



Westport's five shortlisted options all feature a new container port being built in Kwinana. Understandably, people are concerned about the possible impacts this may pose to Cockburn Sound.

Are these concerns justified? Well, there is no doubt that constructing and operating the port will add a new pressure on Cockburn Sound's marine environment. But how significant are the environmental impacts associated with the port? Can Westport mitigate or offset these impacts by creating other environmental benefits?

The important question is whether all current and future pressures in Cockburn Sound can be managed so that marine ecosystem health and biodiversity can be maintained for the future. This is what Westport is looking at in collaboration with independent experts in marine and environmental science. Our view is that it will take cooperation, focus and effort, but a positive environmental outcome can be achieved.

Westport is aware that the community and conservation groups are watching our process closely. The Environmental Protection Authority will also have to assess the final option.

As the Kwinana port will be an essential piece of economic infrastructure benefiting all Western Australians, it is in Westport's best interests to ensure our process is robust and addresses potential environmental challenges now, in the early planning stages.

This issue of the Westport Beacon sets out the work that has been conducted to date, the work that is being planned and the initiatives and collaborations Westport is involved in to help preserve the marine environment of Cockburn Sound.

A modified ecosystem

Cockburn Sound is one of the most intensively used marine areas in Western Australia – by both the community and industry.

The Sound is a popular boating, diving and fishing area, and home to several public beaches. As one of very few major natural embayments on the west coast, it is also an important habitat for marine flora and fauna, including seagrass, little penguins and bottlenose dolphins, and provides the right conditions for critical biological processes such as pink snapper spawning.

The natural protection provided by Garden Island, which is one of the key features that makes Cockburn Sound such a special place, is also what attracted planners to designate Kwinana as Perth's main industrial area in the 1950s. The first bulk port was established soon thereafter for Anglo-Iranian Oil Company (now BP Development Australia), and Cockburn Sound subsequently became the Outer Harbour component of the Fremantle Port Authority (now Fremantle Ports).

In the 1950s, environmental impacts were not prioritised or regulated the way they are today. As a result, industrial wastewater outfalls and nutrient pollution went largely unchecked from the 1950s through to the late 1970s, causing water quality to decline. More than 75 per cent of the original seagrass was lost due to the excess nutrients prior to 2000.

From the 1980s, voluntary measures by industry, action by the community and environmental regulation by the State Government began to be implemented.

The Cockburn Sound Management Council (CSMC) – comprised of industry, government and community members who facilitate input into the environmental management of Cockburn Sound – was established

in 2000 to advise the Minister for Environment, and the *State Environmental (Cockburn Sound) Policy (SEP)* was implemented in January 2005. The SEP established an environmental quality management framework which was designed to protect Cockburn Sound from the adverse effects of pollution and waste discharges. This is managed and periodically reported on by the CSMC in its 'State of the Sound' report.

These initiatives have vastly reduced industrial nutrients and contaminants in Cockburn Sound, resulting in marked improvements in water quality and clarity throughout much of the Sound. The increased water clarity has, in turn, enabled seagrasses to once again extend into deeper waters and reduced the occurrence of algal blooms.

However, the marine ecosystem of Cockburn Sound today remains modified from the environment that existed prior to the 1950s.

The Western Trade Coast and Australian Marine Complex (AMC) now border the eastern shore of Cockburn Sound, with Garden Island's HMAS Stirling Naval Base situated on the west. There are five operational bulk jetties visited by more than 800 ships each year, plus further ships visiting both the AMC and Naval Base, with several fully and partially dredged channels to facilitate access for these vessels. It is worth noting that through careful management and improved practices, these industries have flourished while water quality has continued to improve in Cockburn Sound.



Photo courtesy of Fremantle Ports

A marine environment worth protecting

In Stage 1 of our process, Westport's Environmental Work Stream undertook a preliminary analysis of the Kwinana study area and identified 21 ecological and 16 social values associated with the marine environment.

