

Kinmel Bay Coastal Defence Improvements Scheme Environmental Statement Non-Technical Summary

Final

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LD&DESIGN

ameyconsulting



JBA Project Manager

Sam Wingfield
Phoenix House
Lakeside Drive
Centre Park
WARRINGTON
Cheshire
UNITED KINGDOM
WA1 1RX

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Contract

This report describes work commissioned by Amey Consulting, on behalf of Conwy County Borough Council. Lydia Price of JBA Consulting carried out this work.

Prepared by Lydia Price MSc BSc

Assistant Analyst

Reviewed by Dorian Latham BA PhD CEnv FCIEEM

Purpose

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Non-Technical Summary

Background to the proposed scheme

The coastal communities at Kinmel Bay are currently threatened by increasing flood risk. In 2021, the number of properties at risk from a 1 in 200-year flood event was 892, which will increase to 3,335 properties by 2121.

Conwy County Borough Council (CCBC) are proposing to construct coastal flood protection works along the coastline at Kinmel Bay, to extend and improve existing defences. Together, the upgrades and additional coastal defences discussed are referred to as the proposed scheme.

Along the stretch, there are already several flood defences including rock revetments, cobbled beaches, sea walls and floodgates.

The objectives of the Kinmel Bay Coastal Defence Improvement scheme as stated in the Outline Business Case are as follows:

- Reduce flood damages to residential and non-residential properties.
- Ensure community and stakeholder 'buy-in' for the scheme.
- Develop a scheme that is deliverable within the engineering time constraints.
- Develop a scheme that is adaptable to change; and
- Sustain and/ or improve the tourist and amenity benefits through continued operation of the beach and the North Wales Coastal Route.



Figure 1-1: Location of the proposed scheme.

Description of the proposed scheme

The proposed scheme is split into two coastal management units, with three specific areas, Towyn Revetment, Kinmel Bay West and Kinmel Bay East. Descriptions of the proposed works are as follows.

Towyn Revetment

At this location, the proposed works involve significantly upgrading the new rock armour to increase the amount of flood protection it offers. The upgrade will maintain the same slope but increases the width of the crest and height. Where possible, the current rock armour material will be reused and repurposed. The existing sea wall will also be raised by 0.75m. There will also be some additional ecological enhancements to the rock armour these include creating a textured surface which will encourage the growth of marine invertebrates.

There are also a series of public realm proposals in this area which include:

- Enhancement of the areas of existing meadows
- A proposed parklet at the eastern end of the Towyn Revetment. The parklet will comprise of:
 - Lounging seats
 - Picnic tables
 - Decorative paving
 - Cycle parking
- Improvement will be made to the existing access points adjacent to the Golden Sands Caravan Park.

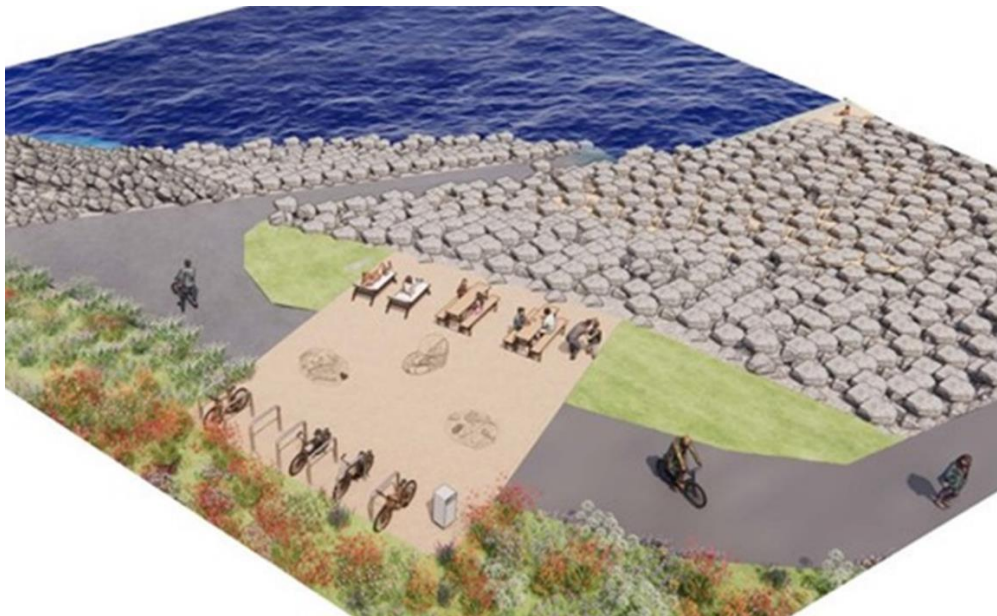


Figure 1-2: Indicative visualisation of the proposed parklet at Towyn Revetment.

Kinmel Bay (East and West)

There are several coastal defence proposals along this section. This involves increasing the height of the sea wall along the entire stretch by 500m. There will also be an upgrade to the flood gate at St Asaph Avenue car park to match the new sea wall height. The increased height of the sea wall will provide improved protection from flooding to Kinmel Bay. The car park will also be reprofiled to ensure that flood water will be returned to the sea wall through the floodgate.

At the eastern end of Kinmel Bay, the existing rock armour will be enhanced and upgraded. The existing height of the seawall behind it will be raised by 0.5m and the new rock armour will match the height of the sea wall. The length of the new unit will be approximately 420m and end near the sand dunes east of Kinmel caravan park.

Where necessary, sand dunes will be re-instated along the stretch to the east of the car park at the end of St Asaph Avenue. There are also public realm proposals at the Kinmel bay portion of the scheme.

A parklet at Kinmel Bay West which includes:

- Cycle parking
- Cycle maintenance and charging facilities
- Lounge seating
- Informal play equipment
- Shelter for informal use
- Decorative paving



Figure 1-3: Indicative visualisation of proposed Kinmel Bay West Parklet.

There will be widening the footpath to 4.5m between Sandy Cove and Baysville Coffee and Grill.

The existing St Asaph Avenue car park will be enhanced to act as a beach side hub for the community incorporating:

- Enhanced car park with rain gardens and electric car charging points
- A new toilet facility building
- A shelter where Oriel Môr can programme art installations
- Cycle parking, maintenance and charging facilities

- Oriel Môr signage
- Picnic tables and benches
- Play climbing equipment
- Lawn planting with two proposed trees.
- Decorative paving



Figure 1-4: Indicative visualisation of proposed St Asaph Avenue Hub

Beach Access Improvements for Kinmel Bay Beach include:

- Retention of 1 flood gate access point
- 3 enhanced access points to be fully accessible and DDA compliant
- 6 enhanced access points with stepped access.
- 10 access points in total: 1 retained, 9 enhanced.

