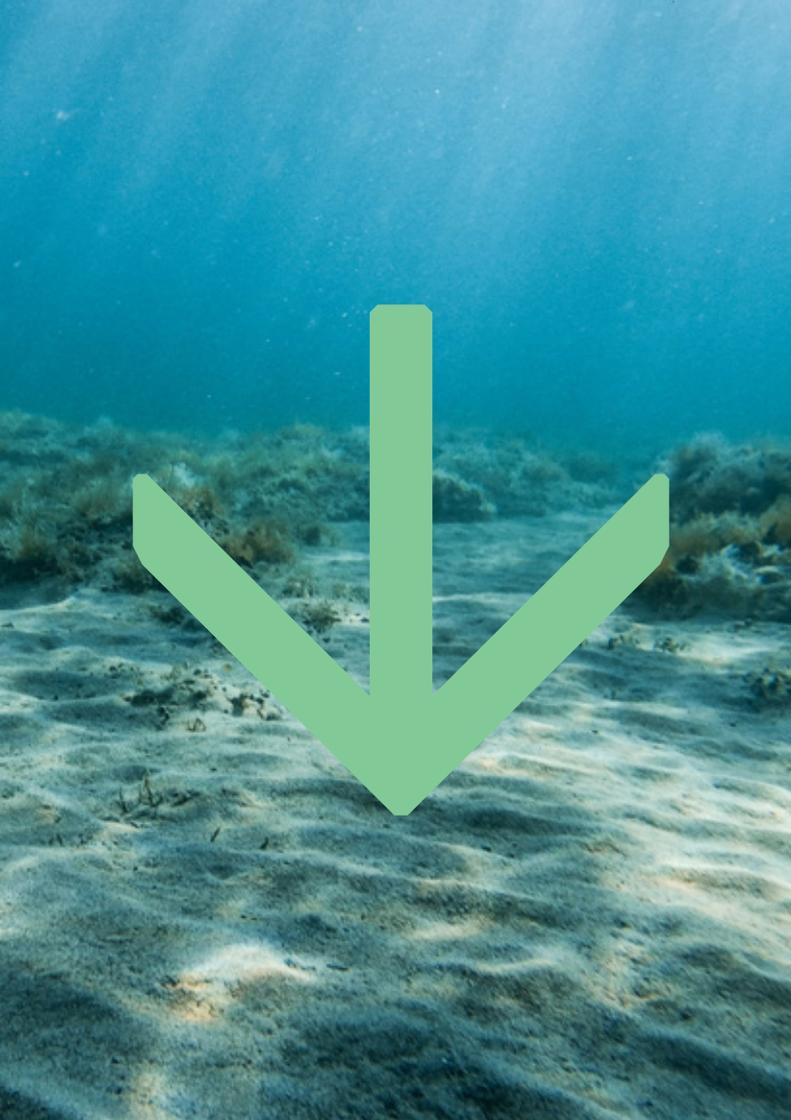


# MARINE FEASIBILITY & ENVIRONMENT STUDIES



## LED BY SCIENCE

We completed marine studies between 2019 and 2024 to build an understanding of local conditions and ensure Star of the South is suitably located and feasible to deliver.

This fact sheet provides an overview of these studies:

- A **marine environment** survey program
- **Metocean** monitoring
- **Seabed** investigations.

All marine studies were designed by scientists and technical specialists, with local knowledge contributed by those who know Bass Strait best - including fishers and communities.



**MORE THAN 50,000**  
MARINE ENVIRONMENT  
OBSERVATIONS COLLECTED



**200 SEABED SAMPLES**  
COLLECTED AND ANALYSED



**700 KM OF**  
SEABED MAPPED



**2.5 YEARS OF WIND DATA**  
COLLECTED



**9 LOCAL VESSELS USED**



**ZERO SAFETY INCIDENTS**



**Star of the South** would harness the power of Bass Strait's strong ocean winds to deliver enough electricity to power 1.2 million homes – helping to create a reliable and sustainable energy system for Gippsland, Victoria and Australia.

# MARINE ENVIRONMENT SURVEY PROGRAM

One of the biggest research programs of its kind in Bass Strait, designed and delivered by leading researchers to build understanding of the marine environment and biodiversity in this little studied area.

