

Lessons learned from one of New Zealand's most challenging civil engineering projects: rebuilding the earthquake damaged pipes, roads, bridges and retaining walls in the city of Christchurch 2011 - 2016.

Beachville Presentation

Story: Beachville Seawall

Theme: Construction

A presentation which describes the stages of construction of the Beachville Road seawall.

This document has been provided as an example of a tool that might be useful for other organisations undertaking complex disaster recovery or infrastructure rebuild programmes.

For more information about this document, visit www.scirtlearninglegacy.org.nz



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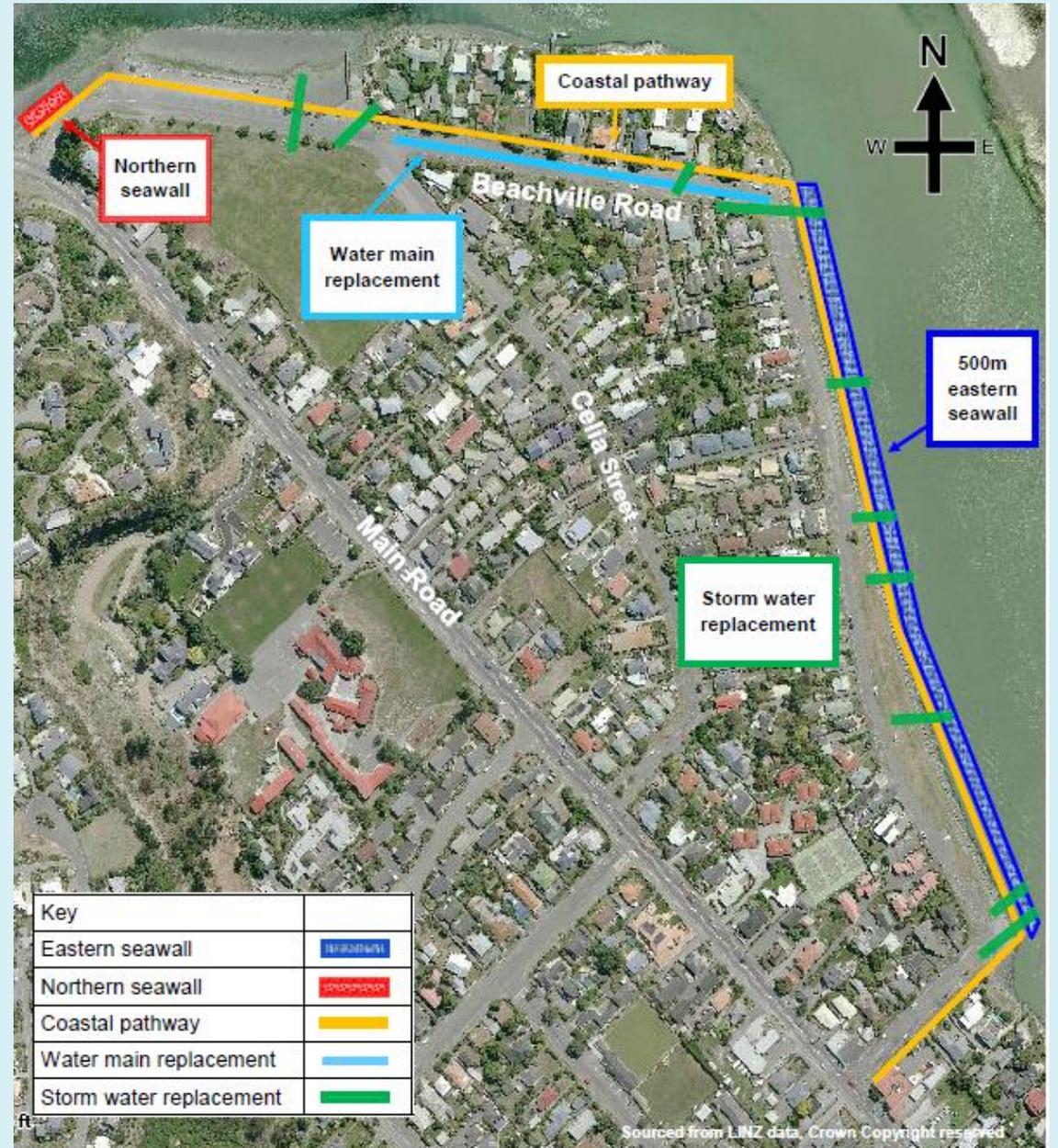
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Beachville Seawall