Some of the values identified for Cockburn Sound are:

- Sheltered ecological communities
- Biological diversity
- High level of water quality
- High level of sediment quality
- Seagrass habitat
- Australian sealions
- Fairy terns
- Migratory birds
- Little penguins
- Bottlenose dolphins
- Pink snapper
- Whitebait
- King George whiting
- Garfish
- Blue swimmer crab
- Shoalwater Islands Marine Park
- Aboriginal heritage sites
- Maritime and historic heritage
- Recreational fishing
- Recreational swimming
- Recreational boating access
- Recreational diving
- Seafood quality safe for eating
- Landscape and visual amenity

MAP 1 KEY

 Ephemeral Seagrass	 Cobble Reef
 Meadow Forming Seagrass	 Pavement Reef
 Patchy Meadow Forming - Seagrass	 Aquaculture Sites
	 Sand



Map 1: Environmental values present around Cockburn Sound

Westport then commissioned the independent Western Australian Marine Science Institution (WAMSI) to conduct a literature review to refine the list of ecological and social values and to undertake a preliminary risk assessment to inform Westport's process.

This work built on previous work undertaken by the CSMC (the *Cockburn Sound Drivers-Pressures-State-Impacts-Response Assessment 2017* and the *2018 State of Cockburn Sound Marine Area* reports) and a number of investigations conducted by Fremantle Ports on the Cockburn Sound ecosystem between 2005 and 2012 as part of the previous Outer Harbour proposal.

WAMSI reviewed more than 500 relevant documents and completed a very comprehensive report that discusses the risks associated with Westport's port options, climate change and other pressures. It also provides a set of recommendations as to how these risks may be able to be avoided and/or mitigated. This work directly informed the Westport multi-criteria analysis (MCA-1) assessment of the long-list.

This early work also emphasised the ecological and social significance of Cockburn Sound and ensured that environmental considerations were prioritised by Westport. Ongoing consultation with stakeholders and the community has reinforced this stance, with the marine environment repeatedly being identified as the number one priority.

Environmental considerations embedded in Westport's process

From its formation, Westport was determined to take on board the lessons learned from other infrastructure projects that may have failed to adequately consider environmental concerns. Our objective to protect ecosystem health and biodiversity signals our strong commitment to ensure that Westport does everything within its influence to realise environmental opportunities and benefits.

The PIANC (World Association for Waterborne Transport Infrastructure) Working with Nature philosophy has been adopted, which results in an important shift in thinking about infrastructure development. It ensures a focus on achieving project objectives in an ecosystem context and in identifying win-win solutions from the outset, as opposed to simply minimising environmental impacts associated with a pre-defined design.

In practice, this means that the Westport Taskforce is continuously looking at the project through an environmental lens, with maximising environmental outcomes being a driver of planning and design decisions. Adopting a Working with Nature approach always leads to better environmental and social outcomes, but more importantly, it will enable Westport to prioritise some values and achieve net environmental benefits where they count the most.

The first step was to establish the Environmental Work Stream (EWS), which comprises more than 25 government and industry representatives and scientists who highlight environmental risks.

The EWS identified environmental risks, commissioned scientifically robust studies and ensured environmental considerations were taken into account during Stages 1 and 2 of Westport's process.

The EWS had input into the development of Westport's long-list and defined the environmental criteria against which the options were to be assessed. This influenced the design and inclusion of options at the front end of MCA-1, and the scoring of options at the back end. Ultimately, it ensured that options with a higher chance of significant environmental impacts were either not included in the long-list or did not get through the first round of options assessment.

In developing the weightings for Westport's first multi-criteria analysis (MCA-1), the environmental criteria were assigned high weightings – 12.7 per cent for marine and 9.1 per cent for terrestrial – in acknowledgment of their significance and feedback from stakeholders and the community (further details on this can be found in [Westport Beacon 7: Westport's shortlist](#)). Together, this 21.8 per cent means that environmental impacts were the second highest consideration behind economic considerations. By assigning these criteria high weightings, options with poor environmental outcomes would be less likely to make the shortlist as they would attract lower scores.

