

Llanddulas to Kinmel Bay Coastal Defence Scheme

Construction Methodology

1. Construction Sequencing

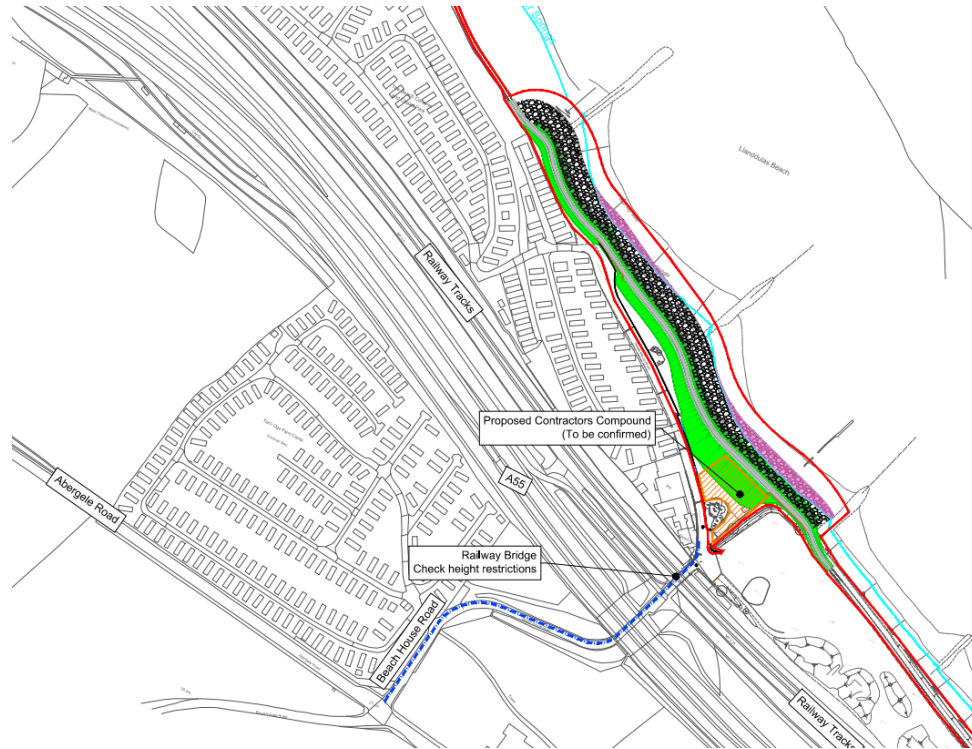
The proposed construction sequence is shown in Appendix A, the outline Construction Programme (CH1701-AMEY-GEN-XX-PR-ZM-0104)

