

Long-term impact of injection of substantial volumes of cold water below 12 m in Western Port Bay

As a SCUBA diver for the past 40+ years, with over 1,500 dives logged, I can say with certainty that the study undertaken to model the impact of cold water on Western Port Bay (WPB) has been inadequate and does not address the long-term impact of injection of substantial volumes of cold water that will settle below 12.5 m into the bay.

Specifically, the proposal from AGL analysis of the impact of the sea water used for heating the liquified natural gas (LNG), drawn from Port Phillip Bay (PPB), and the long-term impact of injecting up to 468 million litres of chlorinated sea water at a temperature of 7°C lower than the existing ambient sea water temperature has not taken into account the impact at depths below 12.5 m.

The AGL risk report states that:

*Up to 450 ML/day of seawater will be drawn into the FSRU before being discharged from the FSRU heat exchanger 7°C cooler than ambient seawater temperature. The modelled behaviour of the discharge from the FSRU shows that the **cold water rapidly descended to depths greater than 12.5 m** below the sea surface and demonstrated that marine ecosystem components in **water depth less than approximately 12.5 m** water depth will not be directly affected in the case of either a single-port or six-port discharge. Consequently, it is concluded that saltmarsh, mangrove, mudflat, intertidal seagrass, subtidal seagrass and channel slope communities and sensitive species that occupy habitats to a water depth of 12.5 m will be unaffected by the direct effects of the cold-water discharge (CEE 2018a).*

This statement indicates that NO consideration has been given to the impacts on the flora and fauna in the sublittoral zone, commonly known as the pelagic zone, and the site of the majority of fisheries that support life on the planet.

To analyse how the injection of cold, chlorinated water might have on the sublittoral zone in the water column and the sea life, a series of simple calculations on a known area provide insight into the impact of the volume of cold water being discharged. The GIJPP Executive Summary indicates that the volume of cold chlorinated water that will be released is:

- 312,000 m³/day from September to February (seven months); and
- 468,000 m³/day from March to August (five months).

For this example, the total volume of the entire Port Phillip Bay is approximately 25 km³ or 25 billion litres.

Table 1: Volumes of cold chlorinated water discharged annually

Volume/day	Months	Volume/year
312 million Litres/day	7	2.184 billion litres
468 million litres/day	5	2.34 billion litres
	12	4.524 billion litres

The total amount of sterile cold water to be discharged annually is approximately 18% of the total volume of Port Phillip Bay. Over the lifetime of the project (20 years) this represents the equivalent of replacing the entire volume of water in Port Phillip Bay 3.6 times – an enormous volume of water.

My experiences of over 40 years of SCUBA diving suggest that, when sea water is both cold and therefore very dense, a thermocline will be created in the deeper channels. Because of differences in salinity and temperature, thermoclines are very robust and do not facilitate simple mixing as would normally be the case if a thermocline did not exist.

Instead, AGL and partners propose that:

Once the FSRU is operating, a marine monitoring program would verify that actual environmental impacts are not greater than predicted. If any unexpected circumstances are detected, appropriate action would be taken to meet the environmental responsibilities of AGL and APA.

This statement indicates that a comprehensive analysis of the likely impact on sea life and fisheries below 12.5 m has not been undertaken. The project runs the risk of creating the equivalent of a zone with reduced life in all of the channels and deeper parts of the bay where the dense cold chlorinated water has been funnelled away from the proposed facility. Colder, more dense zones below a thermocline are generally less productive regions of the ocean, characterised by excellent visibility due to lower densities of plankton and phytoplankton. The lack of food thus impacts on predator/ prey relationships which include marine life (e.g., penguins) and fisheries (amateur, commercial). The nature of the marine environment below a thermocline also changes significantly with different species becoming dominant (flora and fauna).

There are many other aspects of the proposed FSRU that could be challenged, and will no doubt be done so by others. However, discharging 4.5 billion litres each year of cold chlorinated water into the ocean and claiming there will be no significant impact indicates that the risk analysis undertaken for this project has been very selective. Suggesting that a marine monitoring programme be undertaken after the fact is not acceptable. The area below 12.5 m depth has not been part of the original risk analysis, so that establishing any baseline data would be impossible after construction has been completed and the facility is operational.

In closing, should the project go ahead, there appears to be NO requirement for AGL to clean up the resultant contamination (which they have admitted will occur) as there is in the mining industry. Why does AGL get a 'free pass' when other industries do not?

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