activities may result in accidental release of pollutants leading to toxic effects on benthic species.**

The potential for accidental release of pollutants affecting benthic ecology receptors will not be considered further on the basis that the designed-in mitigation measures, including pollution prevention and control measures, will reduce the likelihood and magnitude of effects to a negligible level.

### 4.2.4 Fish and Shellfish

#### 4.2.4.1 Effects considered in Marine Biodiversity Appraisal

The Marine Biodiversity Appraisal will contain an assessment of the following potential activities with respect to fish and shellfish.:

- **Project design footprint leading to removal of potential feeding grounds.**

This potential effect will be considered further in the Marine Biodiversity Appraisal as the Proposal will cause removal of benthic habitat located outside the existing sea wall boundary which may provide habitat/feeding grounds for fish and shellfish species, particularly nursery habitats.

- **Introduction for Invasive Non-Native Species (INNS).**

This potential effect will be considered further in the Marine Biodiversity Appraisal as the Proposal has the potential to introduce marine INNS to other parts of the UK. Rock imported for construction of the sea wall is not, however, considered as a vector for marine INNS as the rock will be quarried from a licenced site onshore and transported dry to the project site.

#### 4.2.4.2 Effects not considered in Marine Biodiversity Appraisal

The following effects and activities on fish and shellfish ecology will not be considered further in the Marine Biodiversity Appraisal, with justifications noted below:

- **Preparation of the toe trench and placement of rock may cause an increase in suspended sediment concentrations and associated sediment deposition.**

Activities will be undertaken in the dry at low-tide, therefore there is no pathway for this to affect fish and shellfish receptors.

- **Placement of rock may cause a temporary increase in SSC and associated sediment deposition.**

Activities will be undertaken in the dry at low-tide, therefore there is no pathway for this to affect fish and shellfish receptors.

- **Sediment disturbances leading to the release of sediment contaminants and consequent toxic effects on benthic species.**

The material to be removed from the toe trench will likely consist of coarse sediments and rock which do not have affinity to bond with contaminants, unlike clay and silt sediments. Further, all materials placed during construction are inert and will not result in release of contaminants into the water column. Given the volume of material to be removed, low levels of contaminants likely contained within the material and that all works will be undertaken in the dry, there is no pathway for this to affect fish and shellfish receptors.

**Project activities may result in accidental release of pollutants leading to toxic effects on benthic species.**

The potential for accidental release of pollutants affecting fish and shellfish receptors will not be considered further on the basis that the designed-in mitigation measures, including pollution prevention and control measures, will reduce the likelihood and magnitude of effects to a negligible level.

- **Project development activities may result in noise emissions leading to disturbance to fish**

This effect will not be considered further. The Proposal activities such as installation of sheet piles, rock placement, beach excavation and seawall excavation has the potential to generate underwater noise. However, the works will be carried out at low-tide in the dry, there will be no water on the beach and therefore no medium through which underwater noise may be propagated to the marine environment such that would represent a risk of injury of disturbance to fish and shellfish species.

### 4.2.5 Marine Mammals

#### 4.2.5.1 Effects considered in Marine Biodiversity Appraisal

No effects on marine mammals will be considered further in the Marine Biodiversity Appraisal due to there being no pathway for an impact to occur to this receptor. Works will be conducted in the dry, and therefore will not impact marine mammal species.

#### 4.2.5.2 Effects not considered in Marine Biodiversity Appraisal

The effects on marine mammals which have been considered but will not be further assessed and associated justifications are noted below:

- **Project development activities may result in noise emissions leading to disturbance to marine mammals.**

This effect will not be considered further. The Proposal activities such as installation of sheet piles, rock placement, beach excavation and seawall excavation has the potential to generate underwater noise, . However, the works will be carried out at low-tide in the dry and therefore there will be no propagation of noise into the, on the beach therefore there will be no water and therefore no medium through which underwater noise may be propagated to the marine environment such that would represent a risk of injury of disturbance to marine mammal species.

- **Vessel traffic associated with the Proposal may result in collision risk.**

No vessels are proposed to be used to construct the sea wall. All works will be undertaken from the shore.

### 4.2.6 Marine and Intertidal Ornithology

#### 4.2.6.1 Effects considered in Marine Biodiversity Appraisal

The Marine Biodiversity Appraisal will contain an assessment of the following potential effects with respect to ornithology:

- **Development activities may result in disturbance to ornithological receptors.**

This has been included for further consideration in the Marine Biodiversity Appraisal as the Proposal will use large machinery which may have effects (e.g. disturbance) on intertidal bird populations.

- **Development activities may result in potential loss of feeding grounds**

This has been included for further consideration in the Marine Biodiversity Appraisal as the Proposal will involve the removal of permanent habitat through the removal of beach sediment outside of the existing sea wall boundary.

#### 4.2.6.2 Effects not considered in Marine Biodiversity Appraisal

There are no effects on ornithology which can be discounted, all potential effects identified will be considered further in the Marine Biodiversity Appraisal.

