FLINDERS PORTS

Outer Harbor dredging – FAQs #2

Issued 12 March 2019

Table of contents

List of figures

EPA licence

In May 2018, the Minister for Planning approved an application by Flinders Ports to widen the Outer Harbor shipping channel in order to accommodate larger vessels. After extensive consideration, and with regard to community submissions on 17 January 2019, the EPA determined that it would proceed to authorise this activity with an environmental authorisation or licence. The EPA previously published a fact sheet on the licence application and another on the objectives of the licence. The licence is also available from the EPA website (https://www.epa.sa.gov.au and follow the links to 'Business & Industry' then 'Industry updates').

Frequently asked questions

The following Frequently Asked Questions (FAQs) have arisen from community enquiries.

When will dredging take place and what method will be used?

Flinders Ports has revised its dredging methodology twice since the original development application was submitted in 2017, with each revision further improving environmental outcomes. The original proposal was for a combination of a medium-sized cutter suction dredger and a trailing suction hopper dredger of about 10,000 m^3 hopper capacity. The proposal included a cutter suction dredge to break up hard material and side cast this material by placing it on the sea bed. A trailing suction hopper dredge would then dredge the sea bed material for disposal to the dredge material placement area and directly dredge soft material encountered.

The EPA advised that this proposed method was unacceptable as it would result in excessive and unnecessary ecological damage. It required Flinders Ports to investigate a dredge methodology which involved no side casting using similar equipment. Subsequently, a revised method was presented which involves the use of a small to medium-sized trailing suction hopper dredger of about 3,000 m^3 hopper capacity and a medium-sized cutter suction dredger with no side casting supported by a 2,000-m^3 hopper capacity split hull barge. When the development application was approved in May 2018, this became the baseline method, with conditions requiring any different methodology proposed to achieve the same or better environmental outcomes.

Flinders Ports has since engaged a dredging contractor that determined it could further improve environmental outcomes by undertaking the dredging in cooler months (commencing no earlier than June 2019) and using a trailing suction hopper dredge and a barge mounted excavator. Duration of dredging using this method is expected to be as short as 3 months instead of the previous estimates of at least 6 to 8 months for other methods. This is expected to significantly reduce the duration of turbidity and impacts to seagrass, which are less active at the proposed times.

The equipment proposed to be used are a trailing suction hopper dredge with a hopper capacity of approx. 12,000 m^2 and a barge mounted excavator with 2 split hopper barges (size unknown at this stage). Modelling of the new methodology has confirmed that the environmental outcomes are likely to be better.

'Green' or 'environmental' valves will be fitted to the hopper dredge, which can be adjusted to reduce air entrainment (the drawing in of air while discharging water) in the overflow discharge, which is a condition set by the EPA licence. This reduces turbidity from the overflow discharged from the trailing suction hopper dredge vessels as it stops air bubbles from rising and bringing fine sediment with them.

What consideration is being given to seagrass?

Seagrasses are flowering plants that depend on sunlight to photosynthesise and grow. When there is abundant light, especially in summer, seagrass photosynthesis is high and the plant will store energy. When there is not enough light, seagrass will draw energy from its reserves. Longer daylight hours and low runoff from rainfall events during summer allow seagrass to photosynthesise enough to store energy which for when days are shorter and there is more discoloured water from rainfall runoff during winter.

Fine particles or suspended sediment in the water scatters sunlight and make the water look murky or cloudy. The more that light is scattered and interrupted from reaching the seagrass, the less photosynthesis can occur. Higher turbidity can increase light stress on seagrasses. Sediment that settles directly on seagrass leaves prevents light from reaching them. Both effects of suspended and settled sedimentation on seagrass leaves can interrupt the light and decrease photosynthesis.

Seagrass can survive through a wide range of light conditions but if photosynthesis is inhibited for too long it can mean that seagrass has to use all of its energy reserves and cannot survive through the low light periods such as winter. In order not to increase stress on the seagrass and affect its health, the EPA is stipulating that the dredging must not be undertaken during December to February when light availability is most crucial to seagrass building its energy reserves. Dredging during winter is expected to be less detrimental than during summer as seagrass goes through a natural shedding process – reducing its energy demands when the natural light levels are lower.