Diag. A – Areas of Sea Defence construction

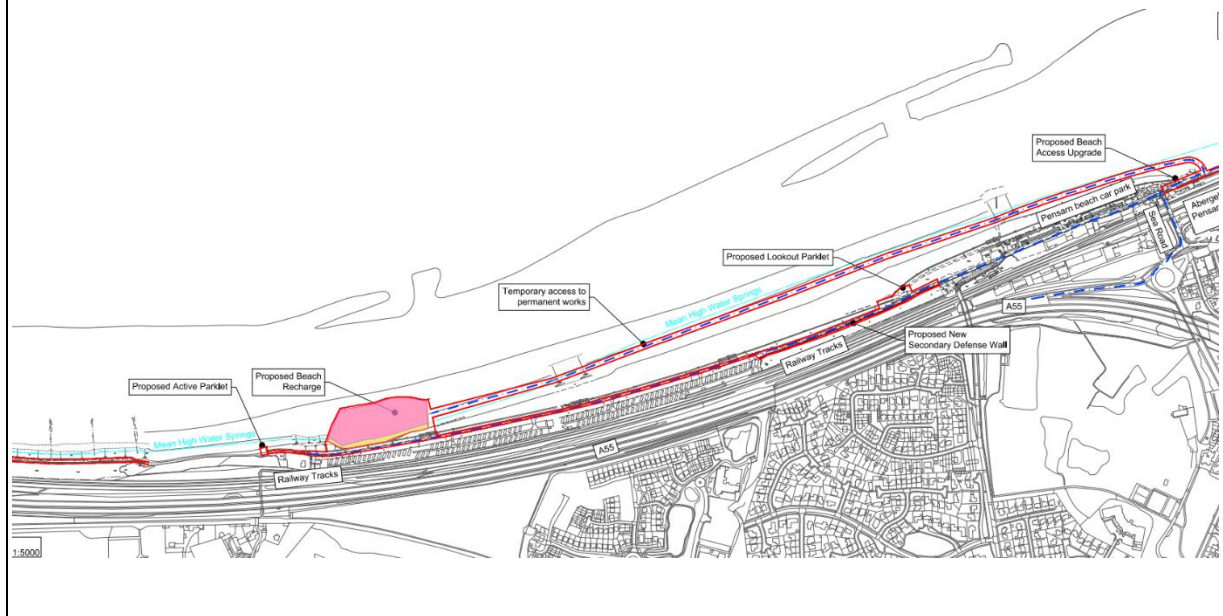


Access Routes - Work is proposed to access from the following points of the public highway (blue dashed line).

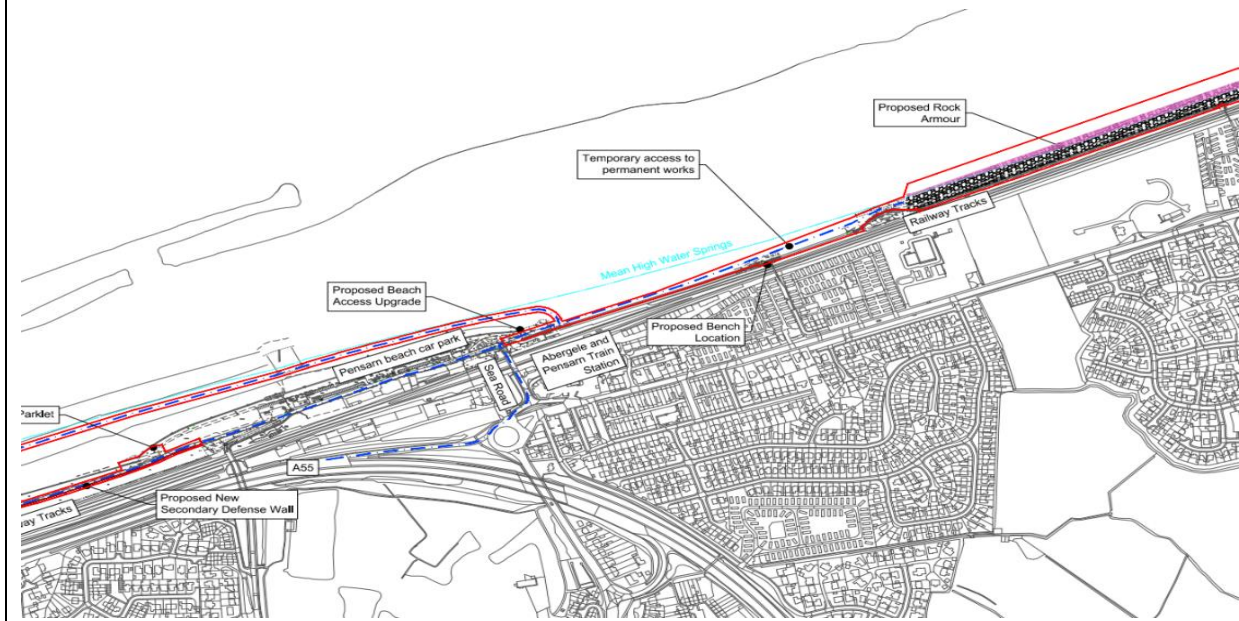
Diag. B - Llanddulas Beach (Thornley's CV Park)