## 4.3 Cumulative Effects

The proposed project is located adjacent to Largs Yacht Harbour which is an operating recreational fishing and leisure harbour. Activities may include vessel movements, maintenance dredging and are considered part

of the baseline. No other projects are currently being planned or being undertaken. There will be therefore no significant cumulative effects on the environment and therefore this will not be considered further in the Marine Biodiversity Appraisal.

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## APPENDIX A – PLANT AND MATERIALS

Plate 4 to Plate 8 provide typical examples of the plant and equipment that will be used during the proposed works.



**Plate 4: Excavator unloading from dump truck.**



**Plate 5: HGV lorries for delivery of locally sourced rock armour.**



**Plate 6: Loading shovel/telehandler.**



**Plate 7: a crane for lifting units/armour into place or clearing existing sea wall.**



**Plate 8: Concrete wagon.**



**Plate 9: Articulated Dumper Truck.**



APPENDIX B – DESIGN DRAWINGS

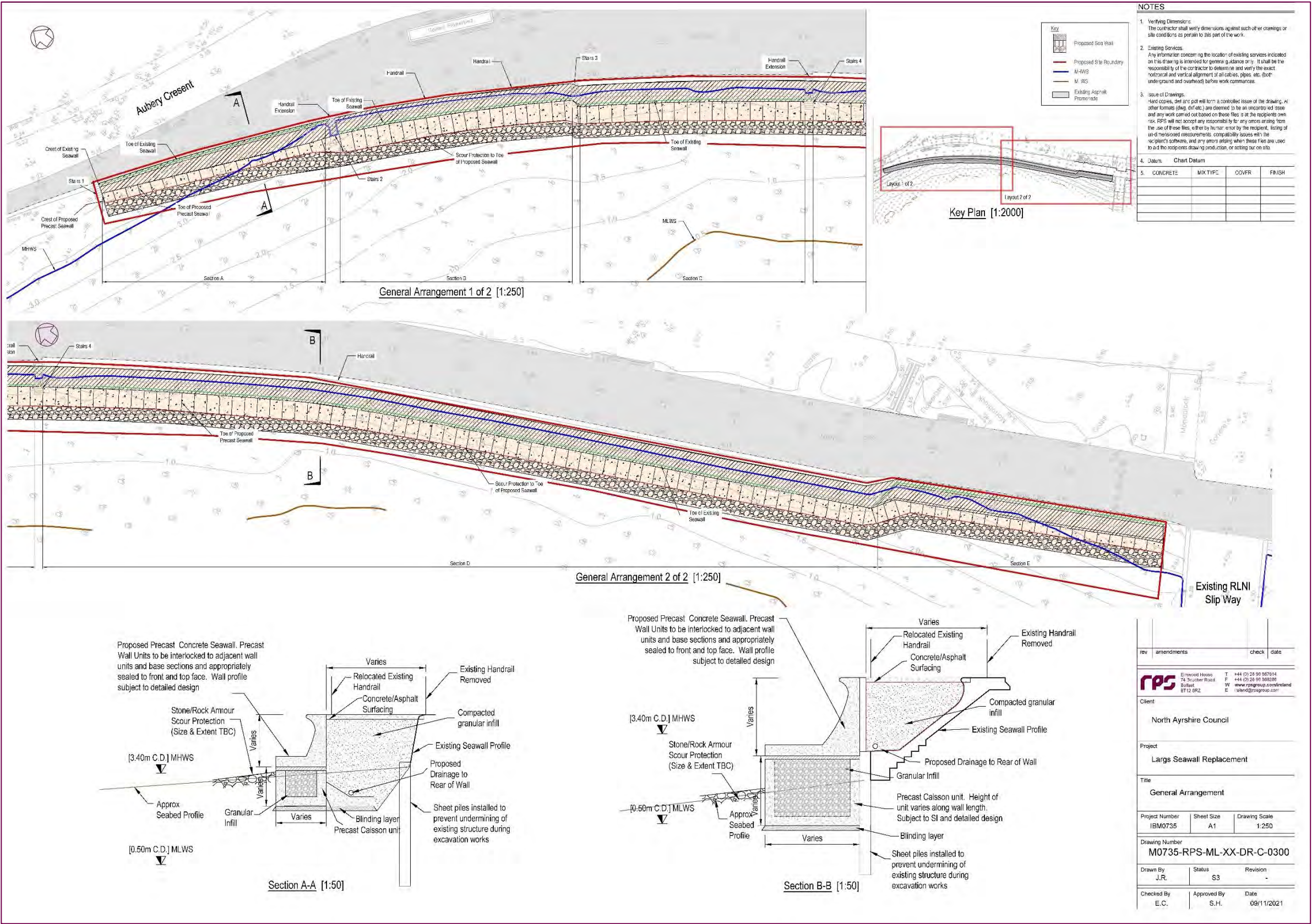


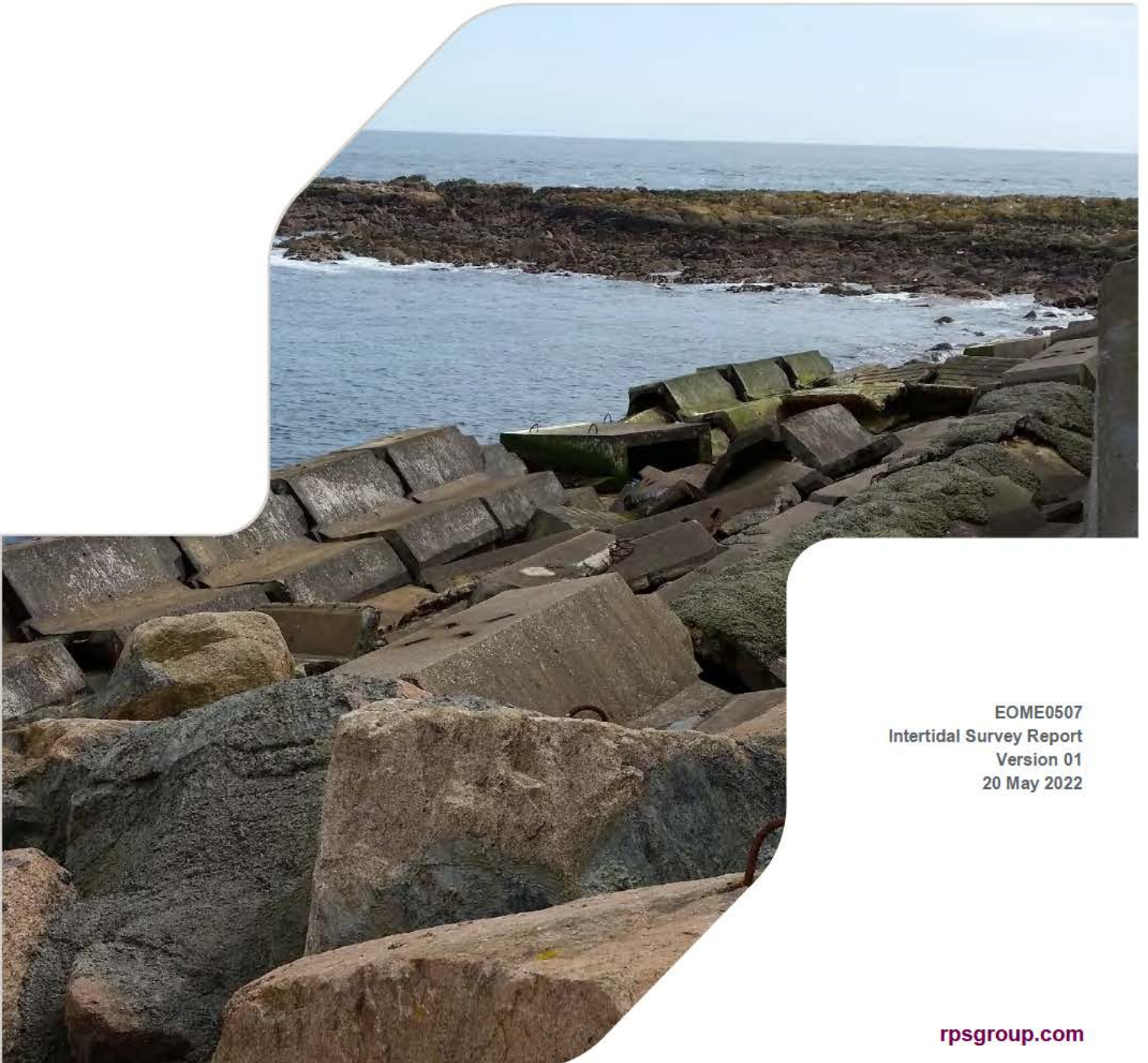
Figure 5.1: Proposed layout of the sea wall replacement.

## Appendix E: Intertidal Survey and Report



# REPLACEMENT SEA WALL, LARGS

## Intertidal Survey Report



EOME0507  
Intertidal Survey Report  
Version 01  
20 May 2022

## REPLACEMENT SEA WALL: INTERTIDAL SURVEY REPORT

### Document status

| Version | Purpose of document            | Authored by | Reviewed by            | Approved by | Review date |
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|         |                                |             |                        |             |             |
|         |                                |             |                        |             |             |