During the MCA-1 environmental workshops, 33 technical specialists from 13 organisations assessed each of the 25 long-listed options on their marine and terrestrial environmental outcomes. Each option was assigned a score from 1 (worst) to 5 (best) in comparison to the other options. Unsurprisingly, the Fremantle options scored very well on the environmental criteria because of the existing operational port, whereas the Bunbury options and some of the Kwinana options did not. This was mainly due to the difficult removal of under-sea basalt and diversion of the Preston River for Bunbury, and certain Kwinana options which impacted heavily on the Henderson Cliffs, Mount Brown or seagrass meadows. However, some Kwinana options did score relatively well on the environmental criteria – and these options now appear on the shortlist.



Monitoring Cockburn Sound

During their above-mentioned literature review and risk assessment for Westport, WAMSI also developed a list of knowledge gaps that currently limit understanding of potential environmental impacts and opportunities in Cockburn Sound. It became apparent that a lack of continuous and fit-for-purpose data was one of these gaps.

Because of the history of nutrient pollution in Cockburn Sound, the current marine monitoring framework is primarily aimed at protecting a set of identified environmental values from pollution, and needs improvement to monitor the health of the Sound more generally. Not enough quality information is being collected on the effects of contemporary pressures such as climate change, commercial and recreational fishing and the cumulative impacts associated with development.

Many of the other knowledge gaps surrounding Cockburn Sound can also be addressed by improving the environmental monitoring program in the Sound. Implementing a fit-for-purpose, real-time monitoring program presents a major opportunity.

Following this realisation, a cross-agency collaboration project commenced to design an improved marine monitoring system in Cockburn Sound. The Department of Water and Environmental Regulation (DWER) is leading the initiative, supported by the Cockburn Sound Management Council, the Department of Primary Industries and Regional Development (DPIRD), the Department of Biodiversity, Conservation and Attractions (DBCA), WAMSI and Westport.

The purpose of a new monitoring program will be to provide a comprehensive baseline for the health of the Sound. It will ensure the collection and availability of environmental data that will be required for future environmental impact assessments (such as for Westport), as well as more holistic environmental management that considers the cumulative effects of contemporary pressures.



Dredging in Cockburn Sound: a key issue

With the exception of the Blue Highway option, all of the port options on Westport’s shortlist require some level of dredging in and around Cockburn Sound to enable container ships access to the port. Dredging involves excavating parts of the seabed, resulting in benthic habitat loss within the footprint of the dredged access channels and turning basin.

If not appropriately managed, dredging can result in long-term impacts that extend beyond the footprint of the original marine development. The process of dredging and transporting the spoil releases fine sediments that may stay suspended in the water for some time, resulting in a plume of sediment (known as a dredge plume) that may impact on fauna (by reducing visibility) and flora (by reducing light availability to the seabed or smothering as these particles settle). Even after settling on the seabed, fine sediment (‘fines’) can be repeatedly stirred up by vessels or storms in a process known as ‘resuspension’ for some time after dredging.

Whereas dredge plumes have caused environmental concerns in the past, these plumes can be managed and their impacts effectively mitigated in a number of ways. Selecting the right dredging equipment and

adopting best-practice dredging management can vastly reduce the volume of sediments being released. An environmentally-focused dredging schedule can ensure protection during ecologically-sensitive time periods and in particular areas.