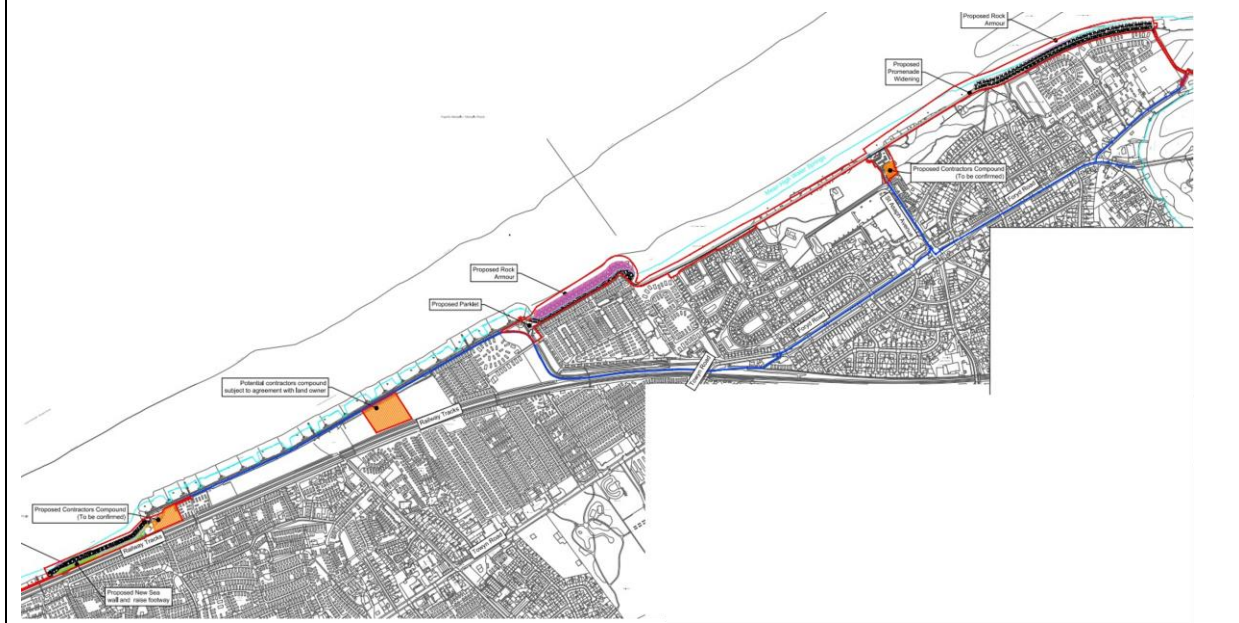
Diag C. Ty Crwn



Diag D. Belgrano Beach – West



Diag. E Belgrano Beach East, Golden Sands, Kinmel Bay Beach – East and West



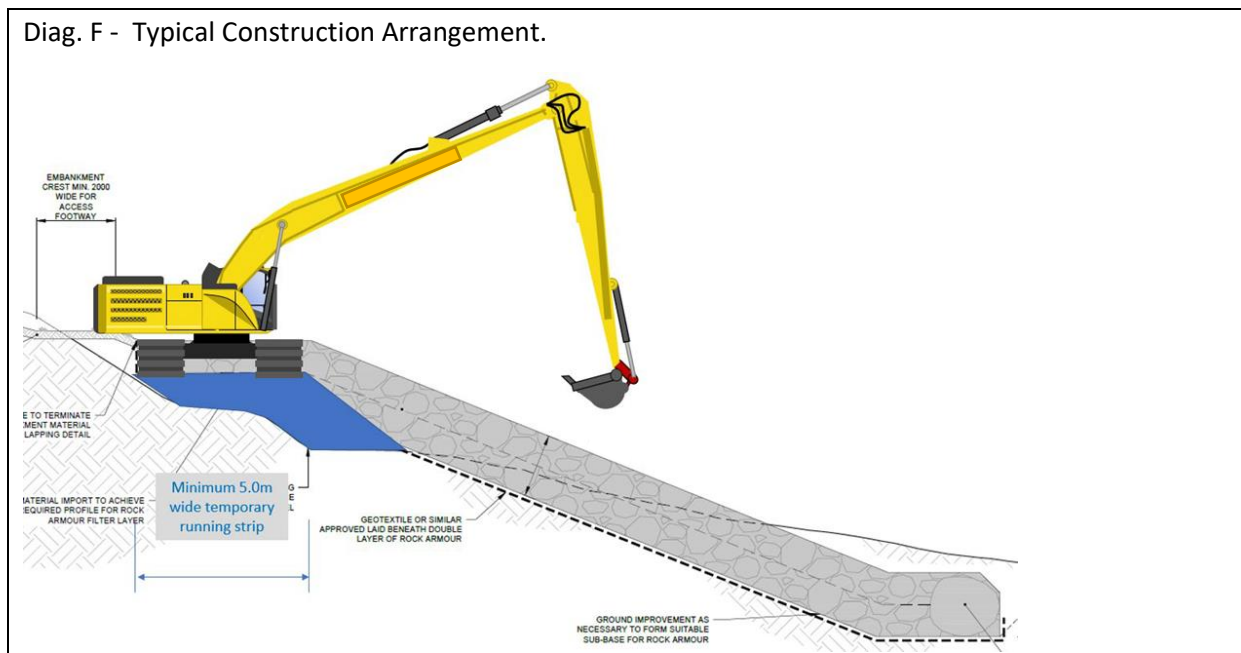
Construction Methodology

While the preferred method for excavations and placing rock armour is per Diag. F 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.

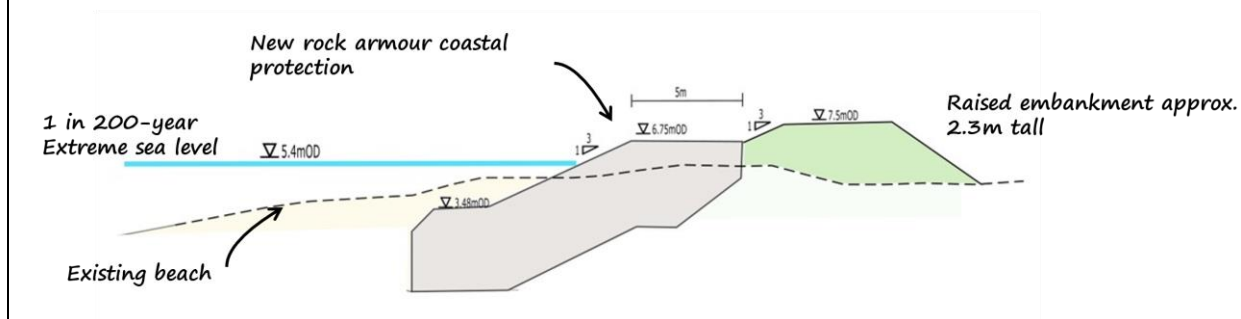
There will be approximately 30 operatives and 10 office staff present on-site, however, it will depend on the number of sites open at any one time.