- 13,000 survey hours over 3 years, collecting more than 50,000 observations.
- Involved leading Australian scientists and research agencies including CSIRO, Monash, Deakin and Curtin universities, and the Blue Whale Study.

## Benthic ecology

This study involved 18 days at sea collecting data on the plants, animals and microbes that live on and in the seafloor, to understand and map biodiversity in and around the project area.

### Study methods



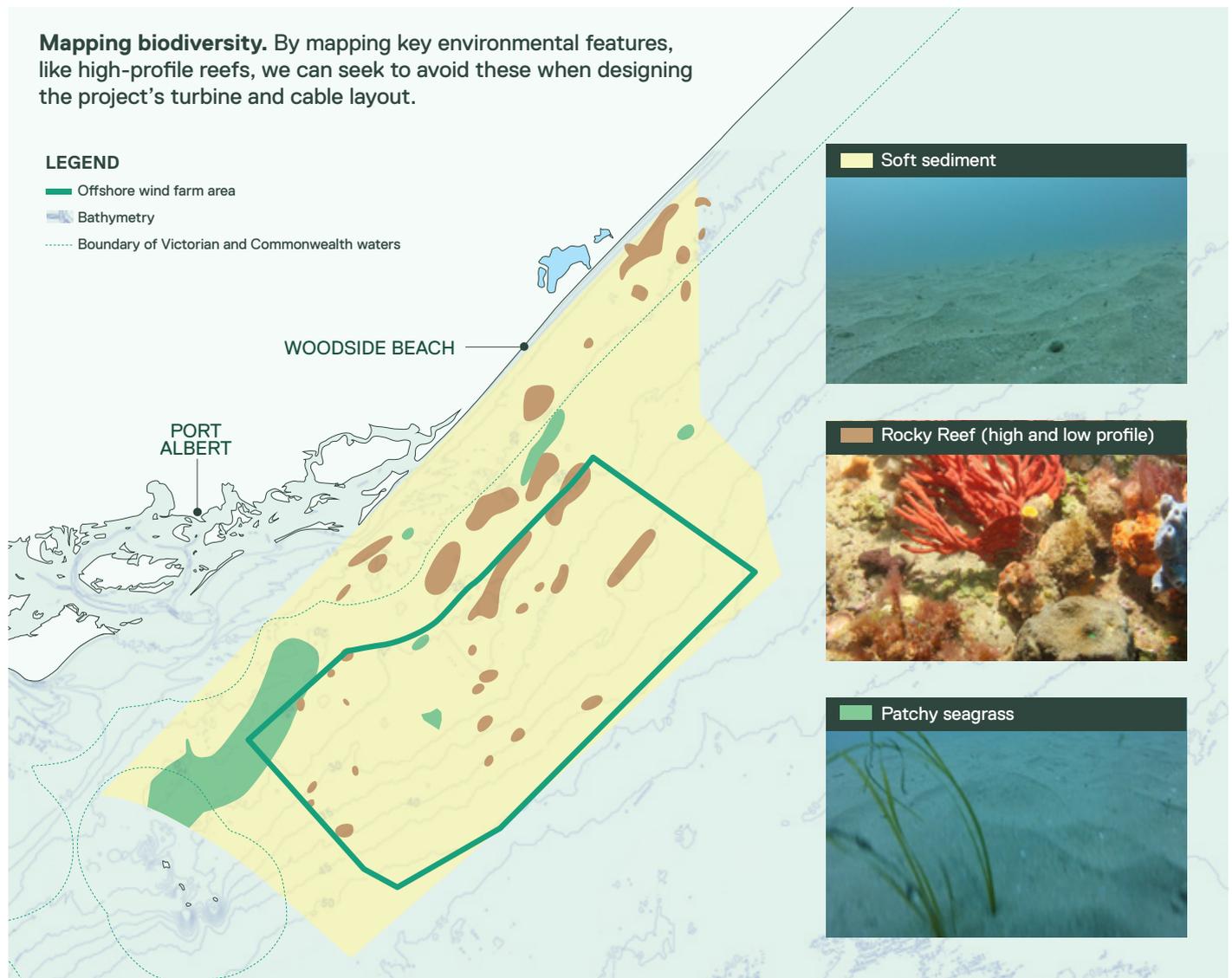
Underwater cameras at 80 locations



200 sediment samples collected for analysis

### Data insights

- The seafloor consists of sand and gravel with traces of shells.
- Patches of high-profile rocky reef were found, typically closer to shore, hosting much of the plant and animal life found during these surveys.
- Patchy sections of Tasman Grass-wrack seagrass cover around 3% of the survey area.
- No listed protected species, communities or key ecological values were identified in the project area.



## Marine mammals and turtles

Researchers surveyed whales, seals, dolphins and turtles to understand species present, migration patterns, behaviours and population sizes.

### Study methods



54 visual aerial surveys



Underwater sound monitoring in 8 locations to identify whale calls



Monitoring seal colonies on nearby islands



Tagging 40 seals to track their movements