Beachville Project Overview

- 500m of Seawall along the Heathcote/ Avon Estuary
- 1.2 Km of Coastal Pathway
- 10000m² of Pavement replacement
- 350m of Storm water repairs
- Various service diversions to facilitate works



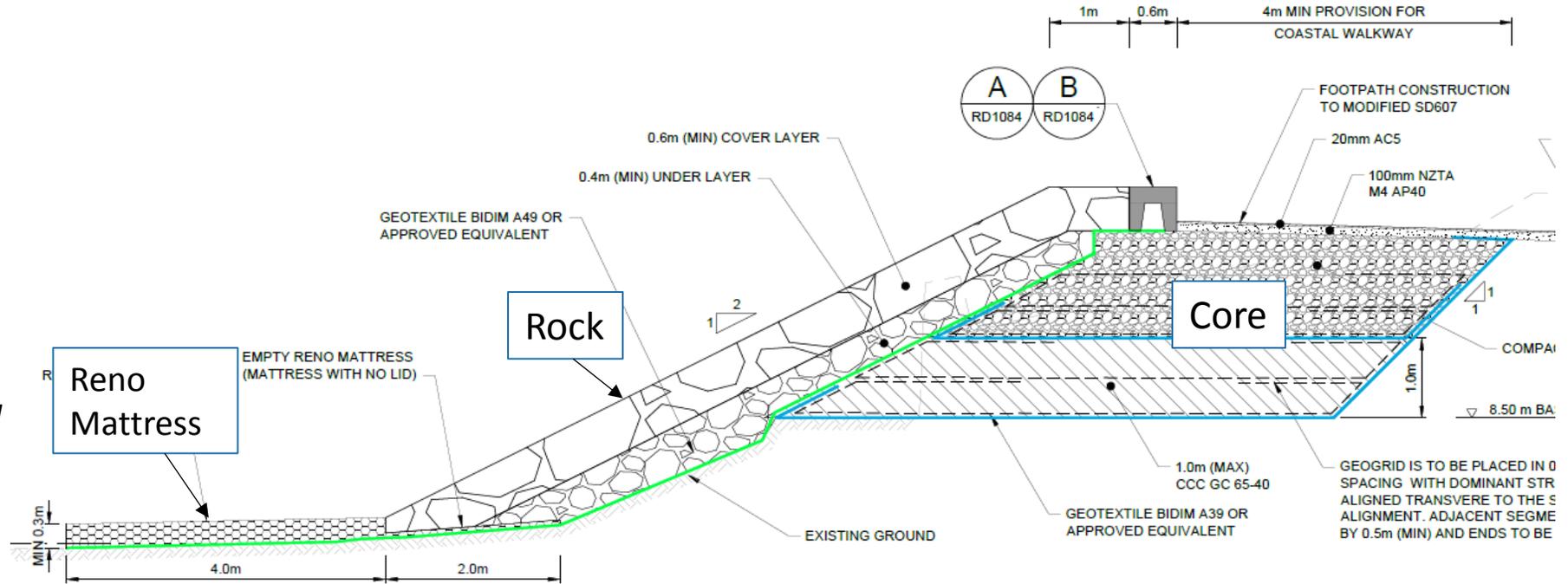
The old Wall

- Built in the early 1900's
- The 2.5m high stone and concrete wall protected Beachville rd. from the Heathcote/ Avon Estuary
- As a result of the 2011 earthquakes the wall settled up to 500mm and slumped forward up to 1 metre in places.
- Existing SW outfalls were damaged leaving Beachville Rd susceptible to flooding during bad weather.