Diag. F - Typical Construction Arrangement.



Diag. G. Llanddulas Beach (Thornley's CV park)

Rock armour and raised vegetated embankment

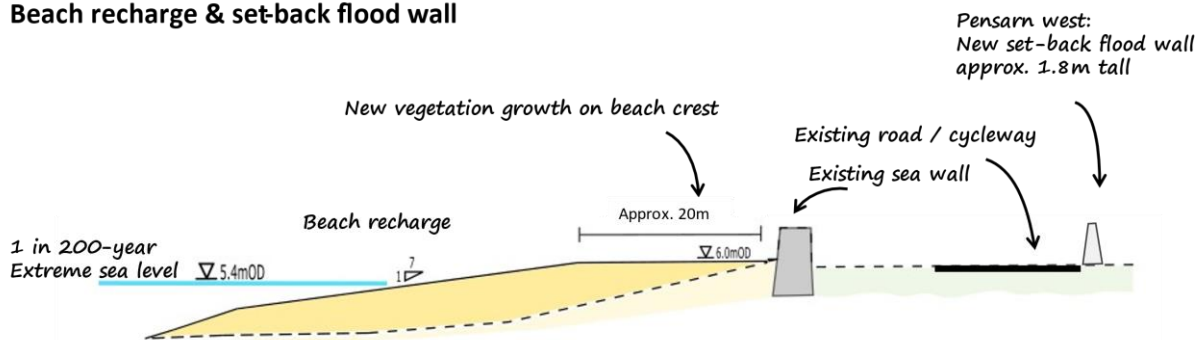


The Llanddulas Beach (Thornley's CV Park) proposed construction sequence is :-

1. Stockpile rock armour
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. Excavate temporary fill between beach access piles
10. Construct beach accesses
11. Construct reinforced earth embankment and cycle path.
12. Spread and seed topsoil on earth embankment.
13. Ecological enhancements

