Kinmel Bay Coastal Defence Improvements Scheme

Addendum Construction Method Statement for Temporary Sheet Piling

14/10/2024 | v1

Document Reference : C4215 – CMS – 0

Document Author – Dafydd Elis

1. Introduction

1.1 This construction method statement addendum has been prepared by Jones Brothers Civil Engineering UK Ltd for the Kinmel Bay Coastal Defence Improvements Scheme.

1.2 The purpose of the construction method statement addendum is to amend the proposed temporary sheet piling methodology included in the current accepted project documentation.

2. Relevant Document

2.1 Marine Licence number: CML2272v1 has been granted for the scheme.

2.2 Construction Method Statement reference CML2272-GKX-JBAU-00-00-MS-EN-0001 referenced in the granted marine licence is the approved supporting document detailing sheet piling installation methodology.

2.3 The approved Construction Method Statement states "*Install sheet piles for beach accesses and provide fill between piles"* in various locations of the project. This methodology as well as the environmental statement assumed that the 7 proposed permanent beach access structures (AP3-AP9) would require sheet piling as part of the construction methodology. This would be spread along the 2km project. A copy of the approved Construction Method Statement is included in the appendix of this document.

2.4 The approved Construction Method Statement page 6, Table 2 states *"Sheet piling will be installed using the Giken (or similar) vibration free piling method. No hammer piling will take place"*

3. Revised Sheet Piling Requirements on the Kinmel Bay Scheme.

3.1 Following additional GI and design development since the original ES / construction methodology and Marine license application was submitted, the temporary sheet piling requirements for the project have now been significantly reduced with alternative, less disruptive construction methodologies for access point AP3-AP7. The only remaining temporary sheet piling requirement for the project is to provide a temporary cofferdam for construction of beach access steps AP10 at the western end of the scheme. AP10 is an alternative access point to the previously proposed AP8 & AP9, thus further reducing the amount of work required in the intertidal zone. The locations of the previous and current proposed beach access steps is shown in Figure 1.

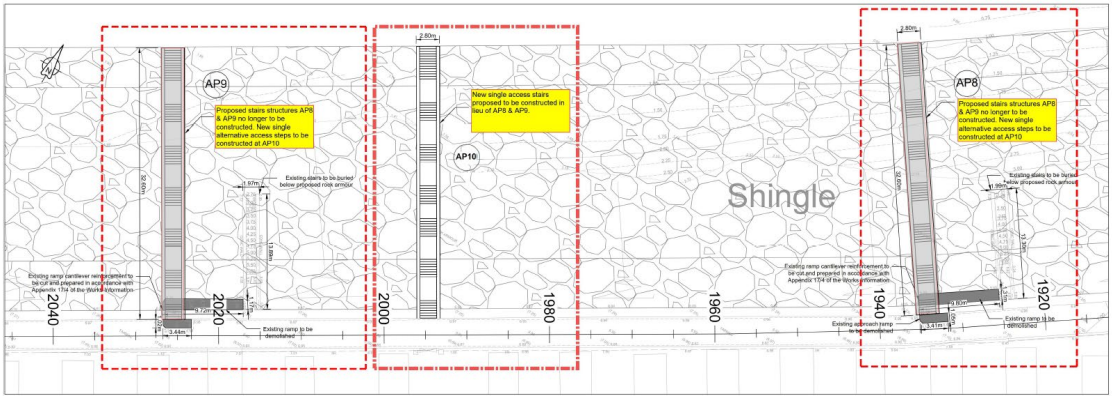


Figure 1 - Drawing showing the original layout of the proposed beach access steps (AP8 (right), AP9 (left)) and the new proposed single beach access steps (AP10 center)

3.2 Due to beach access point AP10 being constructed below MHWS, a temporary sheet pile cofferdam is required to provide safe and undisturbed access to enable construction of the permanent beach access steps without effect of the tidal cycle. This will enable the construction works and material deliveries such as concrete to be undertaken during normal working hours. Without the temporary sheet pile cofferdam, the works would be constrained by the tide resulting in out of hours working.

3.3 The temporary sheet piling cofferdam is currently in detailed design stage however it is not envisaged to be any larger than 25m long x 5m wide. Sheet pile lengths shall be no longer than 14m with a maximum pile embedment of 9m into the ground. The proposed layout of the cofferdam is shown in figure 2 and 3 below.