Informal rest area near Baysview Coffee and Grill providing:

- Bench
- Litter Bin

Upgrade to the existing pedestrian crossing.

Construction of the proposed scheme

An outline construction methodology has been prepared for the proposed scheme. As a contractor is yet to be appointed, specific details are not yet available, as such several assumptions have been made based on experience gained on similar schemes and professional judgement.

Construction methodology

The preferred method for excavation and placing rock armour is for the excavator to sit at the top of the crest facing the rock armour below. There will also be a need for plant to access the site from the north to hand and manage the excavated material, and rock armour.

It is expected that construction activities will take place between 8:00am to 6:00pm between Monday to Friday, and 8:00am, to 12:00pm on Saturdays and no construction on Sundays and Public Holidays.

There will be approximately 30 operatives and 10 office staff present on-site, however it will depend on the number of sites open at any one time.

The construction of the sea defence works of the programme are subdivided into key locations as follows:

Towyn Revetment (CMU3-5B)

Towyn Revetment proposed construction sequence is :-

- Stockpile rock armour and sea wall prefabricated sections
- Carry out initial excavation to form the crest
- Install sheet piles for beach accesses and provide fill between piles
- Install geotextile and sufficient depth of stone along the length crest to provide a running surface / access track for plant movement
- This will be constructed in line with permanent construction specification but used as temporary access platform.
- The temporary imported stone will be reused within the permanent works
- Construct rock armour embankment using long reach excavator situated on crest
- Construct sea wall vertical extension
- Complete crest construction
- Ecological enhancements
- Remove temporary fill between beach access sheet piles
- Construct beach accesses

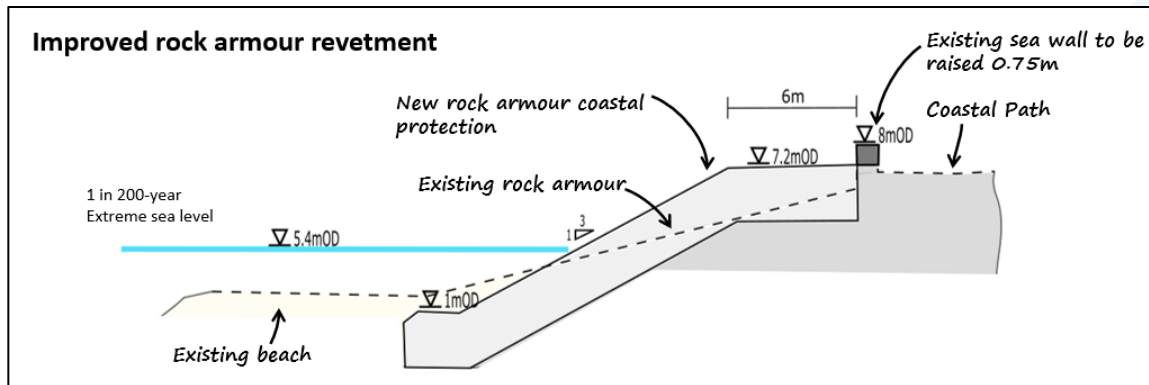


Figure 1-5: Towyn Revetment construction cross section

Kinmel Bay (CMU 3-5C)

The proposed construction sequence at Kinmel Bay is:

- Stockpile rock armour and sea wall prefabricated sections
- Carry out initial excavation to form the crest
- Install sheet piles for beach accesses and provide fill between piles
- Install geotextile and sufficient depth of stone along the crest to provide a running surface/ access track for plant movement
- This will be constructed in line with permanent construction specification but used as a temporary access platform
- Temporary imported stone will be reused.

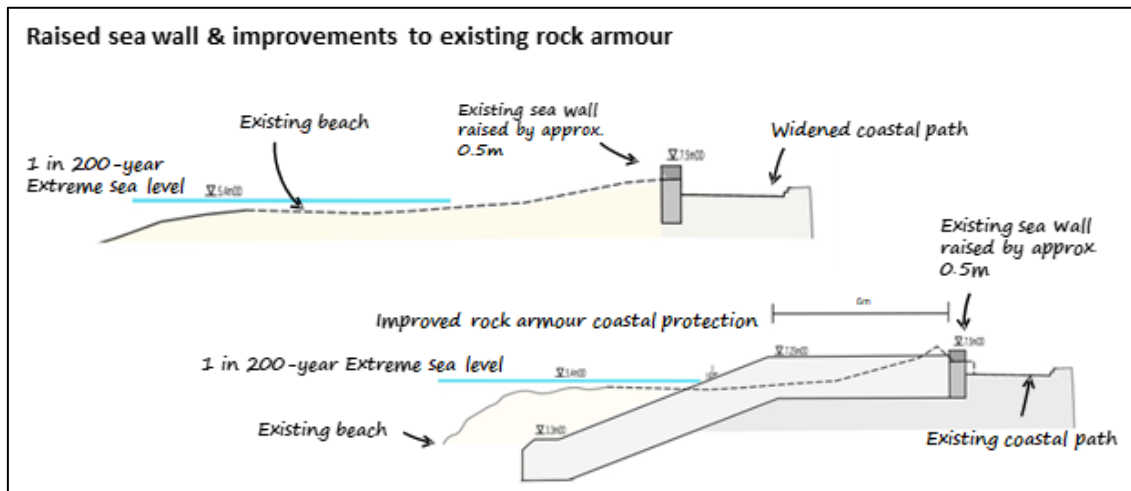


Figure 1-6: Kinmel Bay East and West construction cross section

Construction programme

Figure 1-7 outlines the proposed construction programme across the different elements of the Kinmel Bay Coastal Defence Improvement Scheme.

