

MARINE ENVIRONMENTAL QUALITY



Experience growth.

Marine environmental quality is a broad description of the quality of the waters, sediments, ecosystems and biota (plants and animals) of the marine environment.

The Environmental Protection Authority (EPA) manages the coastal waters of WA by following a regime that sets different Levels of Environmental Protection (LEP) for different sections of the coast depending on the water quality and what that section of the coast is used for (e.g. recreation, fishing, marine reserve). The LEP can be Maximum, High, Moderate or Low and each has a particular set of Environmental Quality Criteria (EQC). The EQC cover water quality and the abundance and diversity of marine plants and animals (EPA, 2015).

WHAT LEP IS RELEVANT TO THE ASHBURTON SALT PROJECT?

The nearshore waters in the vicinity of the Project have been recommended to have a combination of High and Maximum LEPs. The areas to the north have been recommended to have a High LEP (which means small changes in water quality are permitted, but no changes in biota abundance and diversity should occur). The areas to the south have been recommended to have a Maximum LEP (which means no change in water quality or biota abundance and diversity) (DoE, 2006).

WHAT IS THE CURRENT WATER QUALITY NEAR THE PROJECT?

The following table summarises historical water quality monitoring on the eastern side of the Exmouth Gulf from a number of studies conducted for other projects nearby such as the Chevron Wheatstone project and the historical Yannarie Project. Further more detailed water quality monitoring is currently being planned by K+S.

Measure	Definition	Local Water Quality Information
Salinity	Salinity is a measure of how much salt is in the water, and is usually measured in parts per thousand (ppt). For example, the ocean is around 35 ppt, which means in every kilogram of seawater there are 35 g of salt.	The coastline and creeks in the local area are actually more saline than offshore waters (38 - 41 ppt), and the creeks generally become even more saline further inland (an extreme of 65 ppt was recorded). This is likely due to the high evaporation and low rainfall, which over time gradually builds up the salinity in the creeks and sediment.
Dissolved Oxygen	Dissolved Oxygen (DO) is the amount of oxygen dissolved in water. This is measured as the % saturated oxygen. For example, if the water is 100% saturated, that means it's holding as much oxygen as it can. Dissolved oxygen in marine environments should be above 90%, and above 80% for estuaries.	All measured DO levels in the local area (creeks, nearshore and offshore) were above 99%.
pH	pH is a measure of acidity (or alkalinity). It has a scale of 0 (highly acidic) to 14 (highly alkaline) with 7 being neutral. The pH of nearshore waters should be between 8.0 and 8.4, and between 7.0 and 8.5 for estuaries.	Measured pH levels in the local area (creeks, nearshore and offshore) ranged from 8.1 to 8.2.
Temperature	Temperature is a measure of the degree or intensity of heat present in a substance (in this case seawater)	Minimum water temperatures measured were in September and ranged from 18.1°C to 20.6°C. The area is subject to annual variation, as previous studies recorded 22-23°C in September. Maximum water temperatures measured were in mid-January, with a range of 27.1°C to 32.3°C.
Nutrients	Nitrogen and phosphorous are nutrients that promote plant growth, and may be present in organic forms (not immediately available for plants to use) or inorganic forms (immediately available for plants to use).	Measurements of inorganic nitrogen and phosphorus were generally higher in the creeks than the nearshore. This indicates that the mangroves and algal mats associated with the creeks are important for generating biologically available nutrients.
Chlorophyll	Chlorophyll is found within the cells of algae and other phytoplankton and is responsible for photosynthesis (using sunlight to turn carbon dioxide into energy and oxygen). Chlorophyll-a is the most abundant form of chlorophyll, and is used to measure the concentration of phytoplankton in water. Increased phytoplankton is an indicator of increased nutrients.	Chlorophyll-a results show that nutrient concentrations are higher in the creeks than the nearshore waters. Higher levels were recorded in the winter months than in the summer.
Turbidity	Turbidity is the cloudiness of the water due to the number of tiny particles suspended in it (similar to smoke in the air) and can be measured in Nephelometric Turbidity Units (NTU). Turbidity affects light availability to aquatic plants, which restricts the depth at which those plants can grow. The range for estuarine and marine environments is 1-20 NTU.	Offshore, the region generally has low to moderate turbidity 1-3 NTU. Under windy conditions, the nearshore environment is more turbid, with a range of 7-8 NTU. However, the area experiences cyclones and heavy rainfalls, and after Cyclone Dominic, readings of 77 - 143 NTU were recorded and remained in excess of 20 NTU for over a week.
Metals	Heavy metals (e.g. lead, cadmium, mercury, arsenic, copper, selenium, zinc) are naturally occurring and some are essential as trace elements for plants and animals. Heavy metals can also be toxic at certain concentrations, and they bioaccumulate (they are taken up and stored in an organism at a faster rate than they are removed).	Measurements within the region showed that naturally occurring metals were generally below the recommended criteria specified for the protection of North West Shelf ecosystems.



HOW WILL K+S AVOID AND MINIMISE IMPACTS TO MARINE ENVIRONMENTAL QUALITY?

The Project will produce wastewater known as bitterns, which is essentially seawater with the sodium chloride (table salt) removed but still containing other concentrated ocean salts. No chemicals are used during the solar salt evaporation process, so the bitterns do not contain any chemical contaminants. K+S is planning to pipe the bitterns back into the ocean, in a way which will adequately dilute the bitterns, in order to protect marine water quality and avoid effects on marine life.

Dredging (deepening the sea floor) will be minimal (if required at all). Any dredging will be designed to avoid turbidity-related impacts on seagrass beds, coral and the protect the marine environment.

The salt ponds will be designed to minimise seepage and avoid salinity related impacts to groundwater or the neighbouring creeks.

Any areas of acid sulphate soils or sediment will be identified before disturbance takes place, and the Project will be designed and managed to prevent acid sulphate soil or sediment related contamination.

Comprehensive monitoring and management plans will be in place for all Project processes.

K+S recognise that marine environmental quality is important for local ecosystems and recreational and commercial fishing, and are committed to minimising any impacts.

REFERENCES

Environmental Protection Authority (EPA), 2015, Environmental Assessment Guideline 15 – Protecting the Quality of Western Australia’s Marine Environment

Department of Environment (DoE), 2006, Pilbara Coastal Water Quality Consultation Outcomes – Environmental Values and Environmental Quality Objectives, Department of Environment, Government of Western Australia, Marine Series Report No. 1