Disruptions to light reaching seagrass should be minimised to maintain healthy, resilient seagrass meadows. Seagrass monitoring is required under the EPA licence to measure the zones of seagrass impact predicted in the hydrodynamic modelling done by Flinders Ports and to inform management actions that may need to be undertaken during the dredging operation.

The *What will the management actions and stop-work triggers be?* section below describes what kind of timeframe there is between turbidity being elevated and management actions starting (exceeding the trigger).

What water quality and seagrass monitoring will be undertaken?

Flinders Ports deployed 3 water quality monitoring buoys in June 2018, with 2 buoys adjacent to the shipping channel and 1 buoy further south. The buoys are monitoring water quality and in particular turbidity for the purpose of understanding site-specific turbidity information across a number of months.

Monitoring data to date show that background turbidity ranges between 0.6 Nephelometric Turbidity Units (NTU) during calm conditions and about 5–20 NTU during windy conditions (particularly westerly winds). Baseline data has been collected and reported to the EPA to help set licence conditions and confirm its regulatory approach.

The EPA informed Flinders Ports very early that it would be required to establish a ‘before and after control impact’ design approach to assessing seagrass condition. This is a method of evaluating anthropogenic impacts, which are the impacts human beings have on receiving environments. Predicted impact sites are monitored before and after a planned activity to infer impacts incurred as result of the activity.

Control sites are also monitored both before and after the activity to take into account natural variability. The sites must be representative of predicted impact sites (similar habitat and environmental conditions) yet far enough away so as to not be affected by the activities being undertaken.

This assessment is also a requirement of the Native Vegetation Council, and the EPA has been working to ensure consistency in approach to this important work. The EPA will assess and approve the method to be undertaken as well as a report on current seagrass condition before dredging commences. The best time to assess seagrass condition is March and April when seagrass is at its most active and before it sheds some of its leaves during winter.

In addition to reviewing Flinders Ports monitoring data, the EPA will undertake its own monitoring as required. So far the EPA has undertaken diver-based seagrass health monitoring at a number of locations. In addition to this, EPA marine scientists have collected underwater videos of seagrass habitat at many locations, some of which have been monitored since 2010. At the conclusion of the dredge and post-dredge monitoring, a report will be published on the scope and findings.