3.4 Typical Drawings and Photos

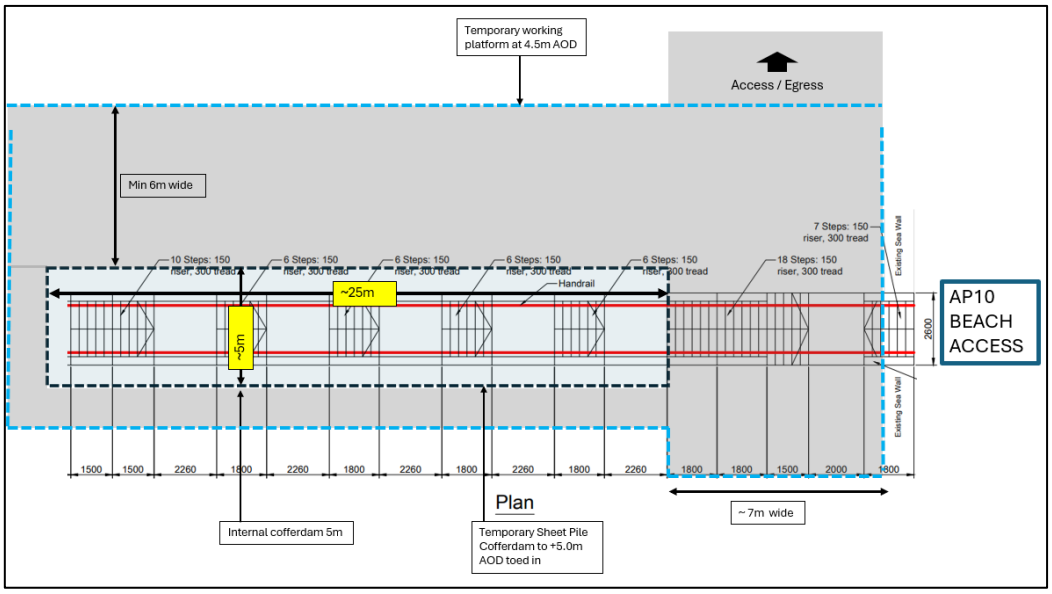


Figure 2 - Plan View of Proposed AP10 Cofferdam Layout

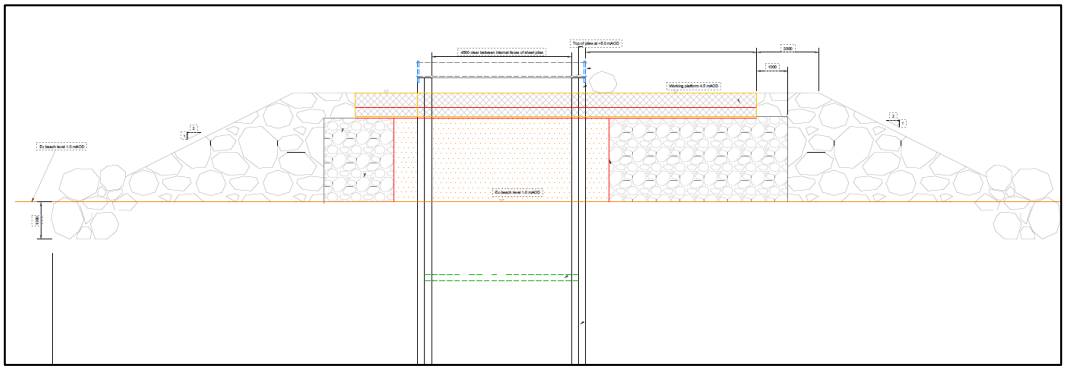


Figure 3 - Typical Cross Section of Proposed AP10 Cofferdam Layout

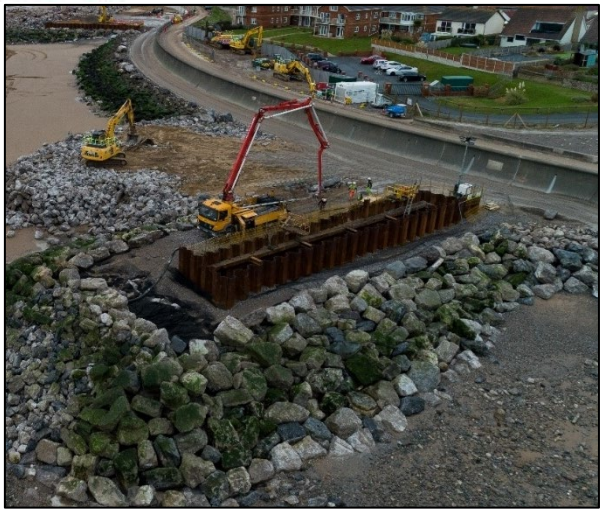


Figure 4 - Sheet piling cofferdam recently installed at East Rhyl using the simiar installation methodology.