Not many people are aware that WA is a global leader in dredging research. In 2011, the \$19 million WAMSI Dredging Science Node (DSN) was launched with the objective of “enhancing capacity within Government and the private sector to predict and manage the environmental impacts of dredging in Western Australia”. A total of 114 scientists from 26 institutions completed research under nine themes (see Figure 1 below) over a period of seven years, wrapping up in 2018. Earlier this year, a **synthesis of the research was published on the WAMSI website.**

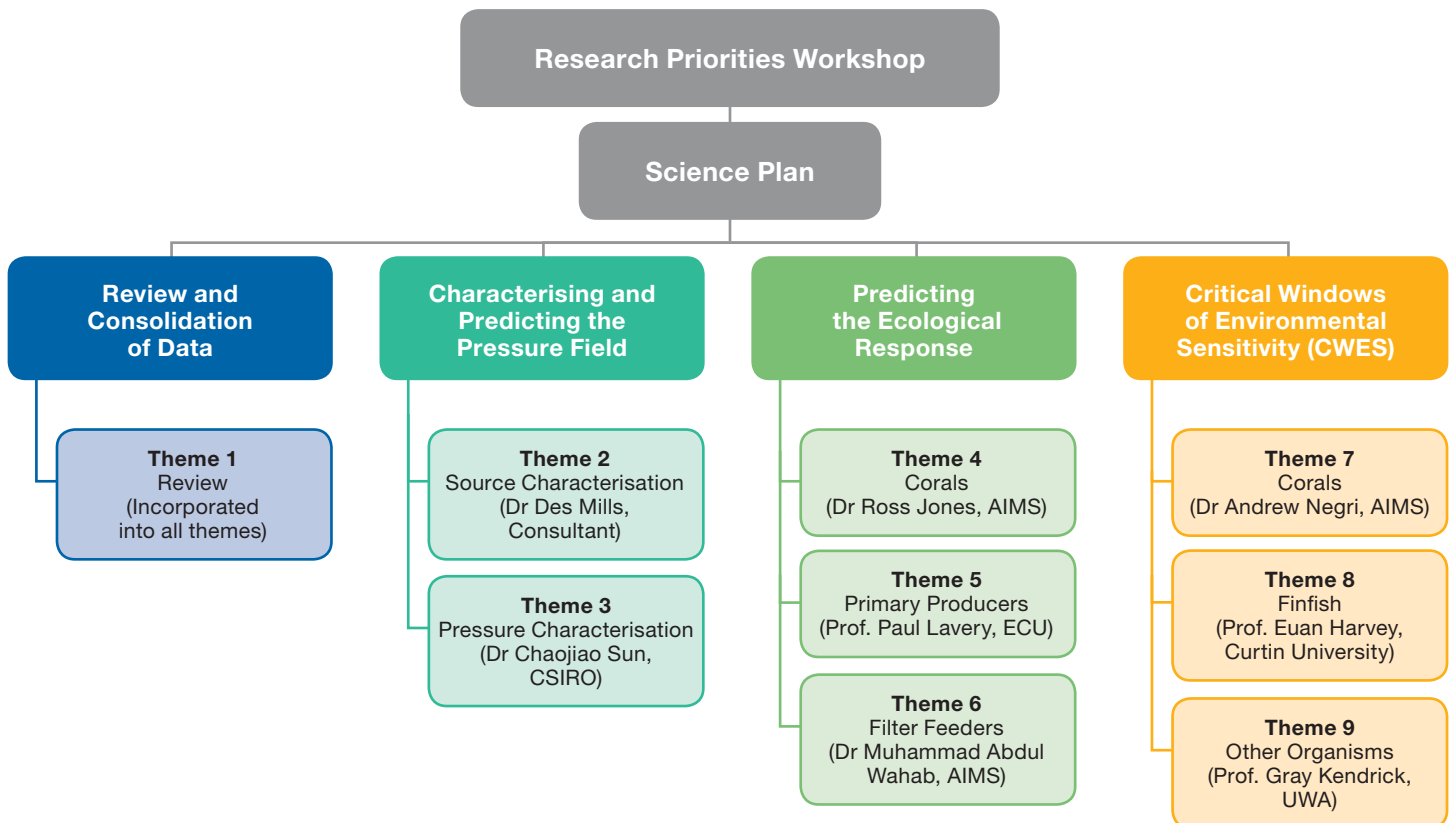


Figure 1: The nine research themes of the WAMSI Dredging Science Node

The DSN delivered one of the largest single-issue environmental research programs in Australia. This remarkable collaboration between industry, government and research institutions, which involved sharing valuable environmental monitoring data, has resulted in:

1. greatly improved understanding of dredging-related environmental pressures, mitigation of impacts and pathways to ecosystem recovery; and
2. the development of tools for effectively monitoring and managing dredging campaigns so that key environmental values are protected.

