Soil Conservation Service

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IECA Australasia Excellence Awards 2019

Drawing a line in the sand – A Practical Approach to Coastal Erosion

SCS Stories from Stockton & Pelican

EXCELLENCE IN INNOVATION, CONTRIBUTION OR EDUCATION TO THE EROSION AND SEDIMENT CONTROL INDUSTRY

WINNER 2019

IECA International Erosion Control Association AUSTRALASIA

Section 1: What did we do?

The Soil Conservation Service (SCS) has developed a collaborative approach to implementing coastal remediation projects, to rectify a disconnect between coastal designers and builders.

In 2016, an east coast low storm eroded Stockton Beach threatening a local surf club. During construction of the wall to protect the surf club, SCS identified the potential for closer collaboration between the designers and the team building the wall.

The project commenced with neither party having a full appreciation of both the technical and practical input required to drive a successful outcome. A more collaborative approach was required to secure an equitable division of risk and to ensure the efficient delivery of the project.

In 2018 a huge storm eroded another section of Stockton Beach, with an old landfill site washing into the sea. In a separate coastal project, designs were finalised to address bank stability concerns in the suburb of Pelican, where a building had previously collapsed into Lake Macquarie.

SCS identified an opportunity to use the experience gained overcoming challenges in 2016 and apply these insights to this next series of coastal projects.

SCS initiated collaboration with clients and designers from the outset of both projects, thereby improving stakeholder cooperation, communication and enabling the optimum outcome for communities living with the threat of coastal erosion.

Section 2 (400 words): How did we do it?

In 2018, following a large storm, an historic Council landfill site started washing into the sea at Stockton. The landowner, Hunter Water, approached SCS to provide emergency assistance. Understanding the risks associated with the coastal environment and the potential need for both short and longer term solutions, SCS requested the input of Royal HaskoningDHV; the engineers that designed a seawall to protect Stockton surf club, which was constructed in 2016 by SCS.

By engaging all three parties on the project from its inception, SCS was able to create a welcoming, collaborative and outcome-driven environment. Through this approach, the client, designer and builder were able to consolidate their understanding of the site complexities and the risks associated with potential solutions.

SCS's primary role was to ensure technically viable erosion mitigation solutions were practically possible to construct while still meeting the design intent of the engineers.

This role commenced immediately during the conceptual phase of the design, escalating through the construction period. Through this collaborative approach to planning and development, the trust and mutual respect developed between the client, engineers and builders improved efficiency and meant that more time could be invested into finding innovative solutions.

The result of this approach was a first for the east coast of NSW – a mega container seawall practically constructed by SCS, while meeting the design intent of Royal HaskoningDHV.

At the same time that the Stockton project was progressing, Royal HaskoningDHV's stabilisation design solution for the Crown Lands Swansea Channel site at Pelican was being finalised. Crown Lands sought SCS support in the same practical role for this design throughout the construction period.

The site-specific environmental challenges were enormous, (6m seas, ground water issues and 1hr construction windows due to tidal exchange) but in the end all risks were identified, quantified and mitigation solutions approved by the clients. The design intent has been accredited by the designers and the projects have been built to these accepted constraints by SCS.

Both the Stockton and Pelican projects have now been delivered successfully. The communities and land managers of Pelican and Stockton now have environmental assets to help guide future erosion mitigation when navigating coastal planning pathways of the future.

Section 3: Where did we do it & who did we do it for?

Project 1: Stockton Beach Site	Project 2: Pelican Site
Client: Hunter Water	***Client: Crown Lands – NSW Government***
Designer: Royal HaskoningDHV	***Designer: Royal HaskoningDHV***
Builder: Soil Conservation Service	***Builder: Soil Conservation Service***

Figure 1: Stockton seawall site

Figure 2: Pelican revetment site

Figure 3: Plan view of Stockton stabilisation – blue indicates location of Mega Containers