### Approval for issue

K Linnane

20 May 2022

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## Contents

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>INTRODUCTION .....</b>                        | <b>4</b>  |
| <b>2</b> | <b>INTERTIDAL SURVEY .....</b>                   | <b>5</b>  |
| 2.1      | Methodology .....                                | 5         |
| 2.1.1    | Timing.....                                      | 5         |
| <b>3</b> | <b>SURVEY RESULTS.....</b>                       | <b>6</b>  |
| 3.1      | Overview.....                                    | 6         |
| 3.2      | Biotopes.....                                    | 8         |
| 3.3      | Observations in wider area.....                  | 16        |
| <b>4</b> | <b>HABITATS OF CONSERVATION IMPORTANCE .....</b> | <b>17</b> |
| 4.1      | Intertidal Sand and Mudflats .....               | 17        |
| 4.2      | Other Biotopes.....                              | 17        |
| <b>5</b> | <b>SUMMARY .....</b>                             | <b>18</b> |
| <b>6</b> | <b>REFERENCES .....</b>                          | <b>19</b> |

## Appendices

|            |  |    |
|------------|--|----|
| Appendix A | List of Biotopes in the Survey Area..... | 20 |
| Appendix B | Target Notes .....                       | 21 |

# 1 INTRODUCTION

The town of Largs is located within the Firth of Clyde in North Ayrshire, Scotland, and is a popular seaside resort. The town is protected by a sea wall located on the Largs Promenade which extends from the mouth of the Noddsdale Water southwards to Largs Harbour. The sea wall is located across a 300m stretch of beach north of the RNLI slipway.

Engineering surveys undertaken have indicated that the existing sea wall structure is deteriorating. Specifically, there is clear deterioration of the gunite facing concrete, where it remains attached to the existing wall face and high levels of corrosion of the existing wall reinforcement. The sea wall is also undermined along a section of wall (approx. 12m in length) where the toe is exposed and no sheet piles were installed. There is also deterioration to three sets of steps ranging in height from 1.8m to 3.1m located along the length of the sea wall. On this basis there is a need for the proposed sea wall replacement scheme which comprises the replacement/encapsulation of the existing 300m long sea wall.

This Phase 1 Intertidal Survey Report provides a characterisation of the benthic baseline environment from Mean High Water Springs (MHWS) to approximately Mean Low Water Springs (MLWS), and identifies sensitive ecological receptors present at the proposed location of the seawall replacement at Largs Bay, Ayrshire. The results of this survey will inform the Marine Biodiversity Assessment being undertaken for the proposed development as part of the Marine Licence application to Marine Scotland Licensing Operations Team (MS-LOT).

The structure of this report is as follows:

- **Section 2, Intertidal Survey:** this section provides a description of the methodology used to undertake the Phase 1 Intertidal Survey;
- **Section 3, Survey Results:** this section describes the results of the survey and classifies the environment by biotope;
- **Section 4, Habitats of Conservation Importance:** this section identifies which biotopes are of ecological and conservational importance; and
- **Section 5, Summary:** This section summaries the report.



## 2 INTERTIDAL SURVEY

### 2.1 Methodology

A Phase 1 walkover survey of the intertidal area in the vicinity of forthcoming seawall repairs at Largs Bay, Ayrshire was undertaken on 6 April 2022. The survey was carried out on a spring tide cycle and focussed on intertidal biotopes from MHWs to approximately MLWS. Tide data for the survey are presented in Table 2.1. The area of seawall repairs and a 50m buffer zone at either side was formally surveyed. In addition, a brief walkover survey extended approximately another 100m either side to check habitat continuity within the wider context of the beach.

The survey was undertaken with reference to standard intertidal survey methodologies as outlined in the Joint Nature Conservation Committee (JNCC) Marine Monitoring Handbook (Davies *et al.*, 2001), Procedural Guidance No 3-1 *In situ* intertidal biotope recording (Wyn and Brazier, 2001 and Wyn *et al.*, 2000), and The Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey (Wyn *et al.*, 2006).

The survey was carried out by experienced marine biotope and coastal habitat surveyor (Max Carstairs) with survey assistance and a health and safety presence from marine ecologist (Kat Majewska).

During the walkover survey, notes were made on the shore type, wave exposure, sediments/substrates present and descriptions of species/biotopes present (JNCC, 2015). The spatial relationships between these features were observed and waypoints were recorded by a hand-held global positioning system (GPS) device, in conjunction with hand-written descriptions and photographs. All biotopes present were identified, and their extents mapped with the aid of aerial photographs and a hand-held GPS recorder. Biotope mosaics have been mapped where a number of discrete biotopes occur intricately together. Any other features within the intertidal zone were also noted including, man-made structures, and any habitats/species of conservation importance. Where present, these features were target noted in the intertidal biotope map.

On-site sediment sieving was undertaken in different biotopes, where physically possible. The locations of sieving stations were determined in the field. The procedure involved the collection of four spade-loads (approximately 0.02 m<sup>2</sup>) of sediment dug to a depth of 20-25 cm, which were then sieved through a series of stacked sieves, the finest of which was 0.5 mm mesh. All macrofauna species present were identified to the lowest taxonomic level possible in the field and also enumerated on site. Field notes were also taken on the physical characteristics including sediment type (Wentworth, 1922) and presence of anoxic layers in the sediment.