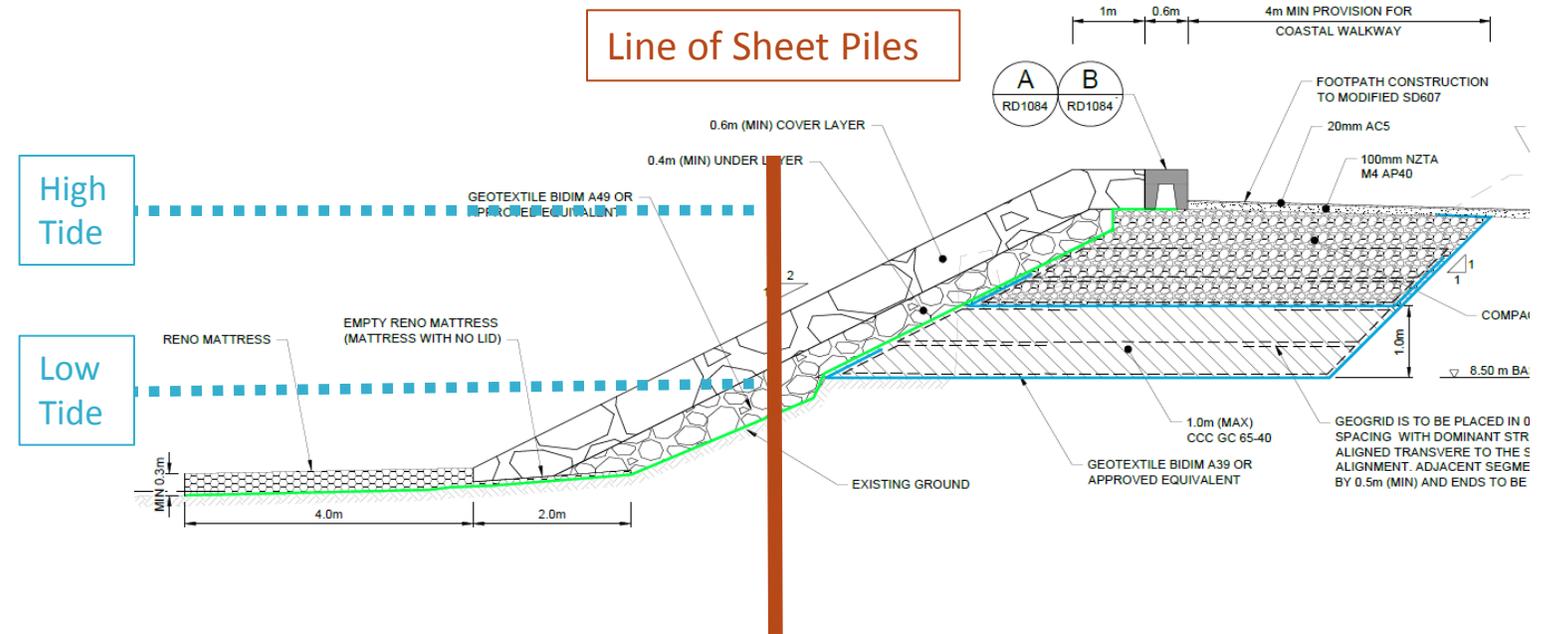
Seawall Design

- 500m long Rock Revetment
- Impermeable Geotextile wrapped core
- 1m thick layer of Rock
- Reno Mattress toe installed on the existing seabed
- *The new structure provides protection from erosion and scour*
- *Is Less susceptible to lateral spread*
- *And is Easily topped up if damaged in another earthquake*



