

1. Assessment, monitoring and management of the Western Basin Gladstone Harbour Development

a) Adequacy of pre-dredging assessment

The Australian and New Zealand Environment Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) guidelines suggest that future port development and associated major dredging programs undertake 24 months baseline monitoring (of water, sediment, biota and ecosystem health) prior to commencement of any activity. No explanation is available for why this did not take place in Gladstone, with the first fish health survey was only carried out after the numerous reports of poor aquatic animal health in August 2011, many months after the project had already commenced.

Subsequently, the absence of bioassay and biomarker testing on the safety of the cocktail of contaminants in the sediments, is a key deficiency, affecting the accuracy of risk projections. This deficiency permits under-estimation of risk, which then flows into overly permissive conditions on dredging, compounded by insufficient monitoring programs to detect impacts. Benedetti, et al. (2012) demonstrates that a multi-disciplinary approach provides a better weight of evidence approach to assessment of risk of sediment toxicity, which can highlight unanticipated toxic additive or synergistic interactions between contaminants. Brinkmann et al. (2010) and Cofalla et al. (2012) looked at using multiple biomarkers to combine hydraulic and toxicological approaches to assess resuspended sediment toxicity. A similar approach has been used in the USA (Schmitt and Dethloff, 2000) for monitoring effects of contaminants on aquatic ecosystems, and given the sensitivity of the area involved in this project (World Heritage Area and productive fisheries), such measures should have been in place.

The lack of predictive power using international sediment quality guidelines was also illustrated by Buruaem, Hortellani, Sarkis, Costa-Lotufo and Abessa (2012). The authors were able to better predict toxicity of contaminants in sediments through using geochemical and ecotoxicological approaches. Gerbersdorf, Hollert, Brinkmann, Wieprecht, Schuttrumpf and Manz (2011) provide further weight to the argument that a multi-disciplinary approach is required to understand likely impacts of contaminated sediment toxicity upon resuspension and distribution into a foodweb and smothering a wide area of benthos.

No bioassay or biomarker work has been undertaken as a result of major fish health problems in Gladstone Harbour. Investigation of this event, where dredging was identified as a risk factor for aquatic animal health in the EIS, should have included this type of testing.

b) Water quality guidelines and monitoring methods

DERM has not used the correct set of Water Quality Guidelines. The current ANZECC water quality guidelines published in 2000 are under review, with the update now due in 2014.

The most protection of the Great Barrier Reef World Heritage Area values of the Western Basin of Gladstone Harbour and Curtis Island is provided by using a 99% protection level trigger value for water quality. DERM has frequently and arbitrarily used only the 95% protection level, which is less

likely to protect exposed aquatic animals. There is no available explanation for this use of different levels of protection.

Vision Environment and DERM's initial monitoring failed to test for dissolved metals, as per the prescribed methodology in the ANZECC guidelines. Some compounds were excluded altogether from early DERM monitoring and testing when fish health was near its worst (July to October 2011). This included TBT, pesticides, and mercury, even though they had been highlighted in historical literature (Andersen L. , 2004; Jones, et al., 2005; Brodie, et al., 2012) as risks specifically identified in Port Curtis. Scientific concerns regarding the adequacy of management practices were not new, as detailed by Brodie and Waterhouse (2012).

Numerous exceedances of the 95% protection level trigger values have been detected by the monitoring program (Department of Environment and Heritage Protection, 2012b, c). However no significant rectifying action has been taken. No evidence is offered as to why these exceedances have been dismissed as "non-toxic" or benign in their impact.

DERM's interpretation belies the genesis of the ANZECC Guidelines, which are the synthesis of international peer reviewed literature, to arrive at the specified trigger values. If the environmental conditions are maintained below the trigger values then the literature suggests harm is less likely to occur. If however the levels are exceeded, then harm is likely to occur.

As documented in this report, DERM/DEHP does not provide evidence to demonstrate that the elevated levels are safe. Instead, they dismiss this strong evidence that exposed aquatic animals are sick and dying in association with these aggregate stressors related to Gladstone Harbour development.

Environmetrics Australia (2011) noted that the Quality Assurance and Quality Control activities used by Vision Environment (the company employed to monitor water quality during the dredging project) were not up to their own standard. They reported serious anomalies in the benthic light measurement data, whereby equipment failed to register readings on numerous occasions, sometimes for up to one month. Where such missing data points were ignored, they are effectively being allocated a zero value. This can only result in an underestimation of the true values. Where the turbidity values are being used as a regulatory tool for seagrass protection in this project – having no readings is a serious problem. It is evident from the report that the monitoring program was being developed in real time **after** the commencement of dredging as the methodologies and equipment changed. This happened again in August 2012 with a shift from turbidity monitoring to a light based system.