#### 2.1.1 Timing

The fieldwork was undertaken on the 06 April 2022 during the optimal period for intertidal biotope survey mapping namely April – October (Wyn *et al.*, 2006). Due to occurrence of low tide close to sunrise, surveying was undertaken before and after low water. Approximate low tide time and height for the survey are presented in Table 2.1.

**Table 2.1: Tide Times and Daylight Hours for Intertidal Survey (based on times for Wemyss Bay). Tide Heights in Meters above Chart Datum, Times in BST.**

| Date       | Start | Finish | Low tide | Height | Sunrise |
|------------|-------|--------|----------|--------|---------|
| 06/04/2022 | 08:20 | 12:00  | 09:25    | 0.48m  | 06:36   |



## 3 SURVEY RESULTS

This section describes the results of the intertidal survey undertaken within the intertidal environment at Largs Bay, aiming to attribute biotopes to the species and habitats identified.

### 3.1 Overview

The survey site had a small tidal range with a narrow intertidal zone with a seawall constructed from concrete present at the head of the beach. Large slabs (25 cm - >1m) had fallen off the seawall and lay scattered around the intertidal zone.

Several species of flora and fauna indicated a low/variable salinity within the survey area, particularly towards the north of the site. The survey area contained a restricted array of commonly occurring species and biotopes (Figure 3.1). The biotope LS.LSa.St.Tal Talitrids dominated the upper shore and strand-line, giving way to a mosaic of 80% LR.MLR.BF.Fser *Fucus serratus* on moderately exposed lower eulittoral rock and 20% LS.LSa.MuSa.Lan *Lanice conchilega* in littoral sand along the mid – lower shore. Patches of LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock and LS.LSa.MuSa.Lan *Lanice conchilega* in littoral sand were observed to the north west of the survey area. A list of all biotopes found within the survey area can be found within Appendix A. Similarly, a summary list of the Target Notes taken can be found within Appendix B.

Sediments processed within the survey area were dominated by cobbles, pebbles, and coarse sand. Most of the survey area was reflective in terms of wave energy with cobbles and pebbles dressing the surface of the beach. At the lower shore where the angle of slope decreased, and wave energy was more dissipative, narrow strips and patches of coarse sand ~ 5-10cm deep lay over cobbles and pebbles.

Other notable observations from outside the survey area include a diffuse groundwater seepage zone at NS 19865 60351 and Noddsdale Water discharged fresh water into the bay at NS 19874 60423 approximately 150m metres north of the survey area.