### Data insights

- Surveys identified 2 dolphin, 2 seal, 10 whale and one turtle species across a broad study area.
- Dolphins and seals were seen year-round and in large numbers.
- Whales were typically seen between late autumn and spring when migrating to or from warmer waters.
- Humpbacks were the most common type of whale recorded. Small numbers of others species were also heard or seen within the broader study area, including the Southern Right, Pygmy Blue, Killer, Bryde's and Dwarf Minke whales.
- Seals in the area have distinct territories. Australian Fur Seals from Rag Island forage between Wilsons Promontory and Lakes Entrance, while Australian and New Zealand Fur Seals from Kanowa Island forage in southern Bass Strait and around Tasmania.
- A single Leatherback Turtle was spotted outside the project, west of Wilsons Promontory.

Australian Fur Seal



### Getting a bird's eye view.

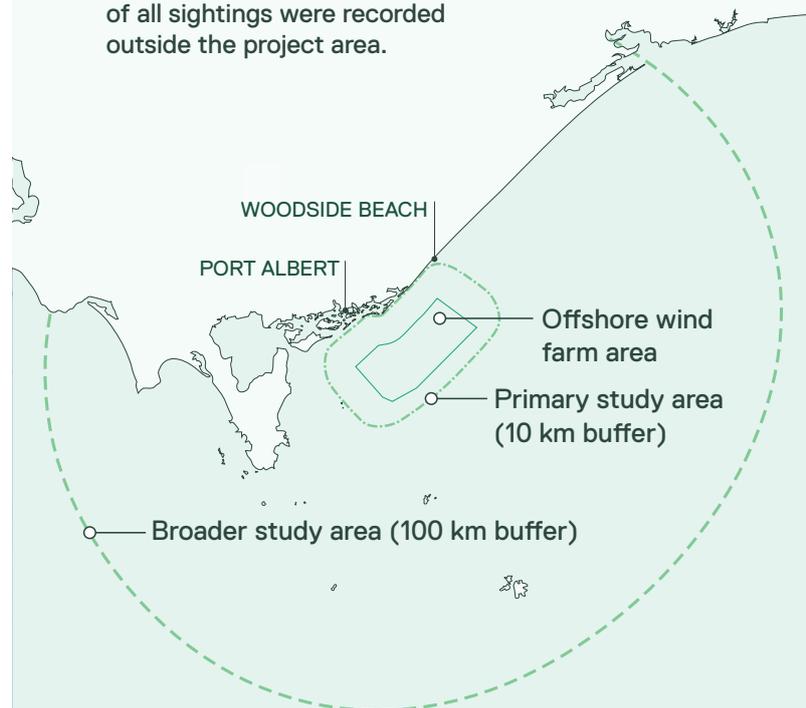
Aerial surveys are one of the best ways to spot whales like the Pygmy Blue, which can swim underwater for up to 90 minutes. Experienced marine mammal observers flew as low as 300 m to identify and photograph the animals.



Humpback Whales

### Searching near and far.

Data from up to 100 km away was collected to build a comprehensive picture of whale behaviours, foraging ranges and migration patterns. Around 87% of all sightings were recorded outside the project area.