3.5 The exact coordinate location of the proposed temporary sheet piling cofferdam at AP 10 are:

Latitude	Longitude
53° 18' 34.790129" N	3° 32' 6.807444" W
53° 18' 33.720776" N	3° 32' 5.669979" W
53° 18' 33.964177" N	3° 32' 4.983553" W
53° 18' 35.058054" N	3° 32' 6.131783" W

4. Reason for Amending Sheet Piling Methodology

4.1 The Giken method offers Vibration-Free Piling and is widely used in the marine environment to limit vibration to marine wildlife when piling directly through water however on The Kinmel Bay Scheme there shall be no piling through water.

4.2 The Giken vibration free piling requires the attendance of a large crane to mobilise and set up the Giken and lift and position the sheet piles. To mobilise a crane in proximity of beach access AP 10 would prove disruptive to the local community and in particular Golden Sands Caravan Park as this would be the only viable access route for a crane to the working area.

5. Alternative Temporary Sheet Piling Methodology Proposal

5.1 It is proposed to install the temporary sheet piles with a leader rig using a Vibro hammer. The leader rig shall be self-sufficient and not require the support of a crane. The leader rig can access the working area along the upper areas of the foreshore without any disruption to the local community and in particular Golden Sands Caravan Park.

5.2 All temporary sheet pile installation will be undertaken from above MHWS on a high-level temporary working platform adjacent to the existing sea wall.

5.3 Ground Investigation has been undertaken at the exact location of AP 10 to confirm the suitability of the revised piling method.

5.4 No piling will be undertaken directly into water. Piling will stop during peak of high tide if water becomes within proximity of the toe of the working platform. This is only envisaged during spring tides.

5.5 Assessment for transfer of vibration during pile driving & extraction for revised installation methodologies are as per figure 5 below.

Based on the following equation the theoretical PPV levels has been calculated to demonstrate the required safe working distances to work within the stated limits.

$$v = C\sqrt{(W)}/r$$

where: **V** = ppv, **C** = soil/hammer parameter, **W** = hammer energy per blow/cycle, **r** = distance to point of interest

Distance (r): [m]	5	10	20	30
Max power ppv (**V**): [mm/s]	16.1	8.0	4.0	2.7
Lower power ppv (V): [mm/s]	16.1	8.0	4.0	2.7

Figure 5 - Assessment for transfer of vibration during pile driving and extraction and nominal distances from piling location

5.6 Whilst there are static holiday caravans near the working area, the closest residential property is more than 200 meters away. The sheet piling installation are targeted for December or January during the quiet season of the adjacent Golden Sands caravan park.

5.7 The proposed piling method is not expected to have negative effects on fish or marine mammals because: there will be no direct transmission of vibration from sheet piles to water (see 5.4); ground-borne vibration dissipates rapidly with increasing distance, before transmission to the water; wave action and turbulent water will generate masking noise in all but calm conditions. If piling is to commence directly following high tide and water is close to the piling zone then a 'soft start' procedure will be followed to allow any fish and marine mammals to move away before full power is used.

6. Timing of Works

6.1 The sheet piling installation shall be as per the approved planning hours. The approved working hours within the Site shall be Monday to Friday between 0800 and 1800 hours and Saturday between 0800 and 1300 hours, with no working on Sundays or public holidays.

6.2 The installation of the temporary sheet piles is estimated to take 2 weeks.

6.3 The removal of the temporary sheet piles should take 1 week.

6.4 If the project programme allows, neap tides will be targeted for the installation and removal period to benefit from the increase distance from tide levels.