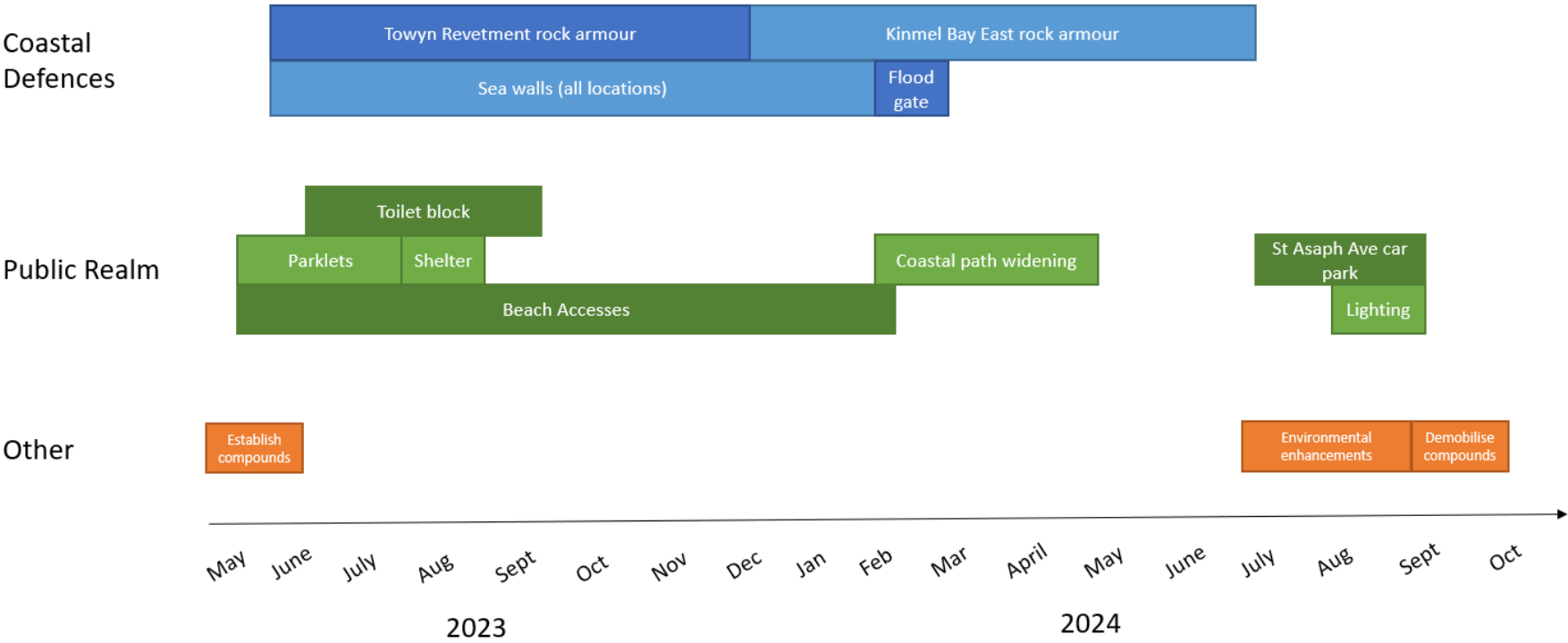


Figure 1-7: Outline construction programme

Construction access

The proposed red line boundary includes the proposed works, construction access routes from the public highway and construction compounds. The proposed access uses existing highways.

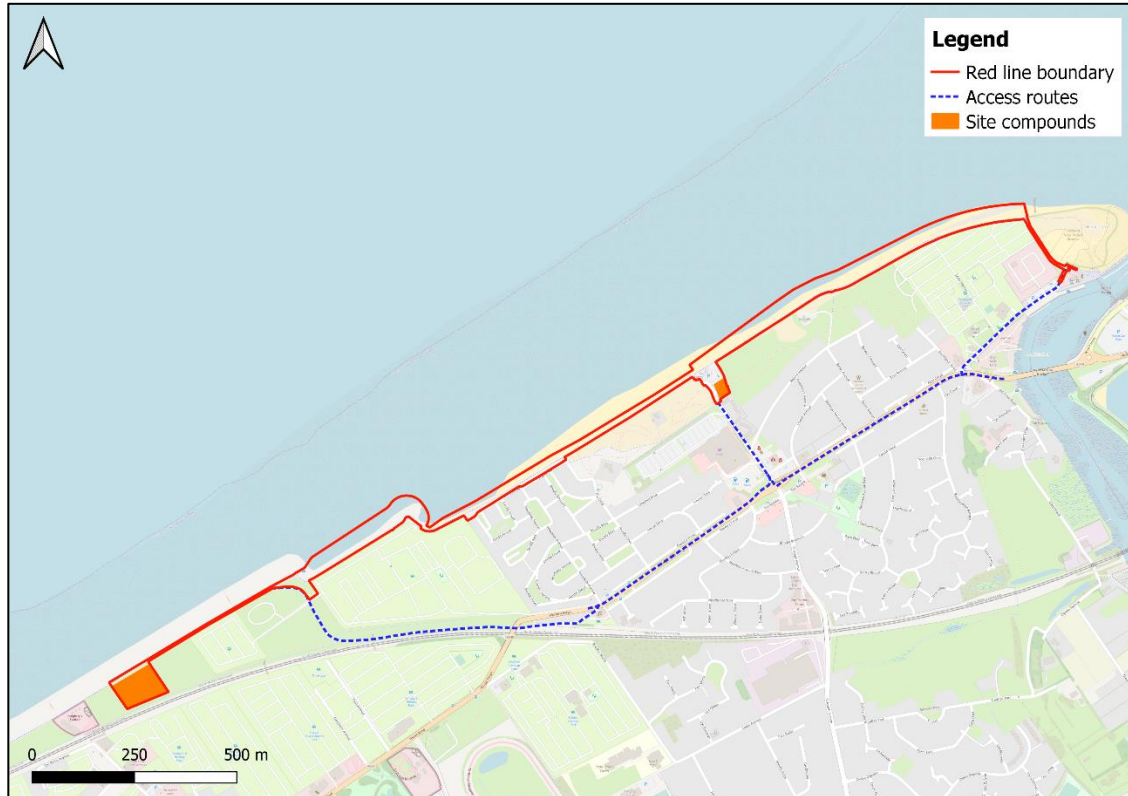


Figure 1-8: Construction compounds and access routes

Construction materials

Table 1-1 below presents an estimate of the construction materials required. These are approximate and may be subject to change.

Table 1-1: Construction material volumes

Construction Material Volumes			
Location	Geotextile (m2)	Rock Armour (m3)	Excavation Volume (m3)
Towyn Revetment	8569	25534	8375
Kimmel Bay East	8602	26716	0
Total	17171	149061	8375

It is expected that any excavated material will retain on site. However, if off-site disposal is required the following will occur:

- Material will be identified with testing
- A material management plan will be developed under the CL:AIRE Code of Practice.
- Suitable storage areas will be identified to process and dry out materials.

Construction Plant

It is proposed that only land-based plant will be used during construction of the proposed scheme. Table 1-2 lists the main plant and machinery required during construction.

Table 1-2: Main construction plant and machinery

Type of Plant	Associated works
40t Tipper	Required for the construction of rock armour
36t Excavators	Required for the construction of rock armour
20t Road Wagons (Concrete and Rock)	Required for the construction of rock armour, sea wall, car parks, coastal path widening, and beach accesses.
10t Tipper	Required for the construction of, rock armour, and sea wall.
3t Tipper	Required for construction of, sea wall, car parks and beach accesses.
1.5t Tipper	Required for coastal path widening.
15t Excavator	Required for the construction of car parks, embankment, sea wall and beach accesses.
5t Excavator	Required for coastal path widening.
Asphalt Spreader	Required for car parks and coastal path widening.
Sheet Piling Rig	Required for beach accesses.
Vibrating Roller	Required for coastal path widening.