## Birds

Researchers spent more than 4,600 hours surveying seabirds and shorebirds to understand species present, their flight heights, behaviours and population sizes.

### Study methods



26 aerial surveys, with laser measuring technology to record bird flight heights



30 boat surveys



12 shore surveys



Monitoring breeding colonies on nearby islands



Tagging over 300 seabirds to track their flight paths and height and collect physiological data

### Data insights

- Surveys identified 50 seabird, 11 shorebird and no bat species across multiple study areas.
- In the project area we saw 35 seabird species including Little Penguins, albatross, gannets, gulls, and terns.
- Short-tailed Shearwaters were seen in the largest numbers during their breeding season. Their average flight height recorded in the project area was 4 m.
- Average flight heights for all birds found in the project area typically range from 0.5 m to 10 m.
- Shorebird surveys on Ninety Mile Beach identified small numbers of Plovers and Lapwings, with more diversity seen around McLoughlins Beach than at Reeves Beach and McGaurans Beach.
- Five shorebird species which migrate between Tasmania and Victoria were seen in small numbers – the White-throated Needletail, Swamp Harrier, Welcome Swallow, Silvereye and a single Flame Robin. The project area doesn't overlap with the main migratory corridor for endangered species such as the Swift Parrot and Orange Bellied Parrot.



**Field work close up.** Brooke (pictured above) camped on Seal Island for eight days to study bird populations on the island. She is pictured here counting chicks in a Short-tailed Shearwater burrow. Over 23 million Short-tailed Shearwaters breed in Australia during spring and summer – with the Bass Strait population estimated at more than 1.4 million.

Rohan (pictured below) travelled nearly 100 km offshore to the Bass Canyon to survey and tag Albatross. Using light-weight tags which run on solar power and fall off when birds shed their feathers, we obtained real-time data, 24 hours a day, on exactly where and how high birds were flying.



Scan the QR code to hear from Rohan about his bird surveys.

Tagging was undertaken by Monash University under animal ethics and state permits.



WOODSIDE BEACH

PORT ALBERT

#### LEGEND

- Offshore wind farm area
- - - Primary study area
- - - Reference study area - Bass Canyon

### Understanding the regional context.

In addition to studying the project area and surrounds, data was also collected from a reference site – Bass Canyon – to gain a regional perspective of seabird species distribution within Bass Strait.

## Fish and invertebrates

Scientists spent more than 70 days at sea collecting data to understand which species of fish, shark and invertebrates are found in the project area, their abundance and seasonality.