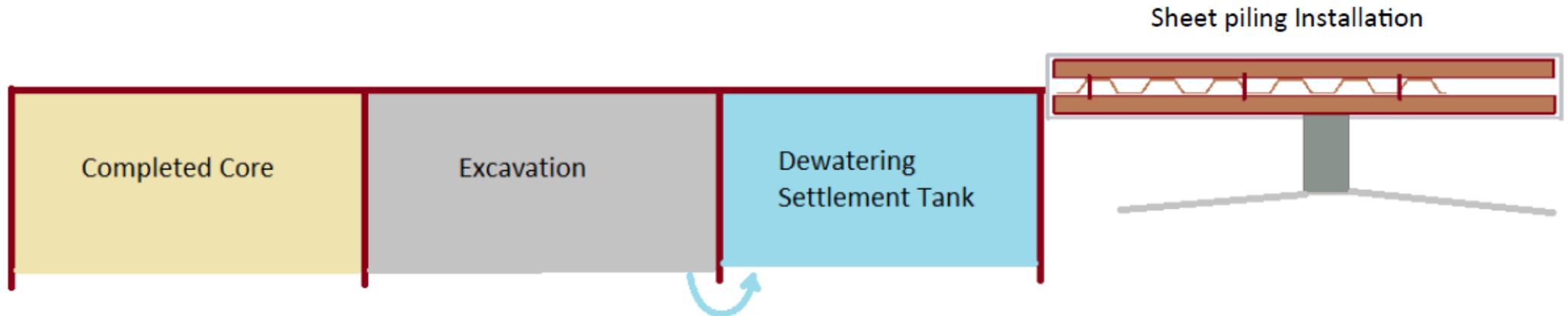
Construction Challenges

- The main challenge facing us was a tidal range of 2.4m, which at high tide left the seawall core under water.
- Sheet piling out to the toe of the wall was quickly ruled out due to time/ cost.
- In the end we decided that we would only sheet pile and dewater the Geotextile Core.



This led to the next challenge..

Working Direction →

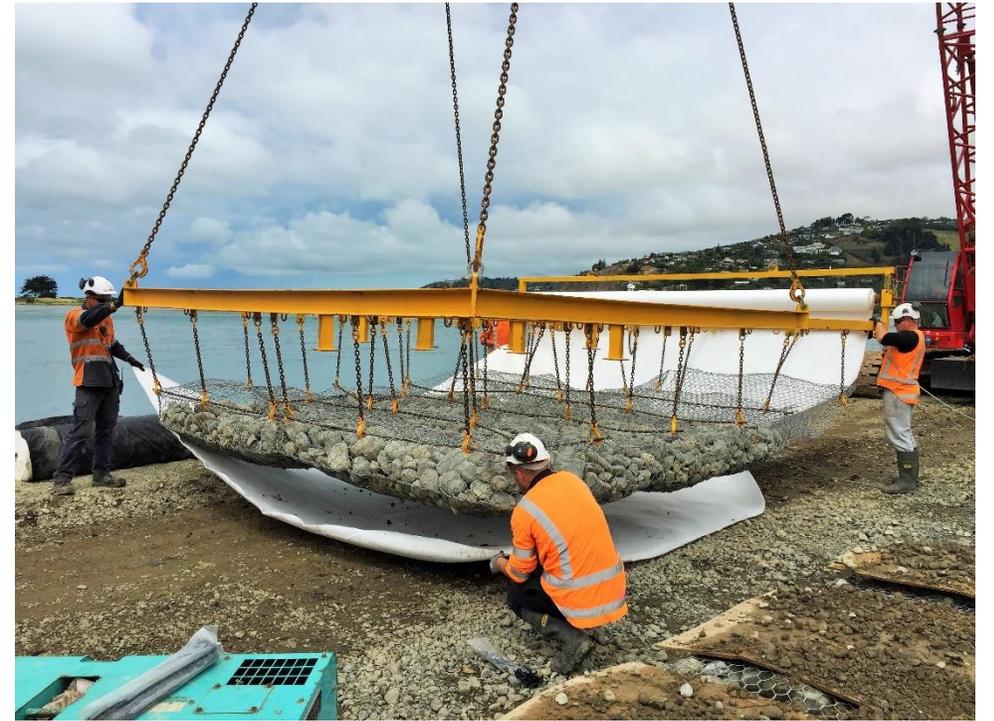


Construction Challenges

How to install the Reno Mattresses under water?

After consultation with Connell Contractors it was decided that Divers would be used to place the Reno's.