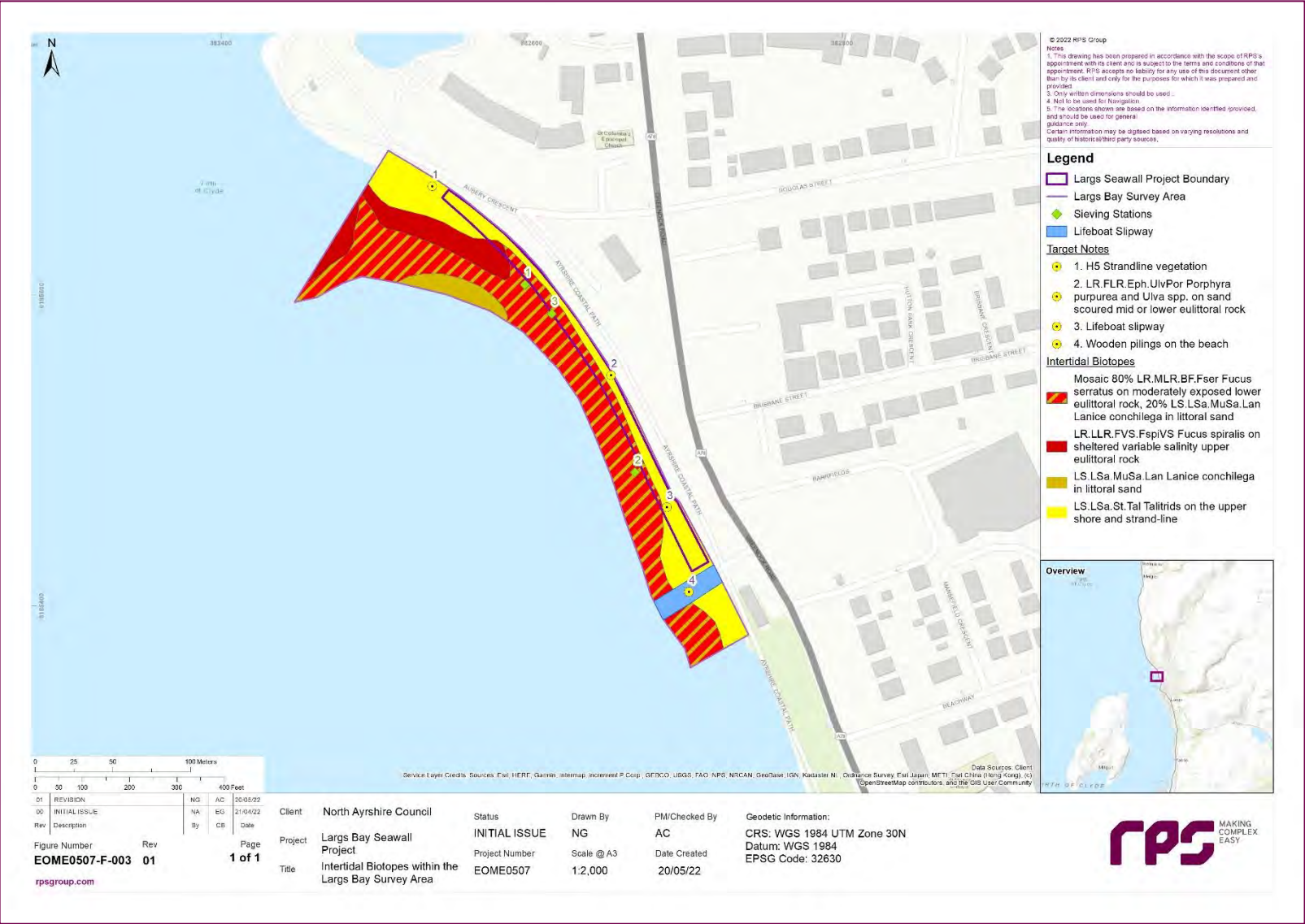


Figure 3.1: Intertidal biotope map of Largs Bay.



### 3.2 Biotopes

The biotope **LS.LSa.St.Tal Talitrids on the upper shore and strand-line** was present at the top of the beach where a super-abundance of sandhoppers (talitrid amphipods) occurred under decomposing seaweed in the north of the site (Figure 3.1). This habitat occurred in a poorer form under the seawall where the density of talitrids was very low due to the absence of a strandline and associated decomposing material.

A limited strand-line of vascular plant flora was also present in the north of the site consisting of sea radish *Raphanus maritimus*, sea mayweed *Tripleurospermum maritimum*, and seedlings of an *Orache* species (Target Note 1). The habitat coding for this vegetation is **H5 Strandline Vegetation** (JNCC, 2003; Figure 3.2).



**Figure 3.2: LS.LSa.St.Tal Talitrids on the upper shore and strand-line and H5 Strandline Vegetation.**

The biotope **LR.FLR.Eph.UlvPor Porphyra purpurea and Ulva spp. on sand-scoured mid or lower eulittoral rock** was distributed sporadically along the seawall (Target Note 2). The green seaweed *Ulva intestinalis*, was abundant while the red seaweed *P. purpurea* and barnacle *Semibalanus balanoides* occurred occasionally. The brown seaweed *Fucus spiralis* was abundant in places (Figure 3.3).





**Figure 3.3: The biotope LR.FLR.Eph.UlvPor *Porphyra purpurea* and *Ulva* spp. on sand-scoured mid or lower eulittoral rock present on the seawall.**

The biotope **LR.LLR.FVS.FspiVS *Fucus spiralis*** on sheltered variable salinity upper eulittoral rock was present in the north of the survey area (Figure 3.1). *F. spiralis* was the dominant seaweed with *Fucus vesiculosus*, *F. serratus* and *Fucus ceranoides* also present (Figure 3.4). The latter indicates low/variable salinity and was more abundant in the north of the site near sources of fresh water. *S. balanoides* was the predominant barnacle species occurring frequently and covering around 25% of the beach stones. The barnacles *Austrominius modestus* and *Balanus crenatus* occurred occasionally in the north of the site. The tube-forming polychaete worm *Spirobranchus lamarcki* occurred frequently from the mid to lower shore while *Spirorbis spirorbis* was present on a small number of *F. vesiculosus* fronds. The gastropods *Littorina littorea* and *Littorina saxatilis* also occurred occasionally while *Littorina mariae* was rare. The limpet *Patella vulgata* and red seaweeds *Polysiphonia* sp. and *Chondrus crispus* occurred rarely. The substrate was predominately cobbles (40%) with pebbles (20%) gravel (20%) and coarse sand (10%) also present. Beneath the surface large interstitial spaces between cobbles and pebbles were filled with coarse sand. Natural boulders (3%) were rare while large pieces of fallen seawall covered around 7% of the beach surface.

*F. serratus* is the dominant species in the middle of the survey area. It was present on mixed sized rocks as in the *F. spiralis* zone and contains the similar faunal assemblage only varying in the abundance of *B. crenatus* which was approaching co-dominance with *S. balanoides*. *C. crispus* was more abundant and joined by another two species of red seaweeds *Dumontia contorta* and *Corallina officinalis* which occurred rarely. *Mytilus edulis* was rare and sponges and ascidians were either absent or very sparse. The best fit for this assemblage is **LR.MLR.BF.Fser *Fucus serratus* on moderately exposed lower eulittoral rock**.