The recent change to use of light-based monitors, meant the locations of monitors move substantially away from the primary area of dredge and boat activity. The locations of the turbidity monitoring bouys can be seen at: http://www.westernbasinportdevelopment.com.au/water_quality_monitoring/

c) Implementation of conditions of project consent

A development permit (SPDE01443011) was issued by DERM on 11 April 2011 which contained conditions that, if implemented, should have controlled some of the risks acknowledged associated with resuspension of contaminated sediments during dredging operations. The risks had been

previously articulated in numerous peer reviewed scientific documents including Eggleton and Thomas (2004), Esslemont, Russell, and Maher (2004), Jones, et al. (2005), Rasheed, Thomas, Roelofs, Neil and Kerville (2003), Vincente-Beckett, Shearer, Munksgaard, Hancock and Morrison (2006) and Apte et al. (2005).

The development permit conditions included the creation of a dredge management plan which was to identify all sources of environmental harm, including but not limited to the actual and potential release of all contaminants, the potential harm of these sources and what actions will be taken to prevent the likelihood of environmental harm being caused. The plan within the development permit (SPDE01443011) should have provided for:

“c) control measures that minimise the potential for environmental harm are in place”.

This requirement appears to have been overlooked, with dredging being permitted on all tides, in all areas, and recently (July–August 2012), under the transitional environmental program (TEP) (LNG Port Dredging and Gladstone Ports Corporation, 2012), irrespective of the turbidity levels and reports of sick aquatic animals and declining seagrass meadows throughout Gladstone Harbour.

The risks of such major operations are reasonably predictable based on published scientific literature and the previous experiences of dredging elsewhere in the world. Some of these risks have been outlined with science based evidence in this report.

d) Methodology for fish kill investigations

The Queensland Government failed to utilise the resources for fish kill investigation that had been developed specifically for the purpose. A prescriptive methodology is outlined in the Fish Kill Reporting and Investigation Manual (Department of Environment and Heritage, 1998) which should have been followed, but was not. Additional fish kill investigation resources have been developed by the Fisheries Research and Development Corporation. (Nowak, Crane, and Jones, 2005). These guidelines for investigation were inexplicably not used by Fisheries Queensland (FQ), or the Queensland, Department of Environment and Resource Management (DERM) when the fish health problems were first reported in May 2011.

Samples sent to the laboratory did not follow the guidelines for submission of diagnostic specimens which are published on the Biosecurity Queensland website (www.daff.qld.gov.au/28_14409.htm). The samples were sent on ice, and were documented to have arrived frequently in excess of 48 hours after death (Biosecurity Queensland, 2011c). The result is substantial deterioration of the tissues, due to autolysis, which impairs the ability of the pathologist to interpret the cause of sickness and death.

Biosecurity Queensland failed to deploy veterinarians with aquatic animal experience to undertake the field investigation in Gladstone, in spite of abundant reports of sick animals. When FFVS tried to work collaboratively with Biosecurity Queensland veterinary pathologists, the following response was received:

*"we are not allowed to talk with you about Gladstone as directed by our BQ managers."*¹

¹ Email 15 June 2012.

e) Baseline fish health monitoring

Fisheries Queensland did not undertake any fish health monitoring until after large numbers of aquatic animals were reported to be sick and a closure on the Gladstone Harbour was implemented on 16 September 2011. Fisheries Queensland (2012) used the term 'baseline studies' to describe their first surveys. When referring to environmental assessments, baseline studies are intended to describe the status of the population of animals of concern **prior** to the project impact commencing, not after the impact has already occurred.

f) Assessment of sound impacts

The Report for Marine Megafauna and Acoustic Survey, 2011 (GHD 2011), stated that the project area was taking place in a "shallow water coastal environment" and flagged that the Gladstone Ports Corporation was aware of the potential and probable impacts of human activity within the Harbour. The report states that between the two survey periods of March 2011 and June 2011, there was an "increase in overall SPL levels in all areas except for morning time in the Narrows".

*"As construction continues this traffic will be expected to subsequently increase. It has been demonstrated that anthropogenic noise (i.e. Coal terminal, and ferry movements) at the measured ranges is far higher than the background noise for all areas at all times of the day. **Anthropogenic noise will therefore be audible by all species at the ranges measured on survey.**"*

The document articulates that a "potential and probable" observed impact is the "disturbance and displacement from increased noise and/or activity during construction and dredging on the local area"; with "potential and probable" indirect consequences being "noise and vibration impacts to marine fauna from in-water construction or ongoing operational activities".

Despite all of the current knowledge of the effects of sound on marine mammals, the GHD report on megafauna (2011), and the recognition of an increase in boating traffic through the Harbour, the Coordinator General arrives at the following conclusion in his report:

"5.2.7.3,....However, I do not consider that the construction and operation of the project is expected to have a significant impact on the key marine mammals and reptile species, either in terms of direct disturbance construction noise or potential vessel strike"

The local Gladstone veterinarian, Dr Scott McAuley was involved in necropsies of several dugong mortalities in mid 2011. He advised FFVS in January 2012, that many of the animals exhibited obvious signs of boat vessel strike, including extensive bruising on the dorsum of the animal. The Coordinator General suggested that:

"The project is not expected to significantly increase the risk of boat strike as the dredging activities are conducted by large, slow moving commercial vessels with conspicuous noise, vibration and lighting."

Such an observation overlooked the use of high speed ferries moving at in excess of 30 knots to move staff to and from the development on Curtis Island.