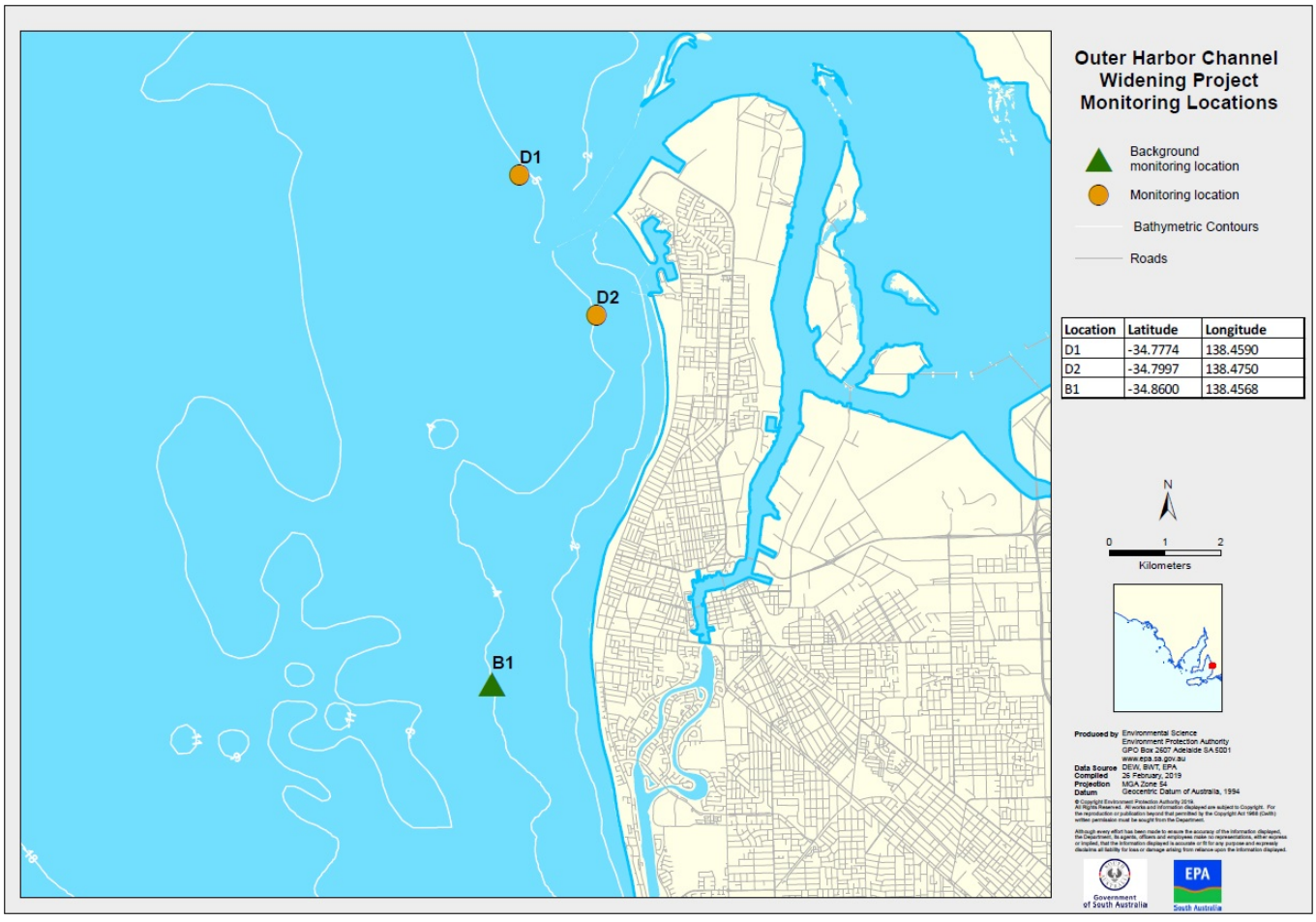

Figure 1 – Water quality monitoring locations

Monitoring data – what will it tell us?

The EPA marine scientists will have on-demand access to Flinders Ports' real-time monitoring data and will be reviewing this as required. Data will be collated using 6- and 15-day rolling averages to assess potential short-term (acute) versus long-term (chronic) turbidity impacts.

Parameter	Units	Frequency of recording
Turbidity	NTU	10 mins
pH	pH	10 mins
Temperature	degrees celsius	10 mins
Dissolved oxygen	mg/L	10 mins
Photosynthetic active radiation (PAR)	mol/m^2/day	10 mins

Rolling averages and why they are used

A rolling average calculates the average (in this case a median) of a subset of data. It is often used in a time series to smooth out short-term variability so that longer-term trends are highlighted. The 'rolling' nature of the assessment means that the average is continually updated based on new data being added.

Using a rolling average allows for a balanced approach to managing a risk through understanding that the ecosystem is resilient to some stress, but if the duration of the stress is too long it may impact on the environment. It avoids requiring management actions for short-term events that are unlikely to impact on seagrass.

6-day rolling average data

A 6-day rolling average uses the previous 6 days' data to calculate an average value for that time period. So each new day adds new data but retains the previous 5 days' worth of data. Rolling averages smooth out lots of small variations in a data set and can help to identify trends. Using a 6-day window recognises that an increase in turbidity does not mean that seagrass will be affected through light limitation.

15-day rolling average data

A 15-day rolling average uses the previous 15 days' data to calculate an average value (in this case a median) for that time period, so each new day adds new data but retains the previous 14 days' worth of data. Rolling averages smooth out lots of small variations in a data set and can help to identify trends. Using a 15-day window recognises that a longer-term increase in turbidity, or a number of spikes that did not trigger the 6-day average may be putting added stress on seagrasses due to more frequent or longer-term limitation to light.