The DSN has ensured that WA is better equipped than any other jurisdiction in Australia – and arguably the world – to effectively manage dredging programmes while protecting our marine environments.

Any future dredging campaign in Cockburn Sound – whether undertaken by Westport or any of the other industrial users of the Outer Harbour – will be required by the Minister for Environment to adopt best practice and comply with conditions informed by the DSN.



Environmental work in progress

Much work is currently underway to accumulate the necessary data to thoroughly assess the five shortlisted options in the second, more rigorous multi-criteria analysis (MCA-2).

Westport has commissioned BMT Oceanica, a highly respected marine environmental consultancy with extensive local expertise, to undertake a hydrodynamic modelling study to inform important decisions on the port designs for the options assessment process. This study will investigate the potential impacts on flushing and water circulation associated with the shortlist's port footprints, and the potential impacts and benefits associated with the options for a deeper channel into Cockburn Sound from the north (exiting towards Fremantle).

The outcomes will feed into MCA-2 and help inform the decision on whether to expand the existing channel into Cockburn Sound or complete the partially-dredged second channel.

Initial results indicate it may be feasible to improve circulation and flushing in parts of Cockburn Sound with strategically-designed entrance channels and infrastructure.

Westport is investigating the potential to incorporate global best practice into our planning. Port design is one of the areas where international projects have successfully been able to achieve environmental and social benefits. Westport is looking at innovative approaches to see whether they can be implemented in Cockburn Sound. One such example is the 15-acre island breakwater system (above) developed by Tetra Tech for the City of Fort Pierce marina in Florida.



City of Fort Pierce island breakwater system, Florida, USA

The breakwater system improves flushing and sediment transport processes and includes mangrove plantings, tidal lagoon features and oyster reefs to enhance its structural stability and functional performance.

Westport is also looking into the environmental benefits of light footprint ports, which is the design of one of the shortlisted options. Light footprint ports rely on an inland container storage facility, which has the potential to reduce the port's physical footprint on the seabed by as much as 70 per cent and reduce marine habitat loss.

Westport will continue to monitor global advancements in port designs and technology to identify innovations that may be suitable and beneficial for the new Kwinana port.

With construction of the port unlikely to commence for at least five years due to the planning and approvals process, and with technology improving exponentially, there may be significant enhancements that become available within that time.

Finally, Westport has conducted focus groups with stakeholders and community members with an emphasis on how to achieve mutually beneficial environmental and social outcomes, especially recreational fishing in Cockburn Sound. Westport will continue to engage with special interest groups, subject matter experts and appropriate government agencies to shape an environmental mitigations package with recommendations for positive outcomes that will be put to Government with our final report.

Garden Island Causeway investigation

Constructed in the early 1970s, the Garden Island Causeway (GIC) serves as the only road connection between the Garden Island naval base, HMAS Stirling, and the mainland at Rockingham. The Causeway has a total length of 4.2 kilometres, which consists mainly of a 3.3 km solid rock-fill wall between two trestle bridges of approximately 600 and 300 metres' length at the northern and southern ends respectively. This solid rock wall has reduced the natural water exchange between the ocean and Cockburn Sound by an estimated 40 per cent.

Water quality in the southern section of the Sound near the GIC where the bulk of the remaining seagrass meadows are, remains relatively poor and continues to show signs of nutrient enrichment caused by poor water circulation.

This raised a familiar question that has divided the local community for decades: would removing or redesigning the GIC to improve water exchange benefit Cockburn Sound's marine environment?