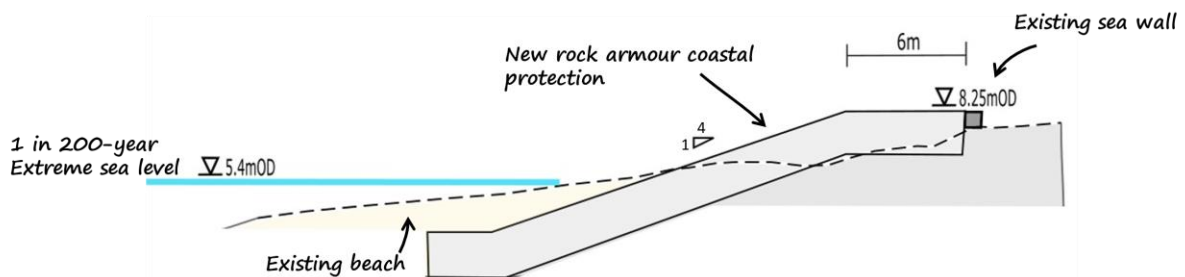
Diag H. Ty Crwn and Pensarn West

Beach recharge & set-back flood wall



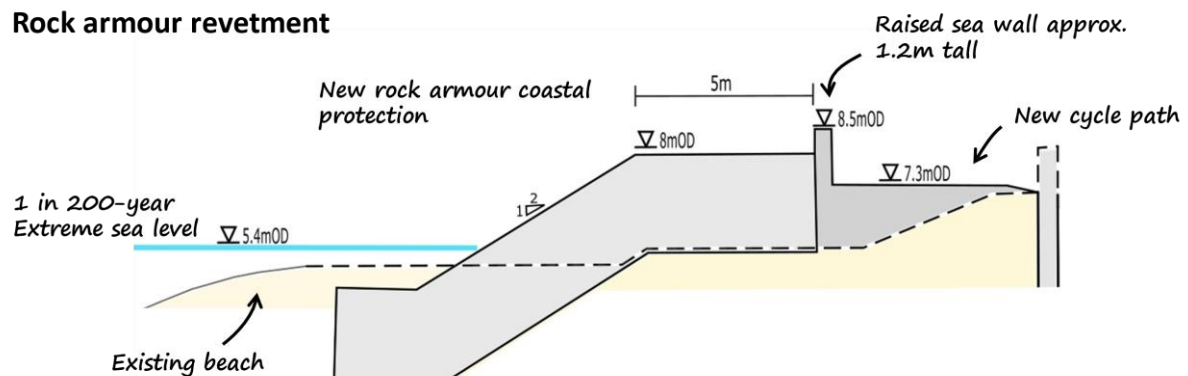
The Ty Crwn and Pensarn West proposed construction sequence is :-

1. Stockpile beach re-charge at the site compound. Any stockpiling on the beach will be above MHWS level
2. Spread material on beach to desired extent and levels
3. Plant new vegetation on beach crest
4. Construct secondary wall

Diag J. Belgrano Beach West**Rock armour revetment**

The Belgrano Beach West proposed construction sequence is:-

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

Diag K. Belgrano Beach East**Rock armour revetment**

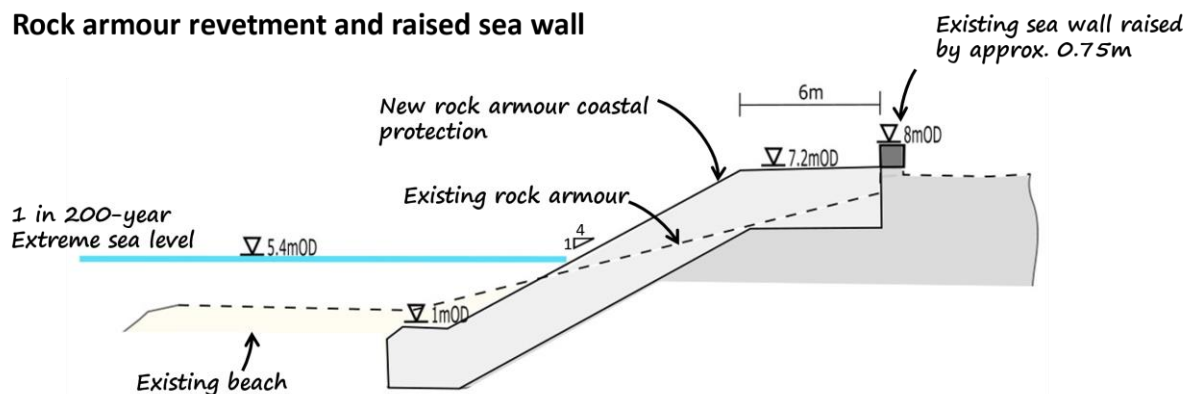
The Belgrano Beach East proposed construction sequence is:-