Appendix 1

Original Construction Method Statement

CML2272-GKX-JBAU-00-00-MS-EN-0001

Kinmel Bay Coastal Defences Improvements Scheme

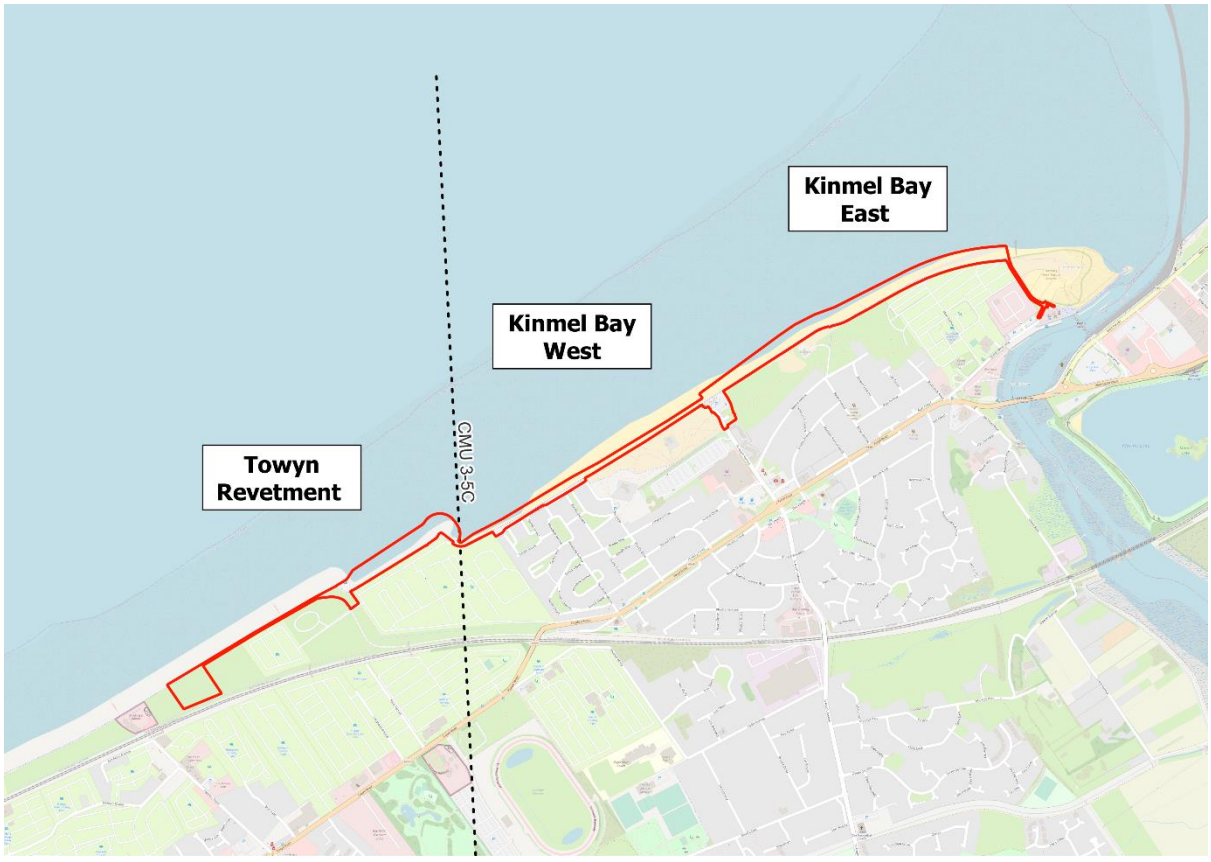
Construction Methodology

CH1701-AMEY-GEN-XX-MS-CE-0108

1. Construction Sequencing

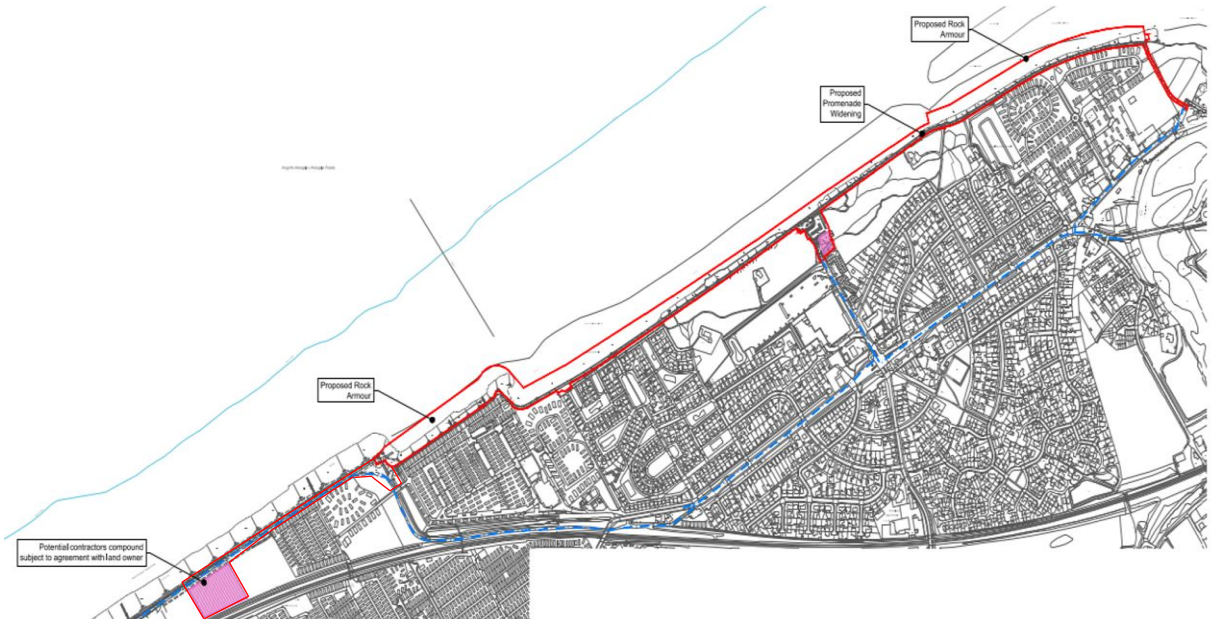
The proposed construction sequence is shown in Appendix A, the outline Construction Programme (CH1701-AMEY-GEN-XX-PR-ZM-0104 – Rev B)