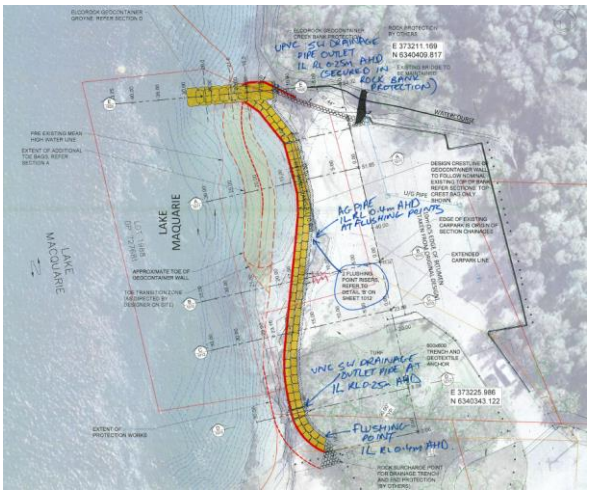

Figure 4: Plan view of Pelican stabilisation with drainage practical iteration notes

Section 4: Pictures tell 1000 words

Image 1: Emma Belford from SCS ensuring the safety of the team and quality of the construction project at the Pelican Geo bag Revetment project

Image 2: Stockton Project team installing coastal grade geotextile to underlay mega container seawall construction.

Image 3: Stockton site – Installation of mega container footing to protect landfill against future erosion

Section 5: Benefit to the environment, the community, the ESC industry & SCS

1. Environmental benefits of both Sea Wall and Channel Revetment

- ***Planning, management and intervention in a coastal environment***

Over an extensive period of working to address erosion in the coastal environment, SCS has become acutely aware of the challenges faced by land managers responsible for either creating or applying coastal management plans.

It became apparent that erosion mitigation solutions needed to adapt to both Government and community concerns. Mitigation solutions need to move away from harder structures, such as rock break walls, towards softer options.

SCS has directly assisted our clients in realising this progression – from a buried Seawall (where the rock foundation is buried by a constructed sand dune) to a geo container bank revetment, and finally through to a mega container buried sea wall.

As part of its key role, SCS ensured the proposed mitigation solutions were built as intended to function as designed. In addition to this SCS internationally accredited quality control system keeps the business focused on both safe and efficient delivery processes.

Once an erosion mitigation structure has been determined, to have the solution flounder in the design stages or fail in construction would be disastrous for the project, the client and the community. The collaborative approach between designer, builder and client - facilitated by SCS - ensured this did not happen.

The productive relationship between Royal HaskingingDHV and SCS has now delivered three different coastal erosion mitigation structures in the Hunter area. These structures can now act as practical examples to better inform intervention decision making for coastal erosion in the future.

Ensuring the structures are built to a certified standard will also inform future assessments regarding practical design life. Each structure has an engineered design life – the quality of construction should ensure this life is met.

- ***Site specific environmental benefits***

Stockton Beach Site: The environmental benefits from the work at Stockton were immediate. The initial emergency response to cap the active erosion site and anchor the capping fabric with sand-filled geo-containers effectively mitigated the environmental and public health and safety concerns for the short term.

To alleviate environmental and public health and safety concerns during the proposed construction period of the longer term solution, Hunter Water decontaminated a buffer zone at both the site of active erosion and the dune surface that would be trafficked to access the site. Exclusion areas were established and progressive revegetation was undertaken.

Figure 5: Progressive revegetation undertaken by Hunter Water on decontaminated surface of landfill site – note exclusion fencing in background – maintained throughout the construction process.

This work facilitated construction of the longer term seawall structure in a contaminant-free area. SCS maintained the defined exclusion zones throughout the construction period to ensure that progressive revegetation of the site could be maintained and conducted by Hunter Water.

With the seawall now complete and the landfill site capped and revegetated using endemic species, the environment has been protected against future contamination from exposed landfill. The mega-container structure has been situated within the existing dune profile to minimise the impact on the beach front environment and maintain the natural amenity of the area.

Pelican Site: As the collapsed building was pulled from the channel of the largest saltwater lake in Australia, it became clear that the environment remaining post-demolition would need help.

The site that was once a car park and restaurant held so much potential as a public recreational area. This potential has been realised through the constructed mitigation solution.

The geo-container revetment and groyne have stabilised the site, addressing both environmental and public health and safety concerns. Sediment from the degraded bank is no longer entering the channel and bank stability is no longer a danger to members of the public.

