



HEGGIES

28 January 2009

20-2014 URS Dredging Disposal 20090123 LR-R1

URS Australia
Level 16 240 Queen Street
BRISBANE QLD 4000

Attention: Chris Pratt

Dear Chris

Laird Point Dredging Disposal Site Noise and Vibration Assessment

1 Introduction

Santos Ltd (Santos) is proposing to construct a dredge spoil placement facility south of Laird Point (Gladstone Harbour) as part of the Gladstone LNG (GLNG) project. The proposed dredging disposal site will accept material from the dredging of the channel and swing basin.

The following letter summarises the findings of the noise and vibration assessment for the Laird Point dredging site, the detailed assessment and findings of which are presented in Heggies technical report (20-2014-R1D5).

The assessment locations are consistent with those detailed in Heggies technical report (20-2014-R1D5). The relevant noise criteria for this assessment are as per Heggies technical report (20-2014-R1D5).

Figure 1 shows the assessment locations referred to in this letter report.

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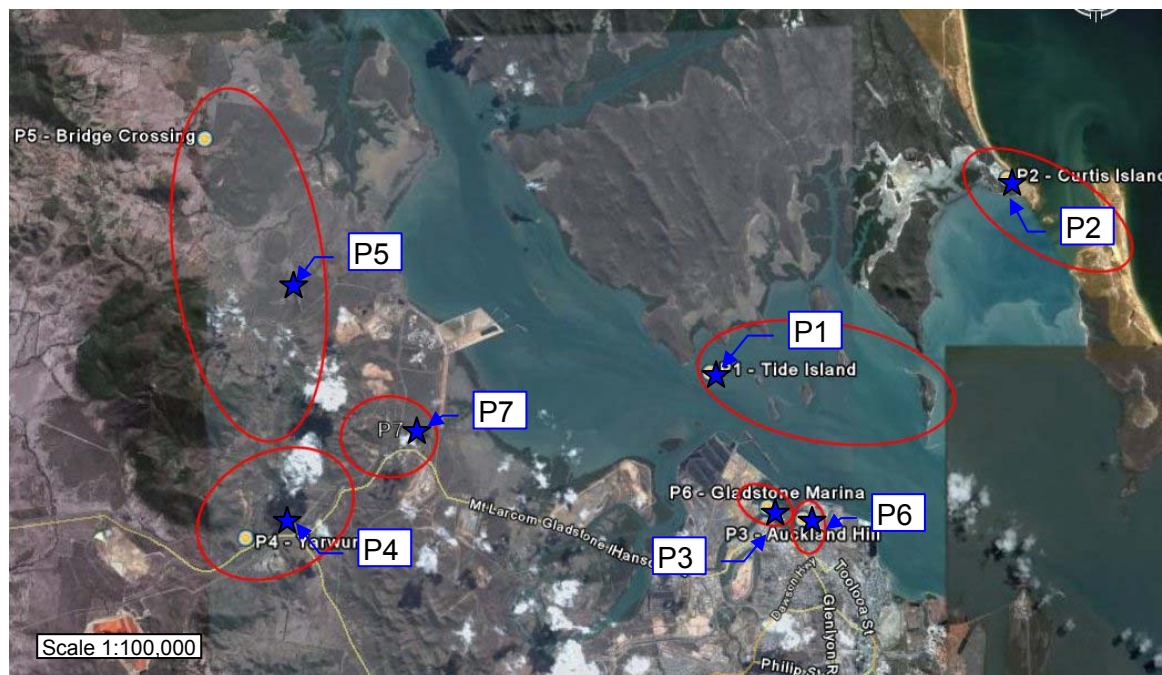
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Figure 1 Assessment Locations



2 Modelling Methodology

The assessment methodology for determining noise and vibration impacts associated with the construction phase of the dredge spoil placement facility is discussed in the following section.

2.1 Dredging Disposal Site Construction

Dredge spoils have been proposed to be piped to an onshore site located to the south of Laird Point. The site will become a dredge spoil placement facility with fill potentially used for future projects and requirements. The site will cover approximately 500,000m² of inter-tidal area with an ultimate volume of approximately 13,200,000m³ achievable with construction of a 20m high bund wall. An interim 10m bund wall will be constructed to enable early operations on the site during the dredging of swing basin and channel for the LNG facility.

The construction scenarios and plant items proposed for the dredge spoil placement facility are shown in **Table 1**.

Table 1 Dredging Disposal Site Construction Scenarios and Plant Items

Stage	Description	Typical Plant Items
Clear and grade	Clearing of vegetation and topsoil throughout site; levelling ground around the site.	3x 50t Excavators 3x D8 Dozers 6x 80t Haul trucks
Construction of 10m bund wall	Construction of a 10m bund wall with 4m wide haul road on the crest of the bund wall and 1:5 side slopes.	3x 50t Excavators 3x D8 Dozers 6x 80t Haul trucks
Construction of 20m bund wall	Construction of a 20m bund wall with 4m wide haul road on the crest of the bund wall and 1:5 side slopes.	3x 50t Excavators 3x D8 Dozers



Stage	Description	Typical Plant Items
		6x 80t Haul trucks

Estimated sound power levels for those plant items listed in **Table 1** are as specified in **Table 2**.