There was progressively more coarse sand present towards the lower shore where **LR.MLR.BF.Fser** was restricted to the hard rocks, occurring in a mosaic with a soft sediment biotope **LS.LSa.MuSa.Lan**, described below.





**Figure 3.4:** Foreshore showing *LR.LLR.FVS.FspiVS Fucus spiralis* on sheltered variable salinity upper eulittoral rock, *LSa.MuSa.Lan Lanice conchilega* in littoral sand. Seawall on left and lifeboat slipway in background.

Large slabs (25cm - >100cm across) of broken seawall were scattered across the *F. spiralis* and *F. serratus* zones. Several fish and invertebrate species attained much higher densities underneath these structures than in surrounding mixed sediments. These included *Nucella lapillus*, *Steromphala cineraria*, *Actinia equina*, *Carcinus maenas*, *L. littorea*, *L. saxatilis*, *Pholis gunnellus* and *Lipophrys pholis* (Figure 3.5).





**Figure 3.5: A variety of molluscs including *N. lapillus* and egg cases on the underside of a fallen seawall slab. The anemone *A. equina* is also present in the foreground.**

Four wooden pilings (Target Note 3) are present on the beach, each one showing a vertical zonation with *U. intestinalis* abundant at the top and *S. balanoides* abundant in the middle section. *F. spiralis* was occasional across both of these zones. Additional species able to colonise weathered fissures, such as *L. littorea* occurred in the middle zone (Figure 3.6). The wood-boring amphipod *Limnoria lignorum* was present at the base of the pilings causing visible deterioration of the structure (Figure 3.7). A small section of wood was removed during the survey exposing animals in their tunnels in order to confirm presence.





**Figure 3.6: Wooden piling showing vertical zonation of species**





**Figure 3.7: Wooden piles narrow at the base due to boring activity by *Limnoria lignorum*.**

The surface of the lifeboat slipway (Target Note 4) is generally free of colonising animals and seaweeds though *S. balanoides* was present on the vertical sides and became superabundant towards the lower shore together with its predator, the commonly occurring *N. lapillus*. Species occurring occasionally on the main wall included *F. spiralis* and *P. vulgata*. *A. equina* and *M. edulis* were occasional and rare respectively in recesses between adjoining concrete blocks.

Small patches and strips of coarse sand (less than 5-10cm deep) were present at the low tide mark. Digging and sieving was undertaken at three stations in this habitat (Table 3.1 & Figure 3.8) and an anoxic layer was not encountered. Occasionally, *Arenicola marina* (Figure 3.9) and *Lanice conchilega* (Figure 3.10) were present but in low densities with a slightly greater abundance of the latter. A single live specimen of *Chamelea gallina* was located on the surface of the sand. This biotope was classified as a poor form of **LS.LSa.MuSa.Lan** *Lanice conchilega* in littoral sand.



Table 3.1: Sieving stations, their physical characteristics and fauna.

| Station | NGR            | Sediments  | Fauna   | Notes   |
|---------|----------------|--|---|---|
| S1      | NS 20021 60237 | Coarse red sand to 5-10 cm, pebbles and cobbles underneath.<br>No anoxic layer | <i>C. maenas</i> – juvenile<br><i>L. conchilega</i> x 4       |   |
| S2      | NS 20090 60115 | Coarse red sand to 5-10 cm, pebbles and cobbles underneath.<br>No anoxic layer | None  | <i>A. marina</i><br><i>L. conchilega</i> nearby |
| S3      | NS 20038 60218 | Coarse red sand to 5-10 cm, pebbles and cobbles underneath.<br>No anoxic layer | <i>C. maenas</i> – juvenile<br><i>C. gallina</i> (on surface) | <i>A. marina</i><br><i>L. conchilega</i> nearby |



Figure 3.8: Example station from sieving station 1 showing gravel and coarse sand content





**Figure 3.9: *Arenicola marina* in LSa.MuSa.Lan *Lanice conchilega* in littoral sand.**



Figure 3.10: *Lanice conchilega* in **LSa.MuSa.Lan** *Lanice conchilega* in littoral sand.

### 3.3 Observations in wider area

Brief observations were made on biotopes surrounding the formal survey area in order to obtain an understanding of biotope continuity across the wider context of the beach. These areas were not mapped and species present were not listed in detail.

The intertidal zone widens significantly immediately north of the formal survey area up to the Noddsdale Water. **LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock** becomes the dominant biotope in this area, within which *F. ceranoides* is sometimes dominant in patches and around seams reflecting freshwater seepage and run-off. *U intestinalis* and *Ulva lactuca* were also observed albeit in low densities in this habitat.

The habitats in the south continue outside of the formal survey area in a similar fashion for approximately 100m.