Diag. A – Extent of Sea Defence construction



Access Routes - Work is proposed to access from the following points of the public highway – shown as blue lines in Diag B, below.

Diag. B – Towyn Revetment, Kinmel Bay East and West - Access Routes



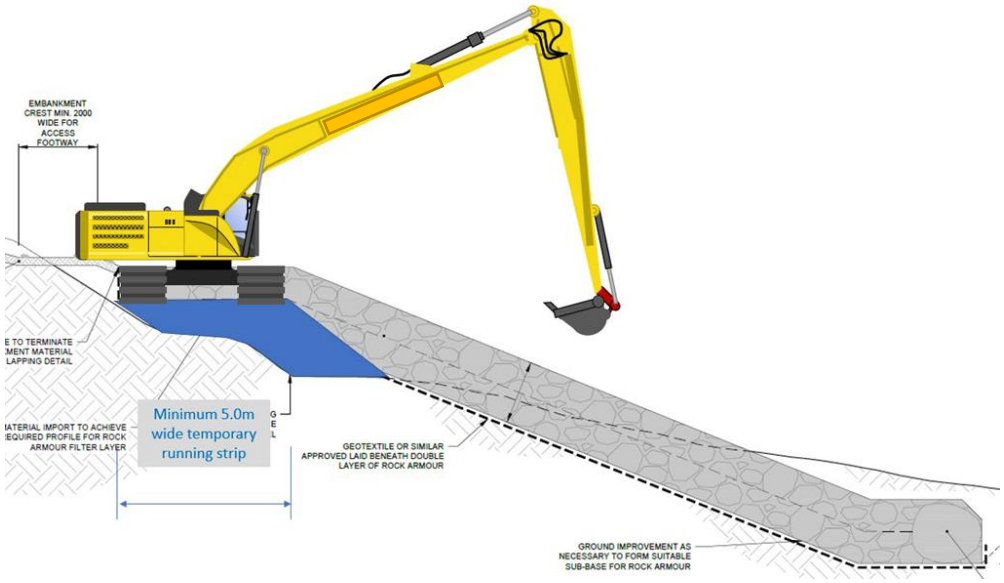
Construction Methodology

While the preferred method for excavations and placing rock armour is per Diag. C below, there will also be a need to enable access to each work site from the north side to handle and manage excavated material, geotextile and rock armour.

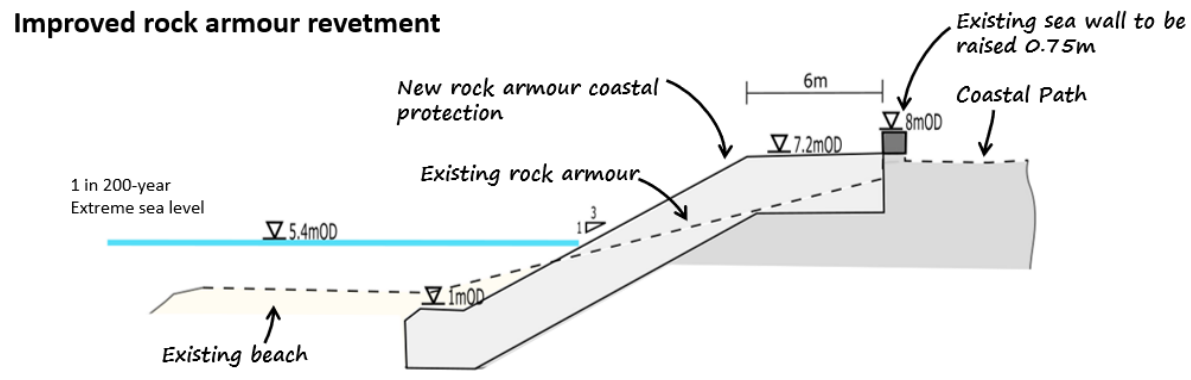
It is expected that construction activities will take place between 8:00am to 6:00pm between Monday to Friday, and 8:00am to 12:00pm on Saturdays and no construction on Sundays and Public Holidays.