1. Stockpile rock armour
2. Carry out initial excavation to form the crest
3. Install sheet piles along top / back of rock armour
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. Excavate behind sheet piles and install retaining wall, fill and cycle path behind sheet piles.
10. Ecological enhancements

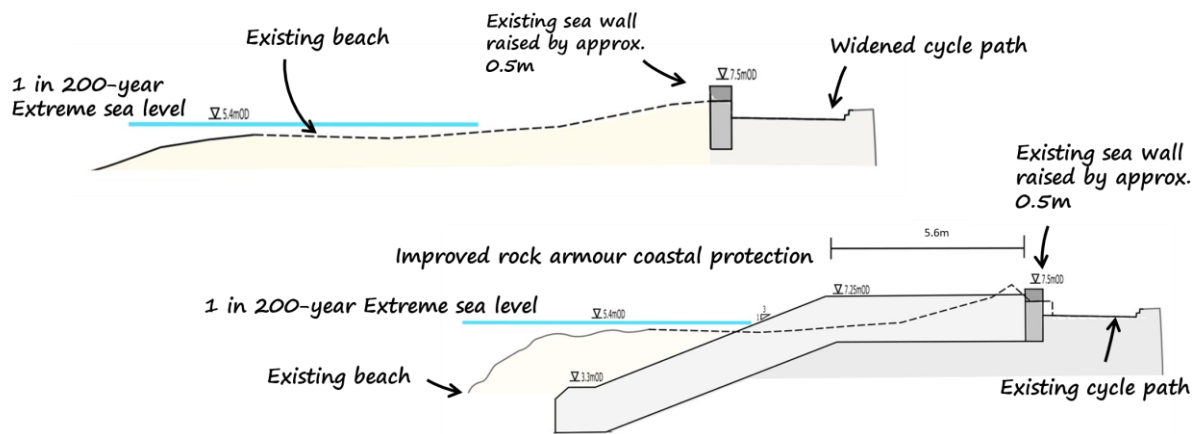
Diag L. Kinmel Bay (Golden Sands)

Rock armour revetment and raised sea wall



Kinmel Bay (Golden Sands) 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. Ecological enhancements
10. Remove temporary fill between beach access sheet piles
11. Construct beach accesses
12. Install sea wall concrete height extensions

Diag M. Kinmel Bay East & 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. Ecological 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. Ecological 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.

CONSTRUCTION MATERIAL VOLUMES							
Location	Geotextile	Embankment Fill	Topsoil	Rock Armour	Excavation Volume (below MHWS)	Scour Protection	Beach Re-Charge
	M ²	M ³	M ²	M ³	M ³	M ²	M ³
Llanddulas Beach (Thornley's)	5358	6725	5000	15967	6849	820	
Ty Crwn							20000
Belgrano Beach West	16001			47685	10014		
Belgrano Beach East	5278			15729	234		
Kinmel Bay West (Golden Sands)	11128			33163	13837		
Kinmel Bay East	12253			36516	573		
Totals	50020	6725	5000	149061	31507	820	20000

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. This coastline has a large tidal range, and the 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.

	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 – Belgrano Beach east & west, Llanddulas Beach, Kinmel Bay east & west, Llanddulas Beach	2	1	4	2							
Sea wall - Kinmel Bay & Belgrano Beach east			4	2	1		1				
Car parks - Llanddulas & Kinmel Bay			2		1		1		1		
Beach Recharge - Ty Crwn				2			1				
Secondary Walls – Llanddulas Beach & Ty Crwn			2		1		1				
Llanddulas Beach earth embankment			2		1		1				
Promenade 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 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 -

- Llanddulas Beach (Thornley's CV Park)
- Ty Crwn

- Belgrano Beach West
- Belgrano Beach East
- Kinmel Bay West (Golden Sands)
- Kinmel Bay East

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