A car park area has been formalised with surface drainage to minimise sediment transfer into the adjacent watercourse. The bank of the water course has been stabilised with sedimentary rock, providing a stable footing for endemic revegetation.

The groyne has increased the surface area of aquatic habitat available within the site and the adjoining bank has been rehabilitated into a turfed recreational area with associated native plantings.

Figure 6: Pelican at time of building collapse (building removed by others) – image printed in Newcastle Herald taken by Simone De Peak

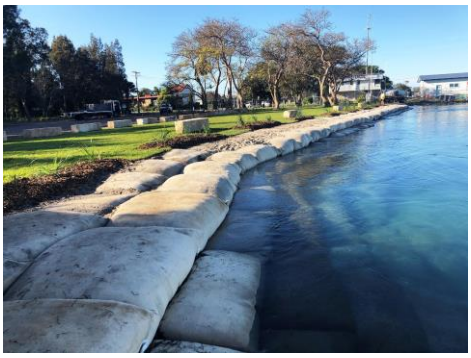

Figure 7: Pelican Site After– Degraded bank stabilised, adjacent area available for recreation

2. Community benefits of both Stockton Seawall and Pelican bank revetment

I. The big picture:

With long-term working knowledge of the complexities that coastal degradation issues present, SCS sought to use the Hunter Water site to highlight the potential leadership role state government could play in this environment.

SCS held a site meeting to discuss short and long term constraints land managers faced when addressing coastal erosion issues. This site meeting was attended by the Secretary for the NSW Department of Industry Simon Draper, as well as representatives from Hunter Water, Crown Lands and SCS.

II. The local picture:

The direct benefit to the local Stockton and Pelican communities was the mitigation of active degradation of their environment.

For the Stockton community, the collective emergency response by Hunter Water and SCS addressed immediate concerns of exposed landfill contaminating the beach. The longer term mega container seawall that has now been constructed gives the community security against future storm events re-exposing the landfill site while fitting with the aesthetic amenity of the coastline. The mega container construction ties in well with the recently approved Coastal Management Plan and will contain potential contaminants from the land fill site while the plan is implemented.

With regard to the Pelican site, the rehabilitation work effectively changed the land use of the site. What was once a restaurant and then a construction site has now become a recreational area accessible to all members of the public. The site is no longer an unsafe demolition exclusion zone. It has now become a haven for local community members to relax and pursue recreational activities such as fishing, kayaking and boating.

Mitigating the active degradation of the channel has also potentially reduced the rate of degradation to the Marine Rescue facility situated downstream of the rehabilitation site.

Figure 8: Source Newcastle Herald – Stockton community members inspecting degraded landfill site exposed by erosion

Figure 9: Snapshot from community workshop – Pelican foreshore stabilisation is a key community concern.

III. The economic perspective:

SCS takes an approach to project management that builds local capacity by supporting local business whenever possible. The delivery model creates a project team of expert local subcontractors.

This team is led by the SCS who controls the quality of the construction process. By taking this approach the direct investment in locally sourced materials and services for the Stockton project was $1.3M from 64 suppliers and $760,000 across 60 suppliers for the Pelican construction process. This equates to over two million dollars directed into private sector local companies as a result of the rehabilitation works.

Hunter Water took a lead role in identifying the opportunity the Stockton site presented to engage with and provide opportunity to the local Indigenous community. Hunter Water engaged with the Worimi Indigenous community, facilitating active roles for community members throughout the delivery of the construction project. SCS readily integrated these roles into the delivery team.

Figures 10: Worimi team members Caitlin Moran & Rebecca Young – engaged by Hunter Water, working within SCS ground delivery team

3. Erosion and Sediment Industry benefits from both Sea Wall and Channel Revetment

I. Education to the wider industry

To maximise the benefit of these projects, a joint presentation (between Royal HaskoningDHV, Hunter Water and SCS) will be made at the 28th NSW Coastal Conference. The presentation will highlight the challenges and successes achieved through the collaboration between designer, builder and client.

This will also attract greater attention to the potential erosion mitigation structures that can be constructed in the coastal environment.