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

Diag C - Typical Construction Arrangement



Diag. D – Towyn Revetment

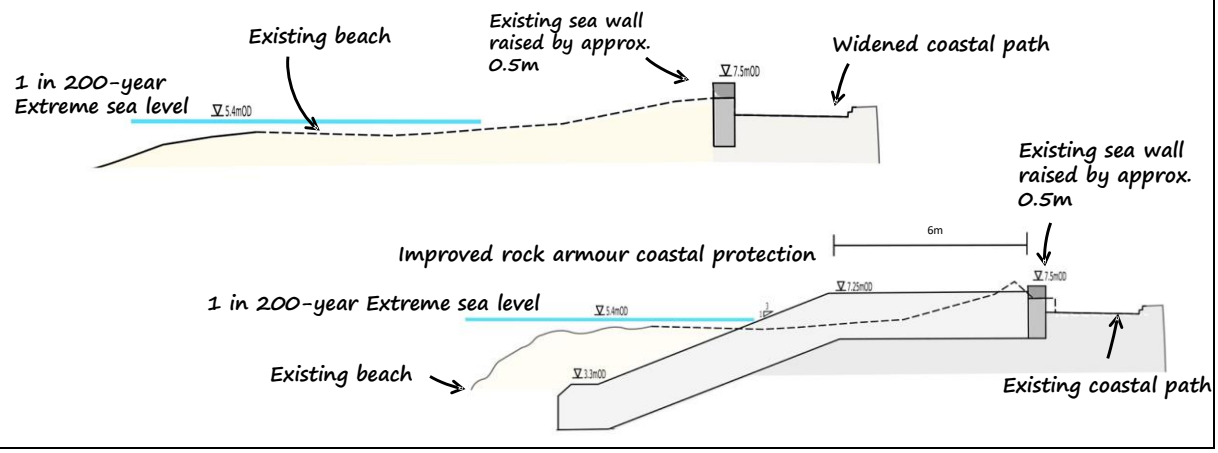


Towyn Revetment proposed construction sequence is :-

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

Diag. E - Kinmel Bay East and West

Raised sea wall & improvements to existing rock armour



Kinmel Bay East proposed construction sequence is :-

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

9. Environmental enhancements
10. Remove temporary fill between beach access sheet piles
11. Construct beach accesses
12. Install sea wall concrete height extensions

Kinmel Bay West proposed construction sequence is :-

1. Stockpile sea wall prefabricated sections
2. Install sheet piles for beach accesses
3. Construct beach accesses
4. Install sea wall concrete height extensions
5. Environmental enhancements

2. Schedule of Construction Materials

The figures in the table below are calculated from design models of the scheme and subject to change, dependent upon site conditions.

Table 1 – Principal Construction Volumes

CONSTRUCTION MATERIAL VOLUMES			
Location	**Geotextile**	**Rock Armour**	**Excavation Volume (below MHWS)**
	M^2	M^3	M^3
Towyn Revetment	8569	25534	8375
Kinmel Bay East	8602	26716	0
Totals	**17171**	**52250**	**8375**

Material Disposal.

Our plan is to retain excavated material on site, however, should off-site disposal be required, the following will occur :-

- Material testing to classify the material
- Development of a material management plan under the Claire protocol
- Allocating suitable storage areas to process and dry out materials

  Note – Incorporation of all site materials within the permanent works is the preferred method.

3. Schedule of Main Construction Plant and Machinery

We have reviewed the drawings and scope of works and our thoughts are that the works will be carried out from the landside. We would not propose the use of marine based plant such as a jack-up or spud leg barges. As this coastline has a large tidal range, barges would not be practical.

We therefore consider that land-based plant should be employed, and we have provided a list below of the key plant proposed.

Table 2 – Construction Plant and Machinery

	40t Tipper (104 dBa)	36t Excavator (101.8 dBa)	20t Road Wagons (Concrete & Rock) (103 dBa)	10t Tipper (106dBa)	3 tonne tipper (102 dBa)	1.5 t tipper (102 dBa)	15 t Excavator (97.5 dBa)	5t Excavator (89 dBa)	Asphalt Spreader (92 dBa)	Sheet piling Rig (69 dBa)	Vibrating Roller (100 dBa)
Rock armour Kinmel Bay East & Towyn Revetment	2	1	4	2							
Sea wall - Kinmel Bay East & West			4	2	1		1				
Car park - Kinmel Bay			2		1		1		1		1
Coastal Path Widening			1			2		1	1		1
Beach accesses			2	1	1		1			1	

Sheet piling will be installed using the Giken (or similar) vibration free piling method. No hammer piling will take place.