Short-term pressures vs long-term chronic impacts to the ecosystem

Short-term or acute pressures are generally intense in nature but last for a relatively short duration. Long-term or chronic pressures may be less intense but continue for a long time. An acute pressure can become a chronic pressure if it occurs frequently.

The marine environment is reasonably robust in coping with acute pressure because tides, winds and waves help to dilute and diffuse the pressure away from the immediate area (for example during storm events). The magnitude of the impact depends on the size and nature of the pressure. Acute pressures are often very obvious because the water in the immediate area can be discoloured or show strong signs of the pressure, but cease to be noticeable within a day or two.

Chronic or long-term pressures can impact severely on the environment because organisms that cannot move away from the pressure, for example plants, may suffer declines in health due to poor conditions. Chronic pressures may be obvious but not as severe as an acute pressure.

Both short-term and long-term impacts can affect the ecosystem, recreational and aesthetic enjoyment of the environment. An acute impact may mean that you should avoid swimming at your chosen beach for a day or so, whereas chronic impacts may cause widespread changes in the ecosystem and affect coastal erosion, fish stocks or other parts of the system.

I can see an enormous plume of cloudy water – what turbidity is the EPA allowing?

The dredging process will by its nature create a visible turbid plume around the dredge site and dredge material placement area. Flinders Ports is required to use satellite imagery at least every 8 days as part of their review of the potential zones of impact predicted in the hydrodynamic modelling.

Turbidity data will be continuously monitored and logged every 10 minutes to compare to the average background turbidity of the previous 6 and 15 days. It is expected that the dredging operations will cause a rise in turbidity locally and this will place some stress on the ecosystem, but will not have long-term impacts. If the triggers established by the EPA are exceeded, management or mitigation actions will be require, which could include stopping dredging. These triggers have been established based on levels of turbidity known to be tolerated by seagrass, balancing the short-term turbidity risks with the potential for an extended dredging campaign caused by stopping and starting too frequently.

High turbidity for a short time such as a few days, is not likely to impact greatly on seagrass health but the EPA is required to be notified when they occur (in real-time) in case the frequency increases to the point where the pressures become chronic and ecosystem health is impacted. Live turbidity monitoring triggers and other mitigation methods will be implemented by the dredgers to actively manage turbidity generation.

When turbidity triggers are exceeded in the first instance, the EPA expects Flinders Ports to examine monitoring equipment and review the data against background turbidity levels. It will look at recent meteorological and current/wave/tide conditions and conduct manual soundings of turbidity to verify instrument readings. If Flinders Ports believes that meteorological or other conditions are causing turbidity, it has an opportunity to present this information to the EPA for consideration. This must be done in writing in each instance.

What will be the management actions and stop-work triggers?

Where turbidity measured at the monitoring probes exceeds 2.8 Nephelometric Turbidity Units (NTU) based on a 15-day rolling average of the median, or exceeds 5.8 NTU over a 6 day rolling average of the median, Flinders Ports must ensure that the procedures described in the approved Dredge Management Plan are undertaken.

If turbidity measured exceeds 5.8 NTU based on a 15-day rolling average of the median, or 15.8 NTU over a 6-day rolling average of the median, then dredging must cease as soon as reasonably practicable and no later than 3 hours of a turbidity exceedance. Dredging can only commence when turbidity no longer exceeds thess limits unless approved in writing by the EPA. A written report must be provided to the EPA no later than 7 days after the exceedance which includes the date, time, duration, and turbidity; the cause(s) for the exceedance, actions taken to rectify the matter; and corrective actions identified and taken or to be taken to prevent future events of the same or similar kind.

Examples of management actions may include:

- changing the dredge location of the trailing suction hopper dredge and/or back hoe dredge until turbidity has been reduced to below the trigger level
- altering the overflow regime of trailing suction hopper dredge to reduce fines being spilt at a location; and/or
- modifying dredge phasing with respect to tidal conditions of the trailing suction hopper dredge and/or the back hoe dredge.

The EPA expects Flinders Ports to have appropriate contingency plans and actions in the event of any fault or failure of any equipment to be used, including monitoring equipment.

What research has been used to model seagrass loss?