This presentation will be underpinned by educational presentations delivered by SCS project managers at the 2016 NSW Coastal Conference, covering practical solutions for erosion mitigation in the coastal environment. The educational commitment to the wider erosion and sediment industry has also seen SCS presenting a practical summary of the construction process for the buried seawall to the Griffith University led Coastal Hazard Short Course.

This commitment was then again supported throughout 2018 and 2019 with SCS project managers delivering practical erosion and sediment control training using Pelican and Stockton as examples of best practice.

Figure 11: SCS Team Coordinator Mick Taylor delivering a stabilisation presentation at the NSW Coastal Conference – covering work on the Stockton peninsula

Figure 12: SCS Team Coordinator Stu Longman delivering best practice Erosion and Sediment Control Training – using Pelican and Stockton sites as coastal best practice

The key theme of the 2019 education campaign is to highlight the effective collaborative relationship behind these projects. This approach allowed both environmental and public health and safety issues to be identified and mitigated in an equitable manner with an agreeable outcome.

If this approach is adopted more widely, more effective erosion mitigation solutions will be delivered across the industry.

SCS has also commissioned an educational video to be created to capture the challenges faced during the construction process at both sites. This video will be distributed through LinkedIn and YouTube to further raise awareness within the industry of what is possible with the right team.

II. Innovation

The construction of the mega container sea wall was a first for the east coast of NSW. This solution was selected due to its ability to be augmented at a later date – added to if other land managers of adjacent land wish to extend the works. Often a barrier to new techniques is a fear of the unknown. By promoting the site and the methods used, SCS hopes to inform land managers of options available for consideration in future decision-making around the erosive coastal zone.

4. SCS benefits from both Stockton seawall and Pelican channel revetment projects

I. Safety: Building a Culture of Care – Beyond SCS

SCS had identified the need to improve its capacity to lead site safety in the marine/aquatic environment. This also fits into the bigger picture safety improvement focus of extending our workplace practices to include our sub-contractors as team members.

Using the framework set out by our internationally accredited integrated management system, the project managers initiated programs for continuous improvement. daily toolbox talks were held when environmental conditions became challenging and input from all stakeholders (staff, subcontractors, designers and clients) was incorporated.

Safety management plans, safe work method statements and risk assessments were completed and iterated as conditions or activities changed.

Training needs were identified and resourced for marine safety and crane dogman operations.

The culmination of the push to conduct these projects in the safest manner possible was the roll out of the Take 5 for Safety campaign across SCS. This campaign was initiated as a result of reflecting on near miss and incident reporting identifying that slowing down and thinking before acting would directly increase the safety of SCS sites.

Both the Pelican and Stockton sites were an integral part of the roll out of this program which eventually impacted the wider business of Local Land Services, reaching more than 1400 staff members and numerous subcontractors.

Figure 13: Third party audit of Pelican Site targeting safety – both environmental and project team as well as quality of management systems.

Figure 14: Safety poster developed and adopted during construction of both Pelican and Stockton to further develop a culture of care for SCS and our teams

II. Building staff capacity –internal education and innovation:

SCS actively seeks to build capacity – within the industry, the business and for the individuals we employ. In 2016, SCS understood the internal need to build a better understanding of the complexity created by the coastal environment.

To address this need the business targeted three educational platforms.

- Formal training through Griffith University's Coastal Hazards short course – sending targeted staff to become suitably qualified.
- Collective workshop training – bringing key presenters from the Coastal Hazard Course and running an internal training day in coastal process and engagement for all staff in the SCS Hunter Area.
- Practical industry exposure – sending target staff to the NSW Coastal Conferences 2017 and 2018

Figure 15: Maggie Muurmans Coastal Community Engagement Program Coordinator from Griffith Centre for Coastal Management QLD training SCS staff

Figure 16: Hunter SCS staff workshopping coastal erosion processes and mitigation solutions

Once the educational needs had been met, the business was better able to resource both the Pelican and Stockton projects with suitably qualified staff.

SCS identified team members to undertake each project with deliberate intent to challenge individuals, and build personal and team capacity to create innovative outcomes.

SCS did this to provide a practical environment for staff to directly apply their coastal process knowledge.