Wheel cleaning facilities will be provided at each site compound which will be included in the contractor specification.

4. Outline Construction programme

Our Outline construction Programme CH1701-AMEY-GEN-XX-PR-ZM-0104 – Rev A which is shown in Appendix A.

We consider that supply, delivery and placement of rock armour material will be key to the critical path of this project. We also consider that there may be a need for enabling works (Est. 5 weeks) in advance of construction to stockpile rock armour (above the MHWS line).

Construction of the sea defence works elements of the programme are subdivided into key locations as follows -

- Towyn Revetment – Rock Armour and Sea Wall Height Increase
- Kinmel Bay East – Rock Armour and Sea Wall Height Increase
- Kinmel Bay West – Sea Wall Height Increase

The work will require installation of one temporary access track (per work site) to the most distant extent of each work site. This will enable construction of the permanent works back towards each access route.

5 - General Measures

General measures that will be implemented to manage the construction process, including construction environmental management (such as general provisions to reduce the risk of environmental pollution/contamination and site waste management procedures)

Archaeological written scheme of Investigation	
NRW - Marine License Consent	Pre-commencement conditions to be discharged
CCBC Planning consent	Pre-commencement conditions to be discharged
UXO survey / risk assessment / Desk top study	Prior to piling / excavation
Environmental Surveys	
Ecological surveys	
Traffic Management Plan	
Stakeholder Engagement / Consultation	NRW Local tenants CCBC Highways Network Rail Statutory Undertakers

6 – Road Access

The proposed 'red line' boundary encompasses the proposed works, construction access routes from the public highway and construction compounds.

The proposed access arrangements are based on obtaining access from existing highways. We do not envisage the use of marine based plant, such as barges.

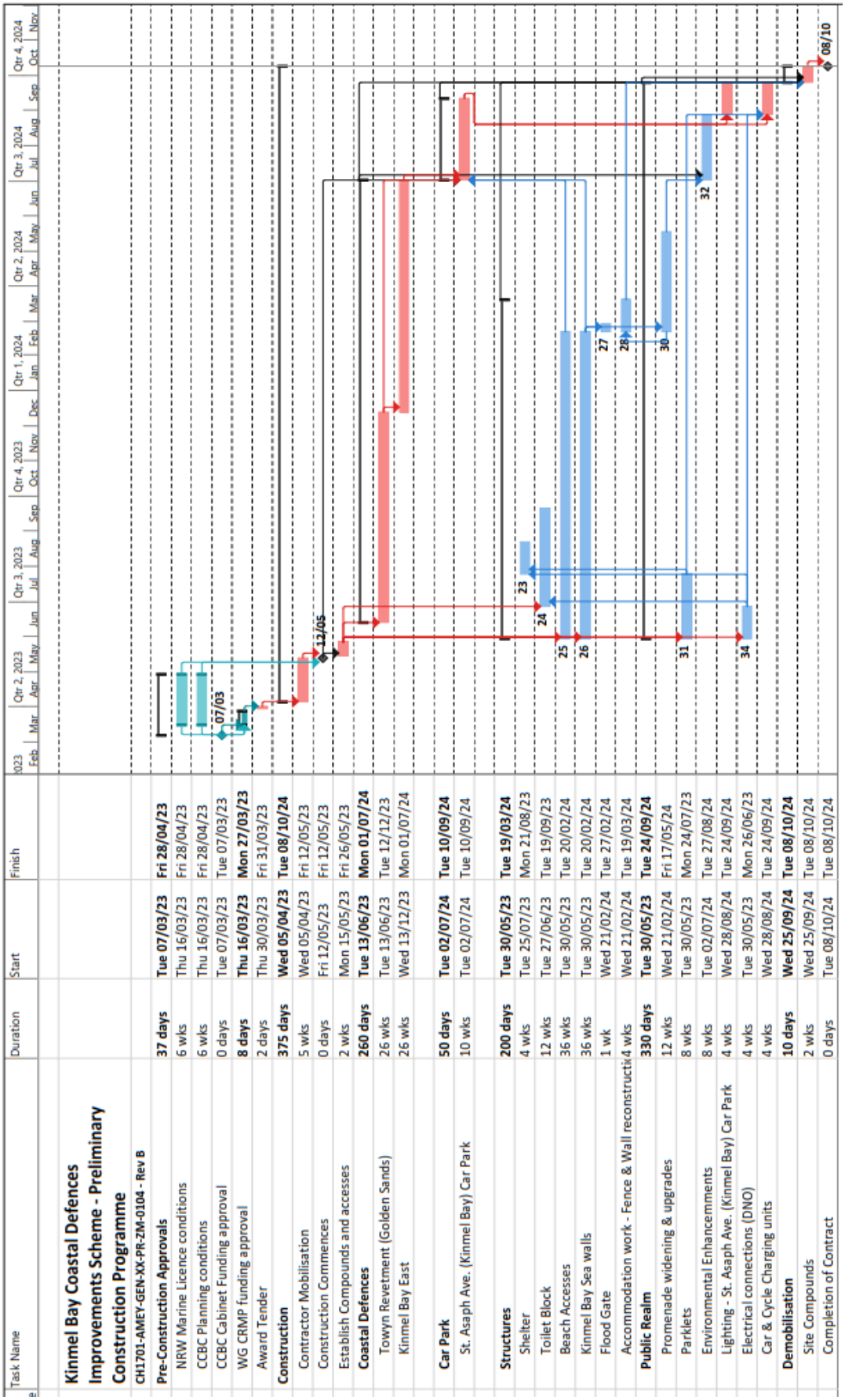
All plant and materials will be delivered by road.