- The mattresses are constructed on shore
- Lifted by Crane using a specially designed lifting frame
- Lowered into the water in line with markers buoys placed using GPS
- Once in the water the Divers direct the lift until the mattress is on the seabed
- The Divers then release all the hooks, and the process is repeated.



Sheetpiling

- Using a cantilever guide frame 8m long sheet piles are driven along the bank.
- Every 30m a return is driven, creating manageable cells than can be dewatered
- Up to 3 cells on the go at any one time





Dewatering and Excavation

Water is pumped from the cell being excavated into the next cell in front, allowing any sediment to settle before making its way into the estuary



*Approx.
40,000m² of
Geotextile has
been used to
date*



*Over
6500m³ of
engineered
fill has been
installed to
date*



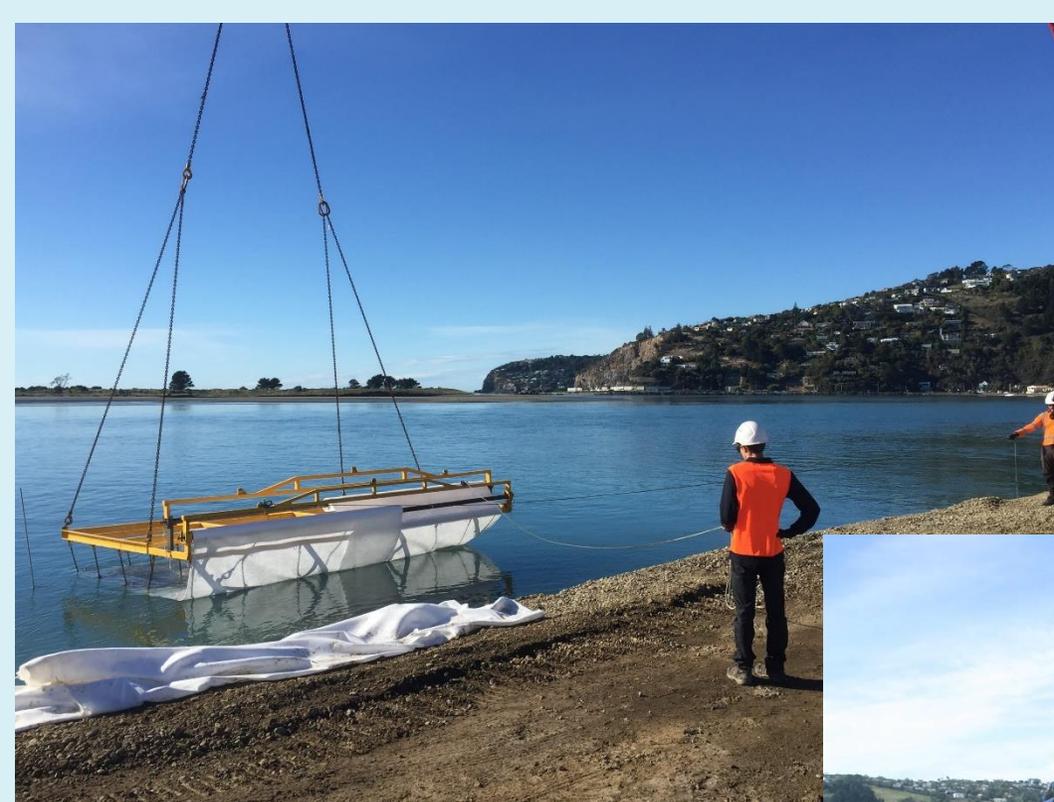
Geotextile Core Construction

Reno Mattress Installation

- First the spools are loaded with the correct amount of geotextile
- They are then fitting to the lifting frame and reno mattress



Reno Mattress Installation



- The mattress is lifted into position and lowered under water
- Divers confirm the position and release the hooks



- The spool is lifted out of the water and the bidim is rolled up the bank to the surface