In order to get consensus from the WA scientific community on this issue, Westport approached WAMSI to convene a workshop to discuss whether or not modification of the Causeway should be considered. Twenty four WA scientists and managers with expertise in Cockburn Sound attended the workshop held in September 2018. Some of those present were working in this ecosystem prior to the GIC's construction.

Surprisingly, the general consensus was that modification or removal of the Garden Island Causeway was **unlikely to result in meaningful environmental benefits**. Any potential benefits would be outweighed by risks to social amenity, ecological stability and highly valued infrastructure.

The **workshop report** was published online and can be found on the WAMSI website.

Westport will be testing the outcomes of the workshop through its hydrodynamic modelling study and is open to investigating the issue further in Stage 3 should this be warranted.



We've got time to plan and act strategically

Given that the estimated timeframe required to plan and construct the new Kwinana port is at least ten years, there is a unique opportunity to invest in the health of Cockburn Sound now, and to build resilience prior to the implementation of any new major infrastructure. Ideally, this would allow some environmental benefits to be realised in the short-term that increase Cockburn Sound's resilience and capacity to deal with any pressures associated with a new port.

WAMSI's review of Cockburn Sound identified many possible mitigation measures that can lower environmental risks, some of which are already in progress:

- Adopting the PIANC Working with Nature principles, including selecting port structures that minimise damage and work with the environment, and engineering niche habitats to improve the ecosystem.
- Rehabilitating seagrass meadows as soon as possible, even before construction commences.
- Avoiding and minimising direct impacts to seagrass where possible.
- Rehabilitating old dredged areas with clean dredge spoil to recreate seagrass habitat and re-establish marine communities.
- Choosing a port design that minimises ship movements in the Sound.
- Considering port options that limit or even remove the need for dredging (such as the Blue Highway).
- Implementing fit-for-purpose water monitoring.
- Continuing to improve management of stormwater and run-off.
- Incorporating protected bird-friendly areas, like the Fairy Tern sanctuary at Rous Head in Fremantle.
- Offsetting any loss of trees with new green corridors.
- Avoiding noisy operations such as pile driving during the breeding season when animals are socialising and calving.
- Building fishing-friendly structures and/or other new recreational facilities.
- Implementing initiatives to build resilience to climate change and other long-term considerations.
- Integrating sustainability principles throughout the life cycle of the project (Westport is following the Infrastructure Sustainability Council of Australia's framework to facilitate this).

Westport will develop more detailed environmental mitigation, offset and improvement strategies with engineers and experts once the port location and footprint type have been determined.

Westport is expecting to face intense scrutiny in the lead up to, and as part of, the likely Environmental Impact Assessment process. We have already started developing a list of environmental research and technical studies to address knowledge gaps that will inform our decision-making processes during the port planning and design stages. This should also provide the Environmental Protection Authority and the community with confidence that everything is being done to achieve the best environmental outcomes possible.

Westport will also continue ongoing consultation and collaboration with the local community, special interest groups such as boating and fishing organisations, and other stakeholders for feedback and ideas to ensure that any opportunities for win-win outcomes are identified.

In conclusion

Now that Westport's shortlist has been determined, the environmental impacts associated with these options are being assessed in much greater detail for MCA-2.

Westport is committed to investigating and identifying ways to preserve what is already in place and protect biodiversity, ecosystem health and social amenity in Cockburn Sound. We will continue to seek input from subject matter experts and take steps to implement proactive measures to preserve the environment to the greatest degree possible and plan for ongoing adaptive management.

There is a lot of work to be done and we know it won't be easy. Building a port in Kwinana will not be without challenges and it will be difficult to build this new infrastructure – which is absolutely essential for all Western Australians and the economic prosperity of the State – without having environmental impacts. However, Westport takes its responsibility to help preserve Cockburn Sound for future generations very seriously, just as we do the need to establish the best freight network for WA for the next 50 years and beyond. We must balance the economy, the environment and the community to find the best compromise to secure the future for the next generation.