Operational requirements and decommissioning

The operational design life for the proposed coastal defence improvements of the proposed schemes is 100 years. It is anticipated that the maintenance of the rock revetments will be very minimal, however, if a large storm event occurs some of the rock may get expelled from the revetment onto the beach. In this event, the rock may require placing back to its original location.

The proposed sea walls are unlikely to incur any maintenance unless damage occurs. Flood gates may require some maintenance, however, this will be specified by the gate supplier.

It is not within the scope of the works to decommission any elements of the permanent works.

Summary of Environmental Impacts

Ecology and Biodiversity

This report identifies and describes all potentially significant ecological effects associated with the proposed scheme and will also identifies appropriate mitigation measures where these are required and details how these could be secured. The

significance of any residual effects has also been assessed. Appropriate enhancement measures have been identified, and any post-construction monitoring required detailed.

Several field surveys were undertaken in support of the scheme, these included Phase 1 Habitat survey, assessment of site's potential to support protected and notable species, intertidal habitat survey and an over-wintering bird survey. A desk-based assessment is also performed to utilise data from biological records centres or online databases of historical information.

An assessment of potential significant impacts to habitats and species was undertaken.

Liverpool Bay SPA

As the proposed scheme is outside the Liverpool Bay SPA, the only potential impacts on the features of the SPA are as a result of the release of harmful chemicals from machinery or workings, which may produce a significant negative effect. However, with the implementation of appropriate pollution prevention methods, there will be no significant residual effect.

Kinmel Dunes LNR

The footprint of the scheme will impact a small area of the Kinmel Dunes LNR. The equivalent area is less than 1% of the LNR, and for the most part, this will be temporary as sand will be replaced following the completion of the works. However, this will be mitigated by ensuring that clearance will be undertaken using a 2-staged method between September – October.

Further enhancement in the form of habitat management will be carried out across the LNR, following construction, in order to improve the condition of habitats present. In particular, interventions will be carried out in the areas of scrub in order to provide more structural diversity to encourage an increased diversity of plants and invertebrates to colonise. There will be no significant residual effect, and a medium-term net gain in habitat quality.

Intertidal Habitats

The works will impact approximately 4,500m² of intertidal habitats, and result in a direct loss of approximately 3ha of sediments which will be replaced by intertidal rock. This will be mitigated through the habitat improvement on the sea wall which will improve the diversity of microhabitats on the sea wall. This will have no residual significant effect.

There is also the potential to negatively impact intertidal and subtidal habitats through pollution incidents. Plant movement may also compact the foreshore impacting the intertidal habitats. This will be mitigated through the application of pollution prevention methods. With no residual significant effect.

Terrestrial Habitats

There will be short-term, temporary losses of amenity grassland habitats during construction. The works will directly impact a small area of open dune habitat within the Kinmel Dunes LNR. For the most part this will be temporary, however, the scheme will result in the permanent loss of approximately 1000m² of open dune habitat. Proposed enhancement includes creating new areas of coastal grassland using a suitable coastal grassland mix.

Birds

The foreshore at Kinmel Bay is potential foraging habitats for a range of wildfowl and wading bird species. At high-tide, there is some potential for diving or other fish-eating species to use the intertidal areas. The birds are currently used to large amounts of disturbance, and due to the availability of nearby intertidal habitat, it is

considered unlikely that there will be a significant impact. The proposed mitigation for significant impact is the avoidance of main nesting bird season for vegetation clearance or pre-works nesting bird checks if required. All identified nests will be safeguarded until the chicks have fledged. Therefore, there will be no residual significant effects.

Otter

There is potential for otter to use the River Clwyd and potentially into the estuary and surrounding coast. However, it is considered unlikely that works will impact on otter holts or resting sites as no suitable sites were found during the survey.

Reptiles (Common Lizard)

There is a small population of Common Lizard in the Kinmel Dunes LNR, and dune habitats to the east of the site provides habitats for several reptile species. There is the potential for temporary, short-term loss of terrestrial habitat, causing a significant potential negative effect. To mitigate this effect, vegetation clearance works will be timed outside of the main autumn and winter period using the 2-staged clearance method. Therefore, there will be no residual significant effect.

Intertidal Invertebrates

The foreshore provides habitat for a range of benthic invertebrate species, however the sediments within the footprint of the scheme are not of high value for macroinvertebrate species. Pollution incidents may have negative impacts, and plant movement may compact the foreshore. A small amount of *Sabellaria alveolata* has been recorded outside of the scheme area, however, the species was not recorded within Kinmel Bay. However, a survey will be completed prior to works being undertaken in the littoral zone to ensure that Sabellaria is not present.

Pollution prevention measures will be put in place to avoid impacts upon benthic invertebrate species. Haul roads within the intertidal areas will be agreed in advance and adhered to in order to avoid the compaction of a larger area of the foreshore. Therefore, there will be no significant residual effects.

Fish

There will also be a small amount of intertidal habitat becoming inaccessible to fish at high tide. However, this would be localised and therefore negligible. During construction, the disturbance of sediments may reduce the foraging efficiency of predators and cause some minor gill irritation.

The works will be carried out at low tide in the dry and therefore the proposals should not cause any noise or vibration impacts to the marine environment.

Marine Mammals

There is a limited number of marine mammal species such as Grey Seal and Harbour Porpoise commute or forage near the proposed scheme. As there is highly disturbed as a tourist beach, it is unlikely the area is used for hauling out and basking.

The works will not require the use of barges to deliver materials and all deliveries will be made via road, therefore, impacts from the works are therefore likely to be restricted to temporary noise disturbance to a few foraging and commuting individuals.

Therefore, impacts from the works are likely to be restricted to temporary noise disturbance. To mitigate any impacts, all works will be undertaken in the dry, and a 'soft start' approach will be carried out each day as this will move the mammals away from the area. Therefore, there will be no significant residual impact.

Invasive Non-Native Species (INNS)

No INNS were identified within the works footprint, however, a biosecurity management plan will be required to ensure that no species introduced the works

area. Measures will need to be put in place to ensure that there is no spread of invasive non-native species or diseases. The Check-Clean-Dry approach should be followed, ensuring that all PPE and equipment is cleaned before leaving site.

Enhancements

Several ecological enhancements have been outlined within the proposed scheme, these include enhancements to the sea wall should be made that encourage growth of algae and colonisation by marine invertebrates and seaweeds.

Further ecological enhancements will be added in the form adding texture to the boulders within the intertidal zone. These indentations in the create niches and ecological opportunities for colonisation by intertidal species. Attention needs to be given to the placement of modified boulders, so they are positioned to be inundated during each tidal cycle and should be agreed with the Ecological Clerk of Works.