### Study methods



Underwater video at 130 locations captured over 200 hours of footage



2 commercial fishing methods to study typical catches



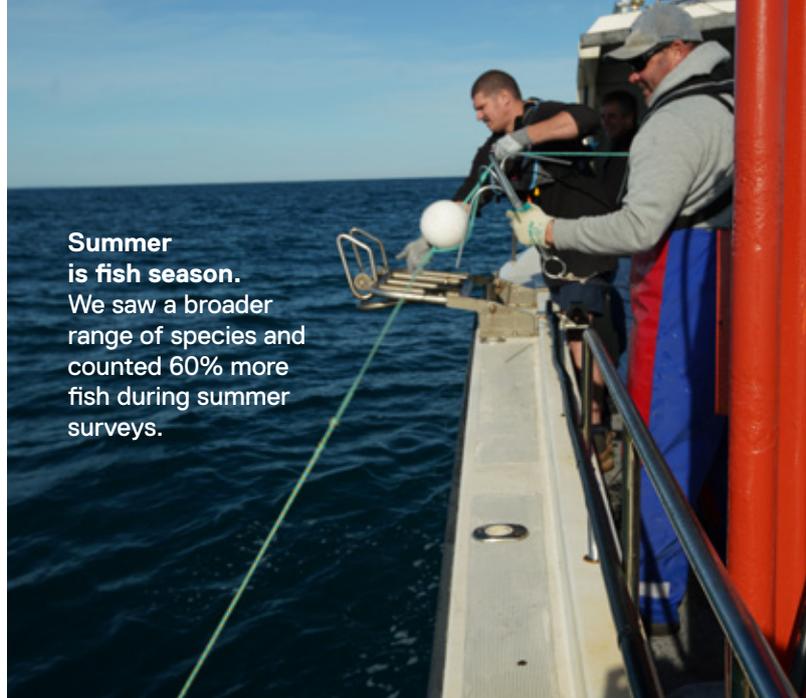
40 echosounder surveys



Monitoring tagged White Shark movements

### Data insights

- Surveys identified 164 species, including 15 sharks, 14 rays, 103 bony fishes and 31 invertebrates.
- Port Jackson was the most common species of shark seen, followed by Draughtboard and Gummy Sharks. A White Shark measuring 6.5 m was the largest. White Sharks were detected during summer and were largely absent in winter.
- Bony fish species in the area are diverse and abundant, especially in summer and less so in winter. Key fishing species seen included snapper, wrasse, trevally, flounder, flathead, whiting and mackerel.
- Fewer invertebrate species were seen and in smaller numbers. These included various crabs, squid, sea stars, and octopus.
- Only one invasive species was identified – the New Zealand screw shell mollusc.



### Summer is fish season.

We saw a broader range of species and counted 60% more fish during summer surveys.



### Watching the underwater world.

We used Baited Remote Underwater Video (BRUV) to observe the underwater world. This involved lowering a steel frame fitted with bait to attract fish and a camera to record them, over the side of a boat. Each BRUV was left in place for at least one hour to record species diversity, abundance and behaviour. Scan the QR code to hear about these surveys.



## Coastal processes

This study involved collecting data on waves, tides and currents to understand natural ocean processes and sediment movement.

### Study methods



2 nearshore wave and current monitors installed near Snake Island and the Kate Kearney entrance



3 floating monitoring buoys in the project area



Collecting sediment samples

### Data insights

- The shorelines between Corner Inlet and McLoughlins Beach are some of the most dynamic in Victoria but were found to be mostly stable with a few areas of existing localised erosion.
- Wave patterns are seasonal, with the strongest waves recorded in winter.
- Wave heights in the project area were under 1.5 metres 90% of the time, largely due to Wilson's Promontory sheltering the area and reducing wave energy.



## METOCEAN MONITORING

This study collected site-specific meteorological and ocean data, including wind speed and direction, wave height, air temperature, humidity and atmospheric pressure.

As offshore wind projects are only developed where the wind is strong and consistent, this study is critically important. Data is used to:

- Inform turbine and foundation selection
- Understand expected electricity production
- Plan for construction and maintenance activities.

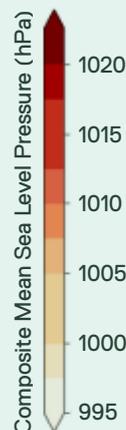
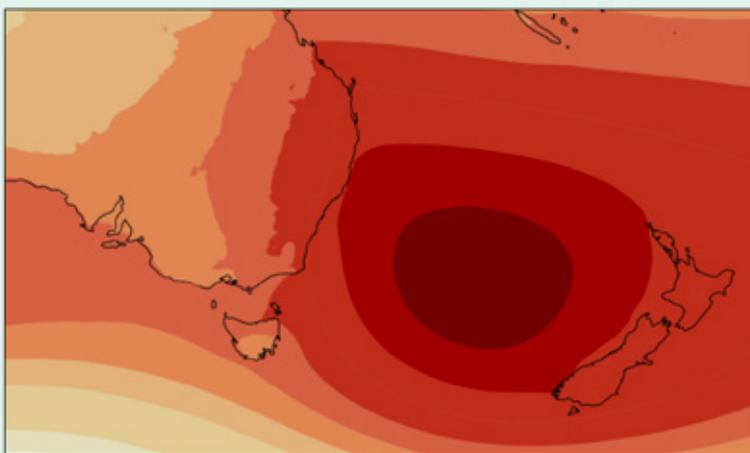
### Study methods



2 floating Light Detection and Ranging (LiDAR) monitors moored in the project area for 2.5 years

### Data insights

- The overall prevailing wind direction is west-south-westerly, running parallel to the coastline.
- The windiest month was January 2021.
- The highest monthly average wind speed, recorded at 150 m above sea level, was 51.5 km/h.
- The strongest wind recorded was 111 km/h.



