

**Central Rhyl Coastal Defence Scheme – Marine Licence Question 7a – Method Statements
(continuation pages)**

Three methods for the access steps are currently being explored, these being:

- Method 1: The concrete foundation of the steps would be formed inside a temporary sheet pile arrangement. An open cofferdam would be used to allow excavation inside the sheet piles to correct design profile. Once the correct formation is achieved concrete would be placed to the desired profile of the step foundation. This work would be done in small manageable sections permitted by the tidal window. The extent of the piling required is suited to the use of an excavator mounted vibratory hammer. These piles would be extracted once the concrete has sufficiently cured. This method has been used recently on the nearby East Rhyl Coastal Defence scheme;
- Method 2: An alternative to above would be the use of drag boxes. These would be used in a similar manner to contain the excavation and act as a temporary former to the concrete foundation as it is formed in small manageable sections as above; or

Method 3: Depending on final design outcome; the Contractor will look to mitigation measures such as using leader rig mounted pile press to improve Method 1 detailed above. In this case the Contractor would likely keep the piles in place where it is used as permanent formwork. This method could also be considered as a viable alternative where permanent ramped access points are constructed, and the sheet piles will remain in place.

Once the concrete foundation is formed, the pre-cast concrete sections will be lifted into place with a large (40-50t) tracked excavator. The precast units will be delivered onto the beach using a tractor and trailer unit.

Sections A-D: Rock scour protection

Rock will be imported directly onto the beach and will be stocked such that the quantity is at least four weeks ahead of the placement schedule. To this end, all rock will arrive on site in pre-graded proportions, ready for incorporation into the works. Rock will be briefly stored along the beach near the works as it progresses.

Tracked excavators (30t to 50t) will excavate to formation at the designated shift location. Where required, articulated dumper trucks will be used to move the excavation arisings beyond the extents of the dig where it will remain unless used for backfilling of the toe. GPS machine control will be used to control accurate excavation to formation level profile.

A roll of geotextile will be connected on to the lifting spool and placed on to the dumper/trailer and transported to the work area. At the work face, the roll will be attached to the excavator and the free end weighted or held in position by the second machine to allow it to be laid on the formation. Once in position the geotextile will be cut with an appropriate tool. The second excavator will commence placement of the rock from local stockpile, whilst the first excavator continues preparation of the next section. Rocks are likely to be moved from the stockpiles and placed one at a time onto the recent formation/geotextile using a grab attachment or bucket until the required profile is reached.

On confirmation that the as-built profile is within the tolerances set out in the specification and sufficient measurements have been taken to calculate accurate volumes, the as-dug

sand/shingle beach material will be used as required by the design to cover the toe up to existing beach level.

Particular care will be required in the construction methodology in the vicinity of the RNLI lifeboat ramp and public access ramp in Section D to avoid the risk to the structures, the public and lifeboat operations. No rock will be stockpiled on the beach where there is any risk to lifeboat recovery operations at high tide. Temporary works designs will be required to ensure no risk of undermining the existing structures and this may require sheet piling adjacent to them.

Sections E-H: Stepped revetment

To provide improved coastal protection the Promenade crest height needs to be raised with a new stepped revetment in front of the promenade and rear sea wall on the landward side of the promenade. The rear sea wall will also act to retain the promenade fill material and prevent any unacceptable loading onto adjacent existing structures. The new revetment will be built over the top of the existing structures as presented in the drawings (CR-MMD-00-ZZ-DR-SC-7101 Coastal Structures Preliminary Design).

The beach is generally of a suitable material for operating tracked plant on, generally the beach in this section is accreting and beach levels/sand thicknesses are sufficient. However, this would require ongoing review. There is potential for areas of low sand build up or soft areas that will have to be assessed during the works. Use of 'bog mats' may be required to provide access. Beach sand levels will be managed to endure safe accessways and operational platforms for tracked plant. It is assumed that a dozer will operate throughout the length of the Scheme to manage beach material and maintain safe accessways and operational platforms for tracked plant. At the end of each tidal shift, plant operating on the beach will be removed to a safe holding area during the high tide and until the next shift. The nearest temporary slipway to the location of works on the beach will be used and the holding area is likely to be in the vicinity of the John Street access or the Central access, near the slipway.

The works associated with the revetment below MHWS include:

- Lifting the pre-cast sections will be undertaken on the landward side using a 120t crawler crane.
- In-situ concrete capped sheet piling (tidal working).
- Prior to the piling operation commencing it will be necessary to reduce the beach level in the vicinity of the new revetment toe and the excavation arisings will be placed beyond the extents of the working area where it will remain on the beach. This will most likely take place up to three tidal shifts in advance of the piling operation.
- It is anticipated that piles will be installed using a vibratory hammer attached to a tracked excavator. At regular intervals a pair of piles will be driven deeper to facilitate gabion basket drainage installation (see below).
- Following the piling operation, a second gang will excavate around the piles to the formation level of the pile capping beam. It is likely that drag boxes will be used to retain the adjacent beach sand. At gabion basket locations the deeper excavation will be completed and stone filled gabion baskets installed above the lowered sheet piles to permit adequate drainage.

- Pre-fabricated reinforcement cages will be lifted into the drag-box using the excavator and concrete poured. Alternatively, the Contractor is currently investigating the use of fibre reinforced concrete to eliminate the need for steel reinforcement and simplify the works in a tidal environment. This is on the basis that the capping beam level is below the long-term possible beach draw-down level and therefore it will not be subject to abrasion and have any potential to release fibres into the marine environment.
- The capping beam concrete works is likely to be completed in two stages, with the second stage carried out following pre-cast revetment unit installation.
- The revetment will be constructed following the above works and the promenade landside construction works. Once these works are sufficiently progressed the revetment installation operation will commence. This work will be carried out sequentially and is anticipated to work from the east back towards the main access point near John Street with all material deliveries from the John Street access.
- The beach material will be excavated behind the previously completed sheet pile capping beam to the suitable profile for the drainage layer. Suitable drainage material will be imported and placed. Then working up towards the promenade level, fill material will be imported and installed above existing beach level, and further drainage material placed to the required profile. The work in progress will be capped with 150mm concrete blinding layer to provide protection from tidal/wave action. It is also likely that transverse walls will be constructed perpendicular to the shoreline at regular intervals, either of mass concrete, gabion basket or steel mesh faced retained earth, at regular intervals sufficient to compartmentalise the work in progress and further protect it or limit the extent of any damage from the sea.
- The fill and blinding works will be carried out in small sections to suit the working window within the tidal shifts. This activity will be carried out to suit the rate of progress of the follow-on precast installation activity, so that the completed and blinded profile is no more than 2 or 3 shifts ahead of the precast placement. This will further limit the risk of damage/rework.
- Precast revetment units will be delivered by tractor and trailer unit to the promenade where a 120t crawler crane will lift them and place them into position on the prepared slope. The daily work will be planned to confirm that at the end of each shift the revetment units are completed to a sufficiently high level to reduce the risk of damage or movement due to tide/waves. Grouting between the blinding and precast units will be carried out as soon as practicable after placement.