A significant amount of literature, modelling and scientific experience has been used to predict the timing, duration and the applicability of trigger values for seagrass. The literature that has been referenced includes (but is in no way exhaustive) the following publications:

ANZECC/ARMCANZ 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* Australian and New Zealand Environment and Conservation Council, and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

BMT 2017a, *Port Adelaide Outer Harbor Channel Widening – Dredge Plume Modelling Report*, prepared for Flinders Ports, R.B22346.006.01.PlumeModelling, 27 June 2017.

BMT 2017b, *Alternative Dredging Scenario – Adelaide Outer Harbor Channel Widening Project*, Technical Memorandum to Arup (John Haese), M.B22346.005.alternative dredge scenario, 27 October 2017.

Boskalis 2018, *Pers Comm from Irena Doets*, received 26 November 2018 by email and attachment (Plume model input Boskalis for BMT.docx).

Bulthuis DA 1983, 'Effects of in situ light reduction on density and growth of the seagrass Heterozostera tasmanica (Martens ex Aschers.) den Hartog in Western Port, Victoria, Australia', *Journal of Experimental Marine Biology and Ecology* 67(1): 91–103.

Cambridge ML and Hocking PJ 1997, 'Annual primary production and nutrient dynamics of the seagrasses Posidonia sinuosa and Posidonia australis in south-western Australia', *Aquatic Botany* 59: 277–295.

Campbell SJ and Miller CJ 2002, 'Shoot and abundance characteristics of the seagrass Heterozostera tasmanica in Westernport estuary (south-eastern Australia)', *Aquatic Botany* 73(1): 33–46

Collier C, Lavery P, Ralph P and Masini R 2008, 'Physiological characteristics of the seagrass Posidonia sinuosa along a depth-related gradient of light availability', Marine Ecology Progress Series 353: 65–79.

Collings G, Miller D, O'Loughlin E, Cheshire A and Bryars S 2006, *Turbidity and reduced light responses of the meadow forming seagrasses Amphibolis and Posidonia, from the Adelaide metropolitan coastline,*

ACWS Technical report No. 12, South Australian Research and Development Institute (Aquatic Sciences), Adelaide.

DHI in Chevron 2010, *Appendix N3 – Tolerance Limits Report for the Draft Environmental Impact Statement for the Proposed Wheatstone Project.*

Erftemeijer P L, Lewis III R and Roy R 2006, 'Environmental impacts of dredging on seagrasses: A review', *Marine Pollution Bulletin* 52(12): 1553–1572.

Fraser MW, Short J, Kendrick G, McLean D, Keesing J, Byrne M, Caley MJ, Clarke D, Davis AR and Erftemeijer PL 2017, 'Effects of dredging on critical ecological processes for marine invertebrates, seagrasses and macroalgae, and the potential for management with environmental windows using Western Australia as a case study', *Ecological indicators* 78: 229–242.

Gils J 2017, *Development of the Adelaide Receiving Environment Model,* prepared for South Australia Water.

Kemps H and Mills D 2016, *Generation and release of sediments by hydraulic dredging: a review*, Western Australian Marine Science Institution, Perth, Western Australia, June 2016.

Port of Townsville Limited (POTL) 2016, *Townsville Port Expansion Project, Additional Information to the Environmental Impact Statement, Marine Water Quality Chapter (Table 6–2).*

Water Technology 2004, *Flinders Port: Port Adelaide Dredge Investigations*, prepared for KBR Pty Ltd, Report No. J115/R01.

Western Australian EPA 2016, *Technical Guidance: Environmental Impact Assessment of Marine Dredging Proposals*, Environmental Protection Authority, Perth.

How will the EPA ensure Flinders Ports only disposes in the designated area?

The dredge and barges must be fitted with an automatic tracking system that uses transponders on vessels to provide information on position, course and speed. Differential GPS-enabled transceivers are required to operate continuously to monitor the location of each vessel. Dredges and barges are required to automatically record any time when hopper doors are opened and disposal is occurring. The EPA will use this information to monitor dredge spoil placement activity as well as conduct inspections of activity.

Underwater surveys must be completed before dredging and following final spoil placement activity cessation, with reports provided to the EPA for assessment.