The proposed enhancements that form part of the scheme, will provide overall gains to the following protected and priority species:

- Birds - through seeding a species diverse grass and wildflower mix along the new coastal embankment in order to encourage invertebrates and reptiles, which will provide new foraging habitat for birds.
- Reptiles - through seeding a species diverse grass and wildflower in the landscaped amenity areas, which will encourage invertebrates, and also through conducting controlled scrub clearance of the dense areas of Gorse and Bramble scrub at Kinmel Bay LNR will improve the habitat mosaic for reptiles.
- Priority invertebrate species - The coastal grassland planting will provide linked corridors throughout the length of the scheme for a range of pollinator species such as bumblebees.

Landscape and Visual Impact

The Landscape and Visual assessment identifies changes likely to arise from the proposed scheme and the importance of any effects. There will be temporary visual impacts over the predicted 12-month construction period anticipated to be from site vehicles and construction traffic. Along with associated construction activities, including workers' accommodation, stockpiles of materials, lighting of specific areas, such as construction compound at the south western end of the Site.

The main landscape character or visual effects arising will be permanent effects from the presence of the proposed scheme once completed.

The Colwyn and Northern Coastline National Landscape Character area

The proposed scheme is within National Landscape Character area 08: Colwyn and Northern Coastline (North Wales Coast). The key features of this landscape are coastal resorts and associated holiday parks, man-made coastal edge with associated flood protection measures and the occasional areas of ecological importance such as Kinmel Dunes and Horton's Nose.

The widening of the promenade would be barely perceptible post construction, as would the increase in sea wall height, which would still allow views of the beach and out to sea. Whilst some of the beach accesses would be larger than at present to allow access for all to the beach, these would again be relatively minor alterations to existing elements of the coastal character. The St Asaph Car Park and associated kiosks and café already exert an urbanising influence in the Kinmel Dunes area, which would only be slightly expanded by the proposed scheme.

The influence of the proposed scheme would extend northwards across the beach in the areas where new or larger areas of rock armour are proposed, due to the physical change in the extent of rock armour and the change from dunes or coastal grassland in some locations to the harder coastal defence. The influence of the proposed

scheme would not generally extend southwards, due to the proximity of the urban edge and holiday parks immediately to the south in most locations.

Colwyn Bay and Rhyl Flats National Marine Character Area

The proposed scheme is located within National Marine Character Area 02: Colwyn Bay and Rhyl Flats, the seascape is shallow waters with sandy beaches adjacent to a developed coastline, and it acknowledges the coastline is protected by various coastal defences. Given that coastal defences are already characteristic of the coastline, along with the presence of coastal settlements and holiday parks, there would be no significant effects on the seascape character as a result of the development.

None of the features of the scheme are located within the MCA and all of the features already exist within the immediate vicinity of the site. None of the elements of the proposed scheme would prevent views of the backdrop of limestone hills or the offshore wind farm as key characteristics of the MCA. The influence of the proposed scheme would extend northwards across the beach in the areas where new or larger areas of rock armour are proposed, due to the physical change in the extent of rock armour and the change from dunes or coastal grassland in some locations to the harder coastal defence.

The effects of the proposed scheme are Neutral, as the scheme is in keeping with the existing character of the coastline.

Visual Receptor groups

There are five locations where the proposed scheme would be visible, the promenade, Kinmel Bay and Beach, Horton's Nose nature reserve and the area around the Harbour Hub Café, Kinmel Dunes Local Nature Reserve and the northern edge of the settlements of Kinmel Bay and Towyn.

The promenade is the route of the Wales Coast Path and Sustrans National Cycle Route 5. It is currently a relatively wide pathway behind the existing sea wall. None of the elements of the proposed scheme (Widening of the promenade path, increase in height of the sea wall, newer of larger areas of rock armour, individual features such as pocket parks, shelters, beach accesses and toilet block) would be entirely new along the promenade with many of them, including the width of the promenade and the height of the sea wall, likely to be barely perceivable once construction is complete.

Kinmel Bay and beach is located immediately north of the site, it is a sandy beach with some level of rock armour against the existing sea wall. None of the elements of the proposed scheme would be entirely new introductions to the beach with the rock armour being a continuation of the existing coastal defence along the beach and the height of the sea wall likely to be barely perceivable once construction is complete. Therefore the proposals are in keeping with the existing character of the beach.

Horton's Nose nature reserve and the area around the Harbour Hub Café is located immediately east and south east of the site. The Dune landscape at Horton's Nose would interrupt views of the proposed scheme in many locations. The area around the Harbour Hub Café is already an urbanised area with lots of hard surfacing associated with pedestrian, cycle and vehicular routes. The Dune landscape at Horton's Nose would interrupt views of the proposed scheme in many locations. For much of the visual receptor group, views would be largely unchanged or there would only be views of the widened footpath and upgraded pedestrian crossing, which would be very minor elements and entirely in keeping with the existing views.

Kinmel Dunes Local Nature Reserve is located immediately south of the site. The main features are the dune landscape, The Promenade Car Park and the sea wall delineating the edge of the dunes. Visitors are either observing the wildlife and natural features, passing through to use the facilities at the car park/other attractions

or accessing the promenade and beach. The higher sea gate and changes to the beach access would be visible, with some limited visibility of the increased area of rock armour. The upgraded car park and the new parklet and toilet block adjacent to the promenade would be positive new features of the view and not dissimilar to the existing view. The increase in height of the sea wall would still allow views over it to the sea and the widened footpath would be a very minor change to the existing views.

The northern edge of the settlements of Kinmel Bay and Towyn is located immediately south of the site. From the edge of the settlements, when the holiday park developments are included, there are only views of the Site from the very northern edge adjacent to the scheme as the flat landform and close proximity of dwellings or caravans/chalets obstruct views from further into the settlements. The widening of the Wales Coast Path and the increase in height of the sea wall would be visible. The new or larger areas of rock armour would be a minor element of the view beyond the sea wall, and the individual elements such as the new parklets, upgraded beach accesses and shelters would be visible where these occur in close proximity to the edge of the settlement. Views would be largely unchanged and entirely in keeping with the existing views.

Two viewpoints of the site, Horton's Nose and Kinmel Dunes, have been assessed. At Horton's Nose the most noticeable change would be the new rock armour which is considered to be in keeping with the existing character of the Site and Study Area. At Kinmel Dunes the most noticeable change from the viewpoint would be the introduction of the new proposed Galley Parklet and associated toilet block, whilst all other proposals are in keeping with the existing characteristics of the view.

Landscape and Visual mitigation measures have been embedded into the design of the proposed scheme, creating a development that minimises effects whilst providing benefits to users. No additional mitigation measures are proposed.

Coastal Processes

The coastal processes chapter considers the potential for the proposed scheme to impact the tidal regime, wave climate, coastal geomorphology, and beach profiles. Impacts were considered with reference to the Zone of Influence, which is the area of the seabed or foreshore that could be affected by the proposed scheme or activity, during both construction and/or operation. The desk-based assessment has been undertaken using a number of sources. For the coastal environment, the main activities which have the potential to impact processes include, material storage on the foreshore, excavation for defence construction, sediment mobilisation, vehicle movements on the foreshore, modification of natural beach morphology, and modification of beach face gradients.