Rock Placement



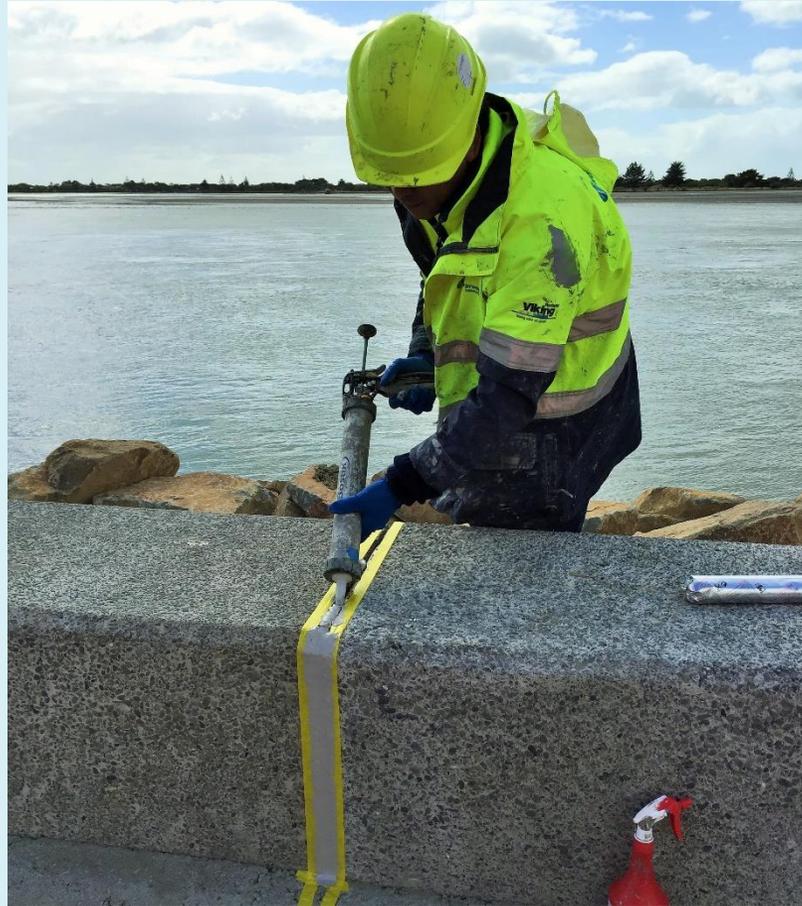
Rock is placed in 2 layers:

- 0.4m of Under Layer – 60-200mm Rock
- 0.6m of Cover Layer – 200-400mm Rock

Almost 6000m³ of Rock has been placed to date

Precast Wall unit installation

- 208no. Precast units to be placed in total
- They are grouted in place, and the joints sealed with Sikaflex
- Once in position rock is placed carefully along the outer face to complete the seawall!



Beachville Progress

- **Seawall** – 90% complete with only the southern tie-in and northern seawall to finish in the next 4 weeks.
- **Storm water** – 80% complete with 20m of pipe left to install.
- **Roading and Coastal Pathway** – 50% complete and due to finish in September
- **Landscaping** – Commencing in July and expected to be completed early September

***Beachville 11200 Finishing Strong
September 2016!***



Communications

Over the past 9 months we have developed a great relationship with the residents of Beachville Rd.

From regular notices – to open days on site, we have kept the residents in the loop throughout the project.

In return we have received regular feedback, letters and most importantly baked goods!

This week the Residents Association threw a Morning Tea for the crews on site, to show their appreciation for the work they are doing.



Beachville Comms Champ

Congratulations To STMS Jason Montford for his outstanding efforts in Beachville. For the last few weeks he has done an excellent job with regard to TM, ensuring road works in Beachville have been completed in a safe and efficient manner. In particular, Jason has been proactive in communicating and explaining TM changes to residents, something they very much appreciate. His good relationships with the locals has meant we have had minimal complaints to date, allowing engineers to focus on other aspects of the project. The daily efforts Jason puts forth reflects the good reputation the crew has earned in Beachville as we've received many positive comments from residents over the last several months about the outstanding service they've received. Individuals like Jason who always look for ways to minimize disruption and empathize with residents living near a busy worksite will be key for a strong finish by Downer and SCIRT. Job well done Jason!



Communications Champion

May 2016
Awarded to:

Jason Montford