**LS.LSa.MuSa.Lan *Lanice conchilega* in littoral sand** on the intertidal extends into the infralittoral zone and a live sea potato, *Echinocardium cordatum* was observed in this biotope. Further out in the infralittoral a band of *Laminaria saccharina* with associated red seaweeds occurred sparsely where cobbles were exposed or lay just beneath the surface of the sand.



## 4 HABITATS OF CONSERVATION IMPORTANCE

This section identifies the biotopes of conservation importance as described by the Annex I Habitats Directive.

### 4.1 Intertidal Sand and Mudflats

The following biotopes are part of the Annex I Habitats Directive habitat – *1140 Mudflats and sandflats not covered by seawater at low tide*:

- ***LS.Lsa.St.Tal Talitrids on the upper shore and strand-line***
- ***LS.LSa.MuSa.Lan, *Lanice conchilega* in littoral sand***

### 4.2 Other Biotopes

All other biotopes within the study area are UK Broad Biodiversity Action Plan habitats.

## 5 SUMMARY

The narrow nature of the intertidal zone means that several biotopes appear spatially compressed and restricted to a transitional state, lacking the space to develop fully into characteristic assemblages. However, two of the biotopes on site qualify as habitats protected under Annex I of the Habitats Directive and all of the biotopes present are UK Broad Biodiversity Action Plan habitats.



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## Appendix A

## List of Biotopes in the Survey Area

| Shore Position    | Biotope/Phase 1 Code | Biotope Name   | Biotope Description   |
|-------------------|----------------------|--|---|
| Upper Shore       | LS.LSa.St.Tal        | Talitrids on the upper shore and strand-line   | A community of sandhoppers (talitrid amphipods) may occur on any shore where driftlines of decomposing seaweed and other debris accumulate on the strandline. The biotope occurs most frequently on medium and fine sandy shores, but may also occur on a wide variety of sediment shores composed of muddy sediment, shingle and mixed substrata, or on rocky shores.  |
| Upper Shore       | H5                   | Strandline Vegetation  | Open community of the driftline on shingle or rock. The stand of vegetation on site was not distinct enough for NVC classification.   |
| Upper Shore       | LR.FLR.Eph.UlvPor    | <i>P. purpurea</i> and <i>Ulva</i> spp. on sand-scoured mid or lower eulittoral rock | Exposed and moderately exposed mid-shore bedrock and boulders occurring adjacent to areas of sand which significantly affects the rock. Under the blanket of ephemeral seaweeds, the barnacles <i>S. balanoides</i> or <i>A. modestus</i> and the limpet <i>P. vulgata</i> may occur in the less scoured areas, along with the occasional winkles <i>L. littorea</i> and <i>L. saxatilis</i> . Few other species are present.   |
| Upper & mid shore | LR.LLR.FVS.FspiVS    | <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock           | Sheltered to extremely sheltered upper eulittoral bedrock or mixed substrata (boulders, large cobbles or shells on mud) in variable salinity conditions characterised by a band of the spiral wrack <i>F. spiralis</i> . The barnacles <i>S. balanoides</i> and <i>A. modestus</i> can be found where suitable substrata are available, while gammarids can be found underneath the fronds of <i>F. spiralis</i> and/or underneath the boulders and cobbles. Also found underneath the fronds and among the boulders are the winkles <i>L. saxatilis</i> and <i>L. littorea</i> and the crab <i>C. maenas</i> . |
|                   | LR.MLR.BF.Fser       | <i>Fucus serratus</i> on moderately exposed lower eulittoral rock                    | Lower eulittoral bedrock and stable boulders on moderately exposed to sheltered shores with a canopy of the wrack <i>F. serratus</i> and an associated fauna consisting of the limpet <i>P. vulgata</i> , the barnacle <i>S. balanoides</i> , the whelk <i>N. lapillus</i> , the anemone <i>A. equina</i> and the sponge <i>Halichondria panicea</i> .  |
| Lower shore       | LS.LSa.MuSa.Lan      | <i>Lanice conchilega</i> in littoral sand  | Can occur on the lower part of predominantly rocky or boulder shores, where patches of sand or muddy sand occur between scattered boulders, cobbles and pebbles. Conditions may be tide-swept, and the sediment may be mobile, but the biotope usually occurs in areas sheltered from strong wave action. The sediment supports dense populations of the sand mason <i>Lanice conchilega</i> .  |

## Appendix B

## Target Notes

| Number | Target Note  | NGR            |
|--------|--|----------------|
| 1      | H5 Strandline vegetation   | NS 19962 60301 |
| 2      | LR.FLR.Eph.UlvPor <i>Porphyra purpurea</i> and <i>Ulva</i> spp. on sand scoured mid or lower eulittoral rock | NS 20076 60178 |
| 3      | Wooden pilings on the beach  | NS 20110 60092 |
| 4      | Lifeboat slipway   | NS 20124 60038 |