### Weather analysis

In addition to collecting weather data in the project area, we also analysed 30 years of Bureau of Meteorology data to understand long-term weather trends and patterns.

This showed that Bass Strait winds are highly correlated with Victorian peak electricity demand periods such as on hot days above 35 degrees. This high-pressure system over the Tasman Sea was present on every single hot day during the 30 years analysed.

This high-pressure system brings strong winds on hot days.

# SEABED INVESTIGATIONS

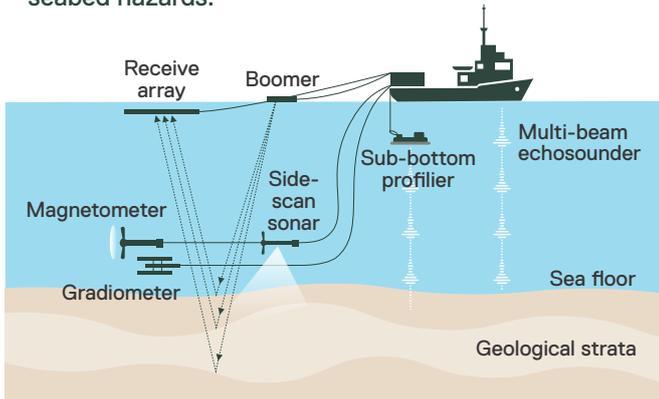
These studies mapped the seafloor and collected data on seabed conditions in the project area.

Results are used to confirm site suitability, design turbine foundations and identify suitable construction methods.

## Geophysical survey

A specialist vessel and crew spent 4 weeks at sea in 2020 to:

- Measure water depths
- Map the seafloor
- Identify any buried infrastructure, shipwrecks or seabed hazards.

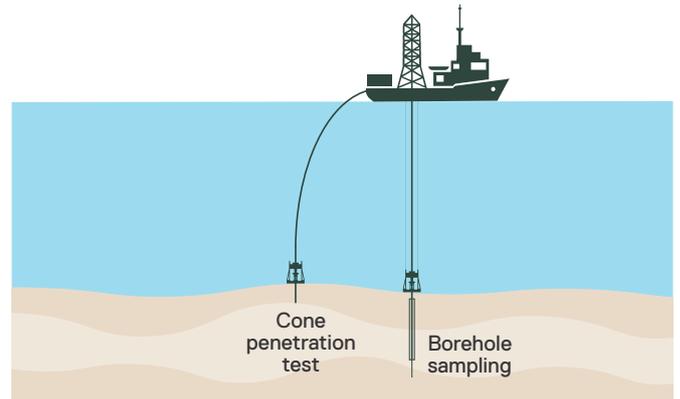


Typical equipment used for geophysical investigations

## Geotechnical survey

A specialist vessel and crew of 50 spent 5 weeks at sea, working 24/7 to:

- Collect soil and rock samples for analysis
- Test the ground's strength.



Typical equipment used for geotechnical investigations

## Data insights

- Water depths in the project area range from 15 m to 47 m.
- The seafloor consists of sand and gravel with traces of shells.
- Underground, we found sand, gravel and sandy clay with traces of shells in varying densities and compositions.
- Ground conditions in the project area are suited to monopile turbine foundations.
- No buried infrastructure or shipwrecks were identified.



**Surveying the seafloor.** Take a tour of the 'Silver Star' vessel and meet the team involved in our geophysical survey.



**Analysing seabed samples.** Soil samples from up to 70 m beneath the surface were collected at 22 locations for analysis by geology and engineering specialists.