The assessment considers the potential impacts from the construction phase of the scheme and the potential for sediment dispersal to local waterbodies, sediment mobilisation, scour, changes to the beach shape and structure, and wider sediment movements. However, the assessment concludes that construction of the proposed scheme will not have any significant impacts.

Much of the coastal frontage from Towyn Revetment to Kinmel bay is already highly modified with existing defences. The extension and alterations to the defences is likely to result in a period of readjustment of the beach shape and structure. There is some potential for impact to sediment movements at Towyn revetment as it encroaches into the intertidal zone. However, the defences at Kinmel Bay are higher on the beach, and therefore will only interact with marine-driven processes during particularly high water. Therefore, the proposed defences are expected to have a minor impact on sediment movements and beach shape and structure. The

assessment concludes that there are no other significant impacts to coastal processes from operation of the scheme.

Potential mitigation measures for impacts to coastal processes:

- Good construction practices, and ensuring as much work as possible is conducted in dry conditions of low water to prevent mobilisation of sediments and construction materials.
- Work should be assessed two weeks in advance to confirm compliance with mitigation measures. Work should also be stopped during storm events to prevent mobilisation of sediments.
- Ecological enhancements will be incorporated to create textured surface features which will help colonisation of intertidal marine species.
- Beach monitoring is already being undertaken on an annual basis. It is recommended that this continues to identify any changes in beach slope gradients and height.

Hydrology and Hydrogeology

The hydrology and hydrogeology chapter describes the existing coastal environment in relation to hydrology and hydrogeology and assesses the potential impacts of the construction, operation and maintenance/ decommissioning (where practicable) of the proposed scheme on the hydrology (surface water quality, levels and flows) and hydrogeology (groundwater quality and levels).

Several mitigation methods were outlined to be included within the design, for the prevention of significant impacts. For each phase, the assessment recommends the following embedded mitigation:

- Construction: practice working methods to prevent water pollution, appropriate storage of hydrocarbons and petrochemicals, water contaminated with hydrocarbons are passed through oil interceptors, prevent silt-laden run-off or chemicals entering watercourse, and measures to prevent soil becoming compacted.
- Operation: infrastructure in line with CIRIA C753, and guidance by BSIDB and LLFA, to make sure that surface water run-off is the same before and after development.

Potential effects during the construction phase of the scheme include:

- Surface water drainage – flows and quality
- Construction site runoff – suspended fine sediments and chemical spillages
- Changes to drainage channels on-site and surrounding watercourses
- Temporary increase in impermeable area and ground compaction
- Impacts to groundwater recharge
- Impact on flood risk.

However, the assessment concludes that during construction and operation, the proposed scheme is not expected to have a significant impact on the identified receptors across both the construction and operational phase. Therefore, no additional mitigation measures are required.

Cultural Heritage

The Cultural Heritage chapter considers the impact of the proposed scheme on the historic environment during the construction and operational phases. The baseline study identified no heritage assets are likely to be physically impacted by the

scheme. However, nine heritage assets are considered to be indirectly impacted by the proposed scheme. These impacts are detailed below:

- The River Street Conservation Area in Rhyl, Grade II Listed Nos 72-75 West Parade, and River Street Conservation Area are located outside of the construction area of the proposed scheme. However, long views from these assets will be temporarily altered during the construction activities.
- The Grade II Listed Foryd Bridge is also located outside of the construction area. During construction the long views from the asset will be impacted. The effect is considered to be temporary adverse.
- The post-medieval bridge building at Foryd Harbour and the Foryd timber yard and quay are both non-designated and outside the construction area. There will be slight temporary impacts from construction to the setting from vehicle movement and noise.

The proposed construction compounds are utilising existing hardstanding and access utilising slipways. Therefore, no impact on any buried archaeological remains is expected. However, the one compound location to the east of Knightly's Fun which is on grass and has the potential to impact previously unrecorded archaeological remains.

There is a low potential for buried archaeological deposits of artefacts being discovered. However, a toolbox talk should be given as part of the induction process and feature as part of the Construction Environmental Management Plan (CEMP) to familiarise the project team with cultural heritage of the area.

The potential for unanticipated impacts of the setting of heritage assets can be avoided through considerations of materials and finishes. It is recommended that the rock armour be of a type that fits in with the geology of the area.

Contaminated Land

The purpose of the contaminated land assessment is to consider the contaminated land baseline relevant to the scheme and assess the potentially significant issues scoped in as part of the scheme. This includes the consideration of risks to human health and environmental receptors associated with the proposed construction and operation of the scheme.

Several mitigation methods were outlined to be included within the design, for the prevention of significant impacts. For each phase, the assessment recommends the following embedded mitigation:

- Within the construction phase, a Principal Designer and Principal Contractor will be appointed to plan, manage, monitor and coordinate health and safety. The Principal Contractor will also be responsible for ensuring the scheme is legally compliant, and consider the risk of Asbestos and linked legislation.
- A Construction Environmental Management Plan (CEMP) will include measures which prevent and manage spillages of substances, soil erosion, or generation of suspended solids, referring to the Guidance for Pollution Prevention. The CEMP will include prevention measures, and site waste and materials management according to the Definition of Waste: Development Industry Code of Practice.
- Material moved around the site, or imported onto site during the construction will be chemically tested for its intended use and shown to not present a risk to controlled waters or human receptors. Movement of materials will be undertaken in accordance with the relevant waste legislation and guidance (CL:AIRE Contaminated Land Definition of Waste: Development Industry Code of Practice). It is also assumed that future construction works will be

undertaken in accordance with legislative requirements, statutory and regulatory guidance and industry best practice.

During the construction phase the following potential impacts were considered:

- The potential for impacts on human health from potential exposure to contamination associated with historical land uses, determined to be not significant, providing the CEMP and tool box talks are implemented.
- The potential for surface water, groundwater and ecological receptor pollution from leaching and migration of contamination associated with the historical land uses is considered not significant for all receptors identified.
- Where sources of ground gases have been identified, temporary confined spaces/construction buildings will include empty spaces below them to allow for gases to escape. This will prevent accumulation of gases and impacts to human health.
- There is the potential for localised spillages of fuel could lead to the contamination of soils as well as surface waters, underlying groundwater and ecological receptors. The assessment has identified potential minor to moderate impacts to surface waters, groundwater and ecological receptors. However, providing that the necessary controls are implemented through the CEMP the final potential impacts are considered to be not significant.