Flinders Ports is required to provide a disposal pattern and plan for review prior to commencing the works. The dredge operator must record the time and location of each load of material that has been placed in the blocks including the dredges (or barges) track during discharge operations and position at the time of commencement and completion of discharge. This information is to be compiled and submitted to the EPA in writing as part of its regular reporting requirements.

How will the EPA safeguard the ecosystems that are impacted by the dredging?

The EPA has been working closely with various teams within the Department of Environment and Water, including the Coast Protection Board, Native Vegetation Council, Adelaide and Mount Lofty Ranges Natural Resources Management (Coast & Marine) and the Adelaide Dolphin Sanctuary to determine the licence objectives that offer the best protection to surrounding ecosystems. Consultation with these representatives has helped to shape the EPA's conditions of authorisation.

The EPA understands that during summer, Bird Island is home to tens of thousands of migratory shorebirds. No dredging will be permitted during summer months, when bird nesting and breeding takes place. Flinders Ports will not allow access to Bird Island for any of its staff or dredge operators.

No habitat loss on Bird Island will be caused by the dredging and the new dredge methodology offers a much shorter timeframe during which birds may be disturbed (3 months). One of the alternate areas for feeding is Section Bank, where the zone of influence of the dredge has been significantly reduced due to the further revisions to dredging methodology.

The Adelaide Dolphin Sanctuary advises that literature suggests dolphins are likely to avoid the dredging activity, however the EPA is requiring Flinders Ports to take the following actions as a precaution:

- monitoring by a trained marine mammal observer (MMO) within a 150-m caution zone around the back hoe dredge
- provision of advice by MMO to personnel on board dredge vessels
- procedures to delay or pause dredging when marine mammals are observed within 50 m from the back hoe dredge; and
- reporting and recording sightings of marine mammals.

Flinders Ports should pay compensation – what if seagrass loss is greater than predicted?

A Significant Environmental Benefit (SEB) offset payment to the Native Vegetation Council of South Australia must be paid by Flinders Ports as compensation for the predicted loss of seagrass. Flinders Ports has approval for the following clearance:

- 4 hectares of direct clearance for the actual channel widening operations; and
- up to 158 ha of predicted impacts associated with a winter dredge operation that will result from increased turbidity and sedimentation of the waters surrounding the dredge operation.

The total amount required to be paid is $944,304.94 in stages:

- $472,152.47 before dredging commences
- $236,076.23 within 3 months of the completion of the dredging

- $236,076.23 or an adjusted amount to reflect the actual seagrass impact within 2 months of the second anniversary of the completion of the dredging.

For information from the Department for Environment and Water's Native Vegetation Council, please visit the Native Vegetation Council website

The licence controls are designed to effectively minimise turbidity and its impact on seagrass. This includes the requirement to stop work where turbidity triggers are exceeded, undertake immediate actions and to report exceedances and actions undertaken to the EPA (see The *What will the management actions and stop-work triggers be?* section above).

The EPA has a range of regulatory tools available including requiring works to cease if it is not satisfied that dredging is being managed in accordance with the strict licence conditions applied. The EPA also has powers to require additional controls, monitoring or reporting via licence condition or environment protection order, and there are sanctions and penalties that it can be apply or seek via prosecution.

If at the end of the dredging, results of post-dredge monitoring identifies that seagrass extent and percentage cover is more impacted than predicted, the EPA will at that time consider and apply the appropriate regulatory response.