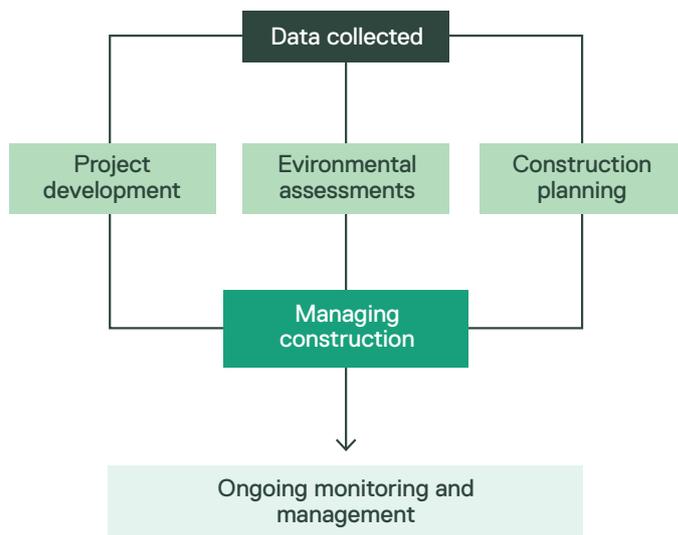


## DATA-DRIVEN PROJECT PLANNING

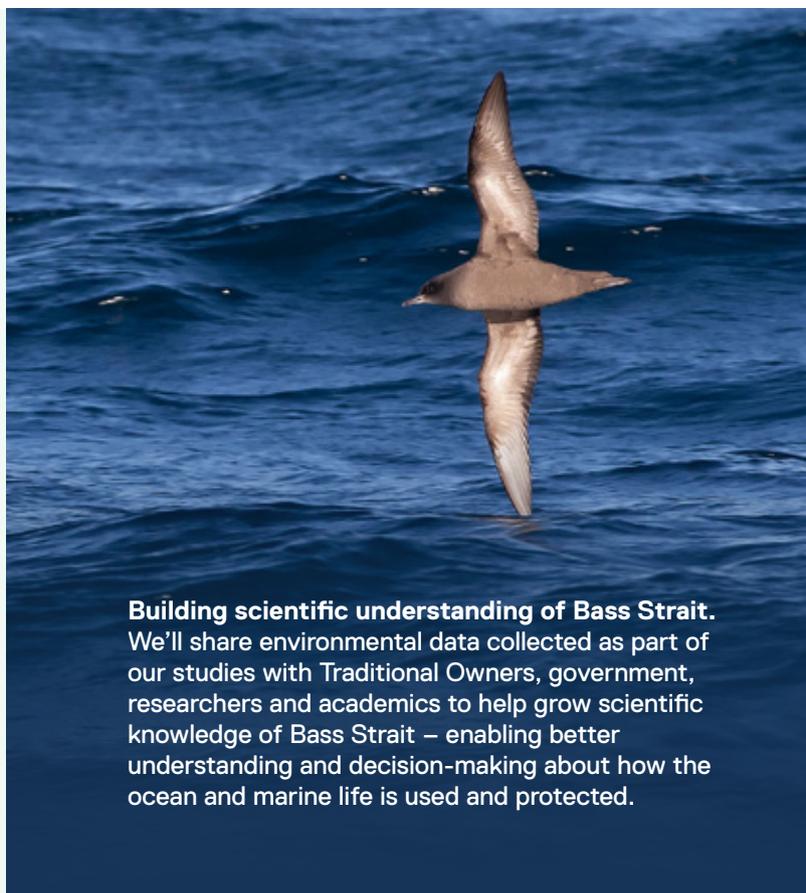
Findings from our marine studies, combined with other available data sources, provide a comprehensive understanding of existing conditions in Bass Strait.

We use this information to:

- Design a project that is safe and suitable for the local conditions
- Prepare environmental impact assessments, which help inform government approval decisions
- Protect marine life and the environment by avoiding and minimising potential impacts
- Plan efficient and sustainable construction and operations
- Provide a baseline for ongoing environmental monitoring to track any changes over time.



**Drawing on local knowledge.** From survey design through to field work, locals played an important role in our marine surveys. Using local vessels, we were able to draw on the deep knowledge fishers, charter operators, and workers with Bass Strait oil and gas experience have of this unique area. Thank you to all involved.



**Building scientific understanding of Bass Strait.** We'll share environmental data collected as part of our studies with Traditional Owners, government, researchers and academics to help grow scientific knowledge of Bass Strait – enabling better understanding and decision-making about how the ocean and marine life is used and protected.

A PROJECT BY



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We acknowledge the people of the Gunakurnal nation as the original custodians of Country and pay respect to Elders past and present.