Continuous improvement throughout the project delivery phase was ensured through:

- **Complementary skill sets:** Both project teams were made up with staff and subcontractors with skill sets (both technical and personal) that complemented one another. In addition to learning from one another - the projects highlighted the need for staff to undertake Marine Safety and Crane Dogman training (completed during the course of the delivery phase).
- **Quality Control:** Each team was given an experienced team coordinator whose role was to manage quality control and provide feedback to encourage learning and growth.
- **Reflect – audit:** Internal, external and third party (including the CMFEU) audited the sites – this was to build a formal review process and ensure adaptive learning was applied.
- **Broader exposure:** Both sites were used to demonstrate techniques to SCS project managers from different areas of the business. This included the Sydney area and staff working for the administrative areas of the business. The business was able to increase the return on time invested in learning as the sites represented real practical examples of work being targeted in other areas.

Figure 17: Staff members Emma Belford and Jack Kostrin completing exemption 38 Marine Safety training during down time on the Pelican Site

Figure 18: Culture of Care: The team at Stockton – complimentary skillsets and subcontractors as integral members of the team

Developing this learning into innovative solutions occurred as challenges arose. For example;

- **Design and fabrication of the 'Lee' Bar:** At the Pelican site the velocity of the tidal exchange through the channel rendered typical geofabric pinning methods useless. A multiple bar design was proposed and fabricated by the project team to address this issue.
- **Sling it don't J bin it:** The manufacturers recommended placement attachment for geo-bags – a 'J bin' was determined to be too restrictive by both project teams. A sling system was proposed on the Pelican site. It was so successful that it was adopted during placement of the 2.5m^3 bags at Stockton.
- **Water everywhere but nowhere:** When access to water became a limiting factor at the Stockton beach site, the team designed and proposed an innovative groundwater recirculation system to continue the works while minimising the release of water from site.
- **You can draw it – but you can't build it:** When faced with a technical stalemate on site between what a designer could draw and what our team could actually construct, the project team at Pelican took the step towards practical design education. They built it from playdough first – this allowed the designer and team to find common ground and understanding. It also built respect that practical constraints were real and must be considered.

Figure 19: Deploying the first 'Lee bar' to hold geofabric underlying revetment and wrapping toe of structure water depths >5m

Figure 20: When designs need a tweak – use playdough!

III. Enhancing industry reputation – external education and innovation:

SCS has a clear direction to target challenging work with environmental benefit. The SCS targeted the works at both Pelican and Stockton as both sites represented the challenging work the business seeks. SCS takes calculated reputational risk to complete work that requires innovative and collaborative approaches to succeed.

The specific skill sets SCS was looking to develop were to:

- become specialists at filling mega containers
- hone practical skills at working in challenging marine environments
- hone erosion and sediment control skills on challenging project sites
- improve the business's approach to safety in a marine environment.

Figure 21: Rising to the challenge: Cranes, Boats, Divers, Diggers, ESC and a 1 hour construction window due to tidal exchange.

Figure 22: The joys of becoming an expert. Mega Container implementation at Stockton, again, & again & again.

IV. Valuing & Consolidating Relationships – THE TAKE HOME MESSAGE!!!

In 2016 a technically sound buried rock seawall, designed to Australian Standards, had been proposed to protect Stockton Surf Lifesaving Club. SCS sought to construct this design but found that the rock specifications needed to meet the design intent were not available anywhere on the east coast of NSW.

This hold point was the catalyst for an ongoing and productive relationship between the technical, Royal HaskoningDHV Coastal Engineers and the practical, SCS builders.

In 2016 both parties were able to work together to adapt and develop a workable solution to deliver a buried sea wall that met design intent using lower specification material.

SCS desire to consolidate and build on this relationship was key to the business' involvement in both the Stockton mega container seawall and the Pelican geobag revetment projects. Once trust and mutual respect had been built the parties involved became more comfortable to propose new and innovative solutions, push boundaries and adapt with an openness that is not present in a typical contractor designer relationship.

As issues have arisen, meetings have been held to assess what is being done and how we can move forward together more effectively. The designer has effectively become a key part of the construction team. Mutual respect and a collaborative approach has facilitated a common understanding – together we are better and deliver more effective solutions for clients and communities.

Figure 23: Natalie Patterson from Royal HaskoningDHV working on a collaborative solution to a practical design iteration at Stockton mega container site