During operation, the following potential impacts were assessed:

- Potential impact to human health from exposure to contamination from historical land uses is considered not significant.
- The potential for surface water, groundwater and ecological receptor pollution from leaching and migration of contamination associated with the historical land uses is considered not significant for all receptors identified.
- During operational phase, the potential for ground gases to escape and impact on human health is considered not significant.

Socio-economic

The Socio-economic assessment considers the potential for the scheme to result in likely significant effects on the health and wellbeing of the population and local economy of Kinnel Bay.

It is expected that the scheme would have a slight positive impact on local employment. During construction the scheme offers economic opportunities to a varied group of suppliers and subcontractors. This is particularly positive for local communities which have significant pockets of deprivation. Amey anticipates a peak permanent staff contingent of 40 staff during the delivery of the scheme (excluding visiting service contractors) and they will endeavour to source labour from the local area. If all 40 positions went to local residents this would temporarily increase the percentage working in construction in Kinnel Bay from 7.6% to 9.3%. In addition, it is reasonable to expect that part of the disposable income of the construction workers will be spent in the area, generating or supporting further employment.

Once built the increased flood protection of the scheme might contribute to the area becoming a more attractive place to live and work, contributing to the local economy indirectly contributing to local employment levels.

During construction it is expected that the scheme would have a slight negative impact on traffic and commuting due to increased Heavy Goods Vehicle (HGV) traffic along the A547 and A548. This increased HGV traffic, is likely to contribute to a slight negative impact on tourism. The construction period is expected to overlap with 'peak season' in Kinnel Bay, however, the scheme is located within a largely residential

area, with the majority of the tourism industry being located outside of the scheme area. As a result, few tourism-related businesses would be directly affected during construction. In the long-term, the overall impact on would be neutral as the defences would protect tourist assets.

During construction there will be obstructions along the Wales Coast Path and National Cycle Network Route 5, causing temporary disruption. There are good links to the A547/548 if diversions are required, but where possible diversions and closures will be locally managed.

Upon completion of the scheme there will be no impacts to traffic and commuting, the Wales Coast path, the National Cycle Network Route 5.

The scheme is expected to have a slight positive impact upon healthcare or and no impact on school provision or demand during construction or operation. If any diversions of the Wales Coast Path are required, these would not impact upon local residents' ability to access healthcare facilities. Any diversions are not expected to impact local children or education workforce, as the closest school to the scheme, Ysgol Maes Own, is located over 735 meters away, and the catchment area suggests that pupils are unlikely to use the Wales Coast Path or the National Cycle Network Route 5 to travel to and from school.

The scheme will have a slight negative impact on open space provision during construction and operation, but that this will be more than offset by the benefits provided by the scheme. During construction it is anticipated 1.15 hectares of beach would be temporarily closed to the public. However, there are 39.29 ha of green space and 188.48 ha of beach within 2km of the scheme, so the temporary closure will only result in a loss of approximately 0.5% of total available open space within 2km of the scheme.

During construction there will be a slight negative impact on noise, nuisance and disruption, due to the scheme situated primarily in residential areas and given the aging population and percentage of the population that are limited by disability or long-term illness.

It is not anticipated that the scheme will have any significant impact, positive or negative, upon the Welsh language.

Mitigation measures for the slight negative impacts during construction are:

- Amey voluntarily becoming members of the Considerate Constructors Scheme (CCS). Some expectations that would contribute to mitigation of potential socio-economics impacts include informing, respecting and showing courtesy to those affected by the work, minimising impact to the local highway, contributing to and supporting the local community and economy and lastly, working to create a positive and lasting impression.
- Ensure the scheme procurement is through the "Sell 2 Wales framework" which aims to help businesses find and win contracts with the public sector across Wales
- Noise and disruption from construction works should be limited to ensure that effects on local receptors within the surrounding residential areas are minimised.
- Diversions should aim to minimise impacts by keeping diversion lengths to a minimum and by providing wide diversion routes where possible.
- Ensure that multiple channels of communication are utilised so that as many stakeholders as possible are informed of the programme. Advertising via multiple methods, including, newspaper, local radio stations, promotion on social media platforms as well as providing local newsletters containing translations in Welsh

and Braille and placing information in local community centres such as libraries and tourist information centres.

- Community engagement and pre-application consultation sessions.

Traffic and transportation

The traffic and transportation assessment considers the impact of construction traffic generated by the construction and once the scheme is built.

Whilst bus and rail options are available for construction staff, they do not provide convenient access to any of the sites. Therefore, it has been assumed that 90% of site staff will drive, 5% will car share and 5% will arrive by public transport.

Construction staff will park in the site compound closest to the work site active at the time to reduce impact on the highway network in the vicinity of the work sites. It is assumed that all travelling via private car will arrive via the A55. This would result in 36 car arrivals / departures in the peak hours between 8 and 9am and depart between 5 and 6pm.

Deliveries of construction material for both sites (Kinmel Bay East and Kinmel Bay West) will be received and stored at the Towyn Revetment compound. The Kinmel Bay East site will also utilise Promenade Pay & Display Car Park compound. Kinmel Bay East requires the largest quantity of material. It is estimated 338 HGV deliveries will take place equate to 676 one-way HGV movements. Assuming deliveries are evenly distributed throughout the construction period and only on weekdays, there will be approximately 9 HGV movements a day. If these are evenly distributed across a working day that would result in 1 HGV movement per hour. Kinmel Bay West requires less materials and therefore less deliveries

Traffic flows on the A548 are anticipated to rise by up to 0.69% with HGV levels anticipated to rise by up to 3%. Traffic flows on St Asph Avenue are anticipated to rise by up to 0.83% with HGV levels anticipated to rise by 1%. These traffic flows will not result in a significant impact on accidents and safety or on the operation of the highway network in the vicinity of the work sites therefore the impact on driver or pedestrian delay is not considered to be significant. As the flows will not significantly increase, pedestrians are not likely to feel fear or intimidation or encounter a reduction in pleasantness whilst walking.

There are no significant negative impacts which will be experienced as a result of the construction works for this project. Any potential impacts are temporary and will be felt only during the construction works.

Mitigation to reduce potential impacts include:

- Active community engagement under the Considerate Constructors Scheme.
- Advanced public advertisement of the works, including the construction material delivery routes.

Noise and Vibration

The construction activities expected as a result of the scheme are likely to be close to noise sensitive residential and holiday let properties and have the potential to generate significant noise and vibration impacts. Therefore, the assessment considers the potential impacts and mitigation methods to prevent significant impacts to the local area. Baseline surveys were completed at 2 locations along the length of the scheme at Golden Sands Holiday Park, and Kinmel Bay Harbour Shipyard. Completed between 17th August to 31st August 2022.

The following assumptions were included in the assessment:

- Construction activities will take place between 8am to 6pm Monday to Friday, 8am to 12pm Saturday and no construction work Sunday or Public Holidays.