We do not envisage any requirement for access outside the red line boundary.

7. Decommissioning

We do not plan to decommission any elements of the permanent works.

Appendix A – Preliminary Construction Programme – (Revision B)



Task Name	Duration	Start	Finish
Kinmel Bay Coastal Defences Improvements Scheme - Preliminary Construction Programme			
CH1701-AMEY-GEN-XX-PR-ZM-0104 - Rev B			
Pre-Construction Approvals	**37 days**	**Tue 07/03/23**	**Fri 28/04/23**
NRW Marine Licence conditions	6 wks	Thu 16/03/23	Fri 28/04/23
CCBC Planning conditions	6 wks	Thu 16/03/23	Fri 28/04/23
CCBC Cabinet Funding approval	0 days	Tue 07/03/23	Tue 07/03/23
WG CRMP funding approval	**8 days**	**Thu 16/03/23**	**Mon 27/03/23**
Award Tender	2 days	Thu 30/03/23	Fri 31/03/23
Construction	**375 days**	**Wed 05/04/23**	**Tue 08/10/24**
Contractor Mobilisation	5 wks	Wed 05/04/23	Fri 12/05/23
Construction Commences	0 days	Fri 12/05/23	Fri 12/05/23
Establish Compounds and accesses	2 wks	Mon 15/05/23	Fri 26/05/23
Coastal Defences	**260 days**	**Tue 13/06/23**	**Mon 01/07/24**
Towyn Revetment (Golden Sands)	26 wks	Tue 13/06/23	Tue 12/12/23
Kinmel Bay East	26 wks	Wed 13/12/23	Mon 01/07/24
Car Park	**50 days**	**Tue 02/07/24**	**Tue 10/09/24**
St. Asaph Ave. (Kinmel Bay) Car Park	10 wks	Tue 02/07/24	Tue 10/09/24
Structures	**200 days**	**Tue 30/05/23**	**Tue 19/03/24**
Shelter	4 wks	Tue 25/07/23	Mon 21/08/23
Toilet Block	12 wks	Tue 27/06/23	Tue 19/09/23
Beach Accesses	36 wks	Tue 30/05/23	Tue 20/02/24
Kinmel Bay Sea walls	36 wks	Tue 30/05/23	Tue 20/02/24
Flood Gate	1 wk	Wed 21/02/24	Tue 27/02/24
Accommodation work - Fence & Wall reconstructi	4 wks	Wed 21/02/24	Tue 19/03/24
Public Realm	**330 days**	**Tue 30/05/23**	**Tue 24/09/24**
Promenade widening & upgrades	12 wks	Wed 21/02/24	Fri 17/05/24
Parklets	8 wks	Tue 30/05/23	Mon 24/07/23
Environmental Enhancemments	8 wks	Tue 02/07/24	Tue 27/08/24
Lighting - St. Asaph Ave. (Kinmel Bay) Car Park	4 wks	Wed 28/08/24	Tue 24/09/24
Electrical connections (DNO)	4 wks	Tue 30/05/23	Mon 26/06/23
Car & Cycle Charging units	4 wks	Wed 28/08/24	Tue 24/09/24
Demobilisation	**10 days**	**Wed 25/09/24**	**Tue 08/10/24**
Site Compounds	2 wks	Wed 25/09/24	Tue 08/10/24
Completion of Contract	0 days	Tue 08/10/24	Tue 08/10/24