

## **The Pluto LNG Project: dredging in a busy harbour surrounded by a proposed marine protected area.**

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Mermaid Sound on Western Australia's Pilbara Coast contains the Port of Dampier, one of Australia's highest tonnage ports, shipping iron ore, salt, liquid natural gas and general cargo since the 1960s, and now providing a support base for the offshore oil and gas industry. Prior to the Pluto project, seven separate loading facilities, each with berths, wharves and channels, have been developed in over 40 years of port operation. The Port currently supports over 4,000 ship movements a year, many being large bulk carriers up to Cape size.

The Sound is surrounded by the Dampier Archipelago which is known to be an area of high marine biodiversity. A proposal to declare the waters of the Dampier Archipelago as a marine park is well developed by the Western Australian Government, but not yet implemented. The boundaries of the proposed park abut those of the Port. Inside the Port, coral communities occur fringing the shallow edges of the Sound. Community condition ranges from relatively undisturbed in Port areas distant from centres of development, to remnant communities of sediment tolerant species immediately surrounding operational areas of the Port.

In 2007, Woodside Energy Ltd received approval from the Western Australian and Australian governments to construct the Pluto LNG Development, including a new wharf and berth facility within the Port of Dampier. That proposal included dredging and offshore disposal of up to 14 million cubic metres of spoil in the construction of berths, a turning basin, a channel and a trunkline, with dredging extending over a 2 year period. Dredging targeted a variety of bottom types, from the rocky shoreline and consolidated calcarenites of the berth pocket to the sandy substrates of the outer trunkline, with the bulk of dredging being unconsolidated sediments moved by a trailer suction hopper dredge. All disposal was to offshore spoil grounds.

An initial prediction of the impact of dredging and disposal on the marine environments of the Sound was made in the impact assessment based on a simple model of sediment dispersion and previous experience with dredging impacts in this area. In a supplement to the approvals process, that prediction was replaced with one made on a more complex model of sediment dispersion, including a sediment resuspension component, with the results interrogated against estimated water quality impact thresholds. Impact predictions focussed principally on hard corals, on the basis that these were the predominant ecological communities within the predicted footprint, were known to be sensitive to elevated sediments and were assumed to be more sensitive than other invertebrates in these areas.

The impact predictions were divided into 3 management areas:

Zone A – an area of approximately 1km around the most intensive dredging where the total loss of coral communities was probable;

Zone B – an area surrounding Zone A in a rectangle up to 5 km from the Zone A boundary primarily in a longshore direction where some coral loss was predicted up to an average of 10% across the zone;

Zone C – being the area within the proposed marine protected area (MPA) where no change to coral or significant perturbation to water quality was allowed.

Stakeholder concerns focussed predominantly on protection of the proposed MPA. To that end the project implemented a two-tiered monitoring approach to provide reactive management. A series of 10 sentinel sites with telemetered water quality sensors provided daily reports on whether dredging was likely to be influencing water quality beyond acceptable levels, while 25 sites were established to monitor water quality and coral health on a fortnightly basis.

Over the three years of monitoring during dredging campaigns, it was clear that non-dredging influences such as cyclones, thermal bleaching, coral predators and coral diseases exerted a much greater influence on water quality or coral health than did dredging. The outcomes of water quality and coral monitoring agreed more closely with the initial minimalist prediction of impact than with the more technically detailed and precautionary prediction submitted as a supplement to the impact assessment.

Elevated turbidity as a result of dredging was only discernible above background within a radius of 3 to 5 km from the dredge. Following any cessation of dredging, turbidity returned to background levels within one or two days. Within the inner Sound there are many other sources of turbidity which constrain the ability of monitoring to assign small effects at greater distance or time to dredging.

In terms of coral mortality, coral cover or the number of coral recruits, there was no evidence that water quality impacts of dredging caused a decline in coral health. While significant mortality events were recorded as a result of thermal bleaching, coral predators and disease, these were mainly in communities most distant from dredging. In contrast to the dynamics of these outer Sound communities, coral communities closest to dredging (including those of Zone A within 300m of dredging) were quite stable over the entire dredging period.

Experience from this extensive monitoring program suggests that telemetered water quality programs are much better suited to providing timely inputs to reactive management of dredging programs than are receptor monitoring programs. The latter will be unlikely to provide any clear indication of the effects of dredging until weeks after those effects have been realised.