- Construction activities will take place on site for an assessed period of 7-hours per shift.
- Construction will take place within the pre-defined red line site boundaries, as detailed within the Construction Methodology document.
- All sites access will be via existing highways and as such no consideration is required to noise associated with their use.
- No decommissioning of permanent works completed will be necessary or considered.
- Noise transmission from the specific plant, equipment or activity on site is assumed to be point source.
- Noise sensitive dwelling will be any dwelling that is used for overnight accommodation. This will include house, flats, static caravans, mobile caravans, and campsites as deemed appropriate located along the length of the development.

The assessment of un-mitigated noise impacts from construction of the proposed scheme on closest residential receptors shows an exceedance of the threshold 65 LAeq dB at Golden Sans Holiday Pal, during construction of Towyn Revetment and Kinmel Bay West. The un-mitigated noise levels at Sunnyvale Caravan Park also exceed the 65 LAeq dB threshold at Kinmel Bay East.

The assessment finds that the estimated vibration level for the piling works will not be of a noticeable level at the closest residential receptors. However, if the ground encountered is not free of obstructions and pneumatic intervention may be required and increase vibration levels.

The assessment also concludes that the vibration generated across the project will not exceed the threshold to generate cosmetic damage to surrounding buildings.

The proposed mitigation methods include:

- The quietest available plant or machinery should be used
- All equipment should be maintained in good mechanical order and fitted with appropriate silencer, mufflers, or acoustic covers
- Acoustic barriers consisting of site material such as bricks, earth mounds or proprietary types should construct when noise cannot be sufficiently reduced by careful siting of noise sources.
- All workers on site, including sub-contractors, self-employed staff and employees must be made aware of the need to keep noise and disruption to a minimum from building works, equipment, plant and machinery, radios, music, vehicles or any other sources.
- The movement of vehicles to and from the site must be controlled to minimise noise and disturbance to nearby residents
- Careful selection of working methods and programme
- Shutting down of equipment when not in use, i.e., maintain a 'no idling policy'.
- Orientating the plant to face away from the residential properties during operations, where possible, may reduce noise b up to 5 dB.
- Handling of all materials in a manner which minimises noise including minimising drop heights into hoppers and lorries.
- Switching all audible warning systems to the minimum setting required by the health and safety executive and using banksmen as an alternative to audible alarms wherever practicable. The use of broadband sounders can also reduce the effective impact of sounder noise on residents.

- Engaging in community liaison to explore ways of minimising noise impacts and increasing local tolerance to noise.

Through the implementation of the above mitigation measures, the mitigated noise exposure values are below the threshold value. However, as some areas are close to the limit, pre-emptive communication at Kinmel Bay west residents can be actions to reduce the likelihood of complaints.

Mitigation measures may prove successful in reducing noise levels, noise levels in open areas, balconies and gardens may exceed the 55 dB LAeq as per the WHO guidelines. It is recommended that regular noise and vibration monitoring during the construction operations be undertaken to ensure that the control and mitigation measures noted in this assessment are undertaken and effective.

Other construction related effects

The Other construction related effects chapter considers potential impacts as a result of the construction phase, not considered within other specific chapters. This chapter assesses the potential impact of construction of the proposed scheme on local air quality and carbon emissions.

The construction phase is likely to generate dust from earthworks, track out and demolition. Earthworks primarily involve excavating material, haulage, tipping and stockpiling. At Towyn Revetment, there will be some excavation and due to the residential properties in close proximity, it is assessed that there will be some temporary slight adverse impacts. This is also assessed at Kinmel Bay, where excavation will also be required.

Trackout is where vehicles leaving each of the sites may transfer dust or dirt onto the road having travelled over unpaved tracks. At Towyn revetment, as the access route involves vehicles travelling over unpaved tracks, adjacent to residential properties, the potential impact is assessed as temporary slight adverse. At Kinmel Bay west, the access will utilise paved roads, and there are adjacent wheel cleaning facilities at the construction compound. Therefore, the potential for trackout is assessed as not significant. At Kinmel Bay east, access involves travelling along a paved track, and therefore assessed as not significant.

There are also several demolition activities at both sites. At Kinmel Bay, the demolition of the Baysville Café frontage and a length of wooden fencing is required. Due to the small building volume with some elements for potential dust release, the potential generation for dust is assessed as not significant. The demolition of the secondary concrete wall at Golden sands and the concrete beach accesses on the existing sea wall, both are assessed as temporary slight adverse as concrete has the potential to generate dust, and the potential building volume.

As some temporary slight adverse impacts were assessed, the following mitigation measures, implemented through a Construction Environmental Management Plan (CEMP):

- Develop a stakeholder communications plan, of dust management plan.
- Display the name and contact of individual(s) responsible for the air quality and dust issues on site, and the head or regional office contact information.
- Record all dust complaints, and exceptional incidents.
- Carry out regular site inspections, and increase frequency when carrying out activities which higher potential to produce dust.
- Setting up screening or barriers around dusty activities, ensuring no idling vehicles and imposing speed limited on access routes.

The carbon calculations estimate the embodied carbon associated with the construction materials at Towyn revetment (428 tCO₂e), and Kinmel Bay east (443

tCO₂e). The emission associated with the delivery of construction materials were also calculated (2 tCO₂e). In total, the combined embodied carbon for the whole scheme is 873 tCO₂e.

Plant usage estimates were also calculated to determine the embodied carbon emissions associated with the plant type usage and utilisation for the proposed scheme. The overall total embodied carbon equivalent estimate is 2,100 (tCO₂e).

Therefore, in total 2,973 tCO₂e would be emitted as a result of the construction of the proposed scheme. Annually emissions of the expected life cycle of the scheme (100 years) would represent an increase of 29.73 tCO₂e. The assessment has found that this increase is not significant in the local and wider context. There are several mitigation methods outlined;

- Rock used should be sourced as locally as possible, but also consider options for suppliers with Environmental Product Declaration that has a low embodied emissions factor. Where possible, opt for less energy and carbon-intensive rock whilst retaining structural standards.
- Utilise less-emissive plant fuel types, and use recycled materials where possible.
- Utilise low or non-Ordinary Portland Cement concrete in low-risk areas where possible.
- Consider potential ecological enhancements which sequester carbon.

Cumulative and in-combination effects

An assessment of potential cumulative and in-combination effects has been undertaken. It has looked at whether the effects caused by the proposed scheme combined to cause a greater effect and whether other developments could combine with these effects to impact the environment in a great, or different way than in isolation. The assessment of cumulative effects considered several other coastal protection works in the region, however it was determined that no residual cumulative effects are likely to arise from these developments and the proposed scheme.

In-combination effects were considered for the nearby residential receptors at each of the proposed sites. This assessment considered in-combination effects of noise, dust, visual impacts and construction traffic. However, the assessment concluded that there are no residual significant in-combination effects.