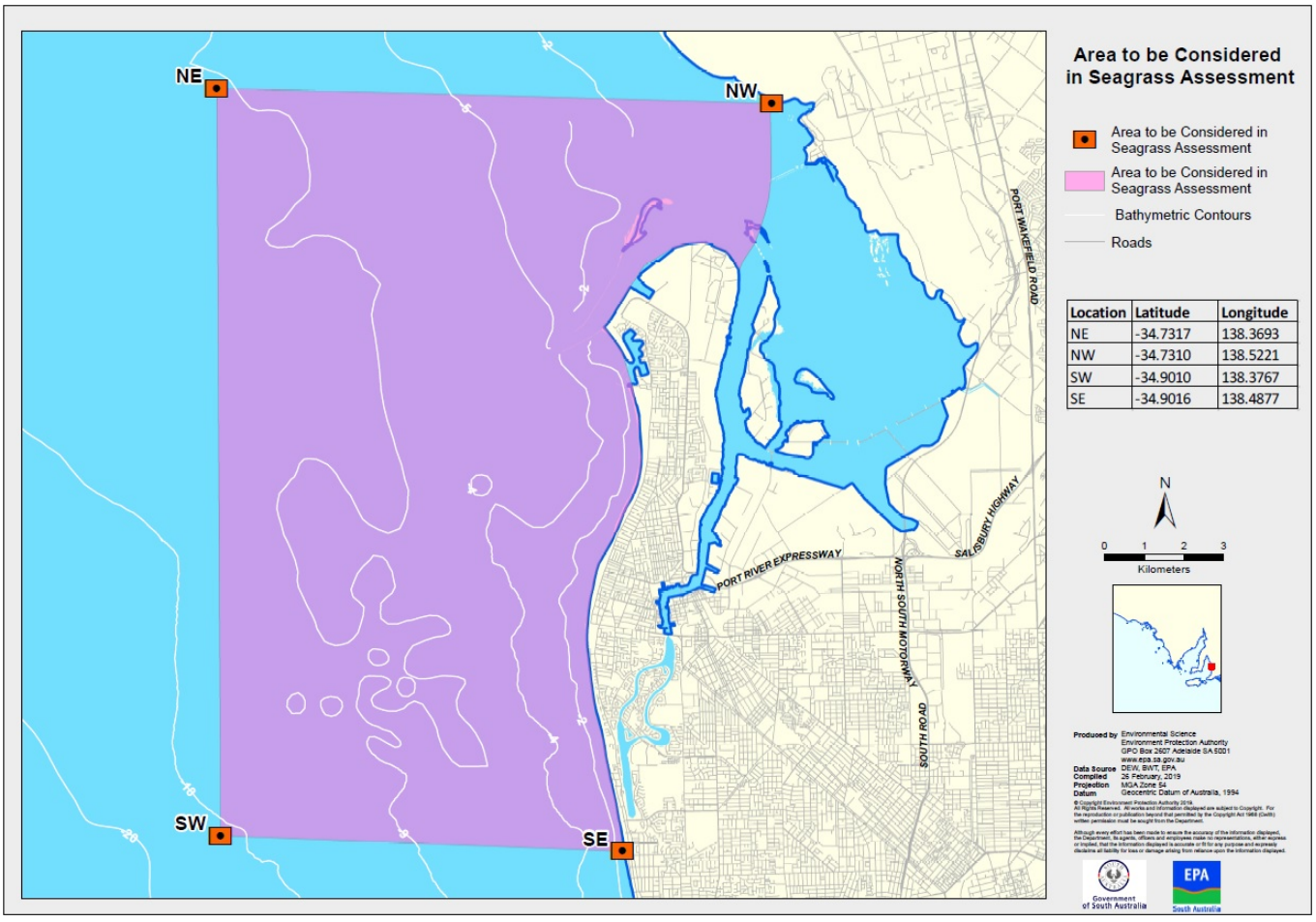

Figure 2 – Seagrass assessment area

How will the spread of *Caulerpa taxifolia* be controlled?

Dewatering, or removing the water from dredge material, is necessary as part of the dredge process and the activity most likely to result in mobilisation of any *Caulerpa spp.* fragments from known current locations.

Flinders Ports is required to implement an approved Dredge Management Plan (DMP) that will identify, as far as is reasonably practicable, all environmental risks associated with the dredging, and will include procedures for managing the presence of *Caulerpa taxifolia* within the dredge area.

A *Caulerpa spp.* survey will be undertaken before dredging commences and all dredge vessel movements will be tracked, with dumping times and locations recorded and reported to the EPA. The environmental objective is to ensure *Caulerpa* do not survive outside of the current containment zone. The final EPA-approved DMP must include other biosecurity mitigations including:

- no high-risk ballast water brought into port limits
- ballast water discharge and marine pest inspections will occur in accordance with Port Operating Procedures
- no harmful marine organisms translocated on the under-keel hull, dredge-head or within the hopper of the dredge.

How will the spread of Pacific Oyster Mortality Syndrome (POMS) be controlled?

Primary Industries and Regions South Australia (PIRSA) is responsible for disease management as it relates to livestock and fisheries management in SA. The following information has been taken from the PIRSA website:

> Pacific Oyster Mortality Syndrome (POMS) is a disease which affects Pacific Oysters *Crassostrea gigas* and is caused by a virus called OsHV-1 micro variant. It causes rapid death and high mortality rates in farmed Pacific Oysters (up to 100% within days of being detected) and can spread quickly if introduced.
>
> The first Australian case of POMS was recorded in 2010 in New South Wales, with the most recent outbreak in commercially grown oysters detected in Tasmania in 2016. In late February 2018, the first detection of POMS in South Australia was discovered in feral oysters in the Port River.
>
> All commercial oyster growing areas in South Australia currently remain free of disease and efforts are focused on future proofing industry (eg biosecure hatcheries, POMS resistant oyster breeding program) and containing POMS to the Port River area.
>
> To reduce the risk of POMS spreading, PIRSA has implemented a ban on the removal of all bivalve organisms (oysters, mussels, cockles, razorfish) from the Port River system until further notice. In addition to the ban, testing and monitoring of the feral oyster population and POMS outbreak in the Port River remains in place and PIRSA is working closely with the oyster industry on statewide early detection surveillance. Strategic knockdowns of feral oysters both in the Port River and in regional areas have also been occurring, noting that total eradication in the Port River is not achievable.

The EPA understands that when water temperatures are cooler – below 19°C, the POMS virus is not active. Under the EPA licence, Flinders Ports must not commence dredging until cooler months when seagrass is less active and less likely to be adversely impacted by turbidity.

The environmental objective is POMS does not spread outside the current containment zone. Flinders Ports and its dredge contractor must only dispose of the dredge material to the authorised dredge material placement area. The barges are required to be fitted with GPS units that will operate continuously to monitor their location. They will also be required to automatically record any time when hopper doors are opened and disposal is occurring.

The EPA has consulted extensively with PIRSA during its assessment of the licence application, and detailed information has been provided outlining the measures that Flinders Ports is required to implement prior to dredging commencing.

These requirements will be detailed in a POMS management plan, which must be approved by PIRSA. All actions within the plan must be implemented to PIRSA's satisfaction and the EPA must be provided with written confirmation of this from PIRSA, prior to dredging commencing.

What about the spread of other marine pests?

The Dredge Management Plan must incorporate strategies for minimising the risk of biofouling causing the transfer and spread of non-native aquatic species through dredge vessels transit and operation, prior to entry into South Australian waters, including:

- hull inspections and cleaning of sea chests and piping, including mooring lines, anchors, chains and warps and unpainted hull appendages such as anodes, velocity probes and echo sounders to ensure the vessel is free from bivalve mollusc species.
- removing biofouling from vessels at a facility that is equipped with adequate waste and wastewater controls to capture and dispose of waste material; and
- recording hull and equipment cleaning including dates, methods and locations at which such activities took place, application of antifouling coating including date, location and type of coating applied and provided to the EPA prior to any dredge vessels entering into South Australian waters.

What community consultation has been undertaken?

The EPA commenced engagement with key stakeholders on the proposal during the State Commission Assessment Panel advice provision in 2017. Community engagement on the licence application commenced on 5 November 2018, and the EPA published a community submissions report on 14 December 2018 that outlined how the submissions process had been taken into consideration in developing the licence objectives.

In making the determination that the EPA would issue Flinders Ports with a licence, on 21 January 2019 a fact sheet out lining these objectives was published and sent to key stakeholders that had engaged with us previously. Community interactions with the EPA are ongoing and community perspectives will always be considered at any time during the project.

The EPA must ensure that conditions it imposes on a licence are reasonable as well as legally enforceable. Licence conditions are therefore developed using very specific legal terminology.