Table 2 Construction Equipment Sound Power Levels (SWL)

Item	Maximum SWL (dBA)
D8 Dozer	118
Excavator – 30t	110
Haul Truck (80t)	117

2.2 Dredging Disposal Site Operational Noise

The dredge spoil placement facility will be divided into several reception lagoons as well as incorporating sand reception pits and a settlement discharge pond. The reception lagoons will be connected by pipeline and weir boxes in order that the discharge water can be transferred by gravity through a series of lagoons into the final settlement lagoon.

It is expected that an onshore pump will help push the dredge slurry through the main transfer pipeline and into the initial reception lagoon. The sound power level for the onshore dredge pump, as shown in **Table 3**, has been obtained from Heggies noise source database and is used to assess the noise emission from its operation.

Table 3 Sound Power Levels in Octave Bands for Onshore Dredge Pump

Source	dBA	Sound Power Level (dBA) Octave Band Centre Frequency (Hz)							
		31.5	63	125	250	500	1k	2k	4k
Onshore Dredge Pump	118	82	97	100	107	110	111	112	112

3 Results and Assessment

Noise levels associated with the construction and operational phases of the dredge spoil placement facility have been predicted at numerous sensitive receivers (approximately 50) in the surrounding community of Gladstone. These sensitive receivers have been grouped based on their location within regards to the ambient noise monitoring (each group is referred to as an assessment location). Each of these prediction locations within each group are assessed against the same construction/operational criteria based on the results of the monitoring. Only the location within each group with the highest predicted noise level is reported. All sensitive receivers have been positioned 1.5 m above ground and a minimum of 4 m from the nearest building facade (i.e. free field). Assessment locations in the Gladstone Region are shown on **Figure 1**.

3.1 Construction Noise

Based on the proposed construction scenarios listed in **Table 1**, **Table 4** shows the predicted construction noise levels at the assessment locations shown in **Figure 1**.



Table 4 Predicted Noise Levels from Dredging Disposal Site Construction

Assessment Location	Construction Noise Criteria (dBA) ¹	Predicted Sound Pressure Levels dBA		
		Clear and Grade	10m Bund Wall	20m Bund Wall
P1	50	19	19	18
P2	50	< 10	< 10	< 10
P3	50	16	16	16
P4	50	13	13	13
P5	50	19	19	20
P6	50	14	15	14
P7	50	23	23	23

Note 1: Construction criteria (50 dBA L_{Amax}(external)) applies to all works conducted outside the hours of 6:30am – 6:30pm Monday to Saturday.

3.2 Construction Vibration

The following potential sources of ground vibration associated with the dredge spoil placement facility construction works form the basis of the vibration assessment:

3.2.1 Truck Traffic

Heavy trucks passing over normal (smooth) road surfaces generate relatively low vibration levels, typically ranging from 0.01 mm/s to 0.2 mm/s at the footings of buildings located 10 m to 20 m from a roadway. Very large surface irregularities can cause levels up to 5 to 10 times higher.

Based on the data above, vibration levels from truck traffic utilising the roads on site are expected to be significantly below both “building damage” and “human comfort” criteria on the site. In fact it is expected that any vibration from truck movements would be imperceptible (i.e. less than 0.15 mm/s).

3.3 Operational Noise

Noise levels associated with the operation of the onshore dredge pump proposed to be located on the dredge spoil placement facility have been predicted at the assessment locations shown in **Figure 1**. The predictions are based on the methodology and noise sources specified in **Section 2.2**. The predicted noise levels for the operation of the onshore dredge pump are presented in **Table 5**.



Table 5 Predicted Noise Levels Associated with Onshore Dredge Pump

Assessment Locations	Background Creep Noise Criteria (dBA)	Predicted Sound Pressure Levels dBA			
		Neutral Weather		"Worst Case" Weather	
		10m Bund Wall	20m Bund Wall	10m Bund Wall	20m Bund Wall
P1 (3.4 km)	31	< 10	< 10	11	11
P2 (10 km)	25	< 10	< 10	< 10	< 10
P3 (7.9 km)	27	< 10	< 10	< 10	< 10
P4 (12.4 km)	27	< 10	< 10	< 10	< 10
P5 (10.5 km)	25	< 10	< 10	13	14
P6 (7.2 km)	28	< 10	< 10	< 10	< 10
P7 (7.0 km)	30	12	12	17	17

It is noted that the predicted noise levels in **Table 5** from the operations of the onshore dredge pump also comply with the sleep disturbance criteria of 50 dBA L_{Amax}(external).

4 Noise Mitigation

Based on predicted noise levels shown in **Table 4** and **Table 5**, no noise mitigation measures would be required for noise emission from the dredge disposal site.

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If you have any queries regarding this assessment, please do not hesitate to contact me on (07) 3858 4800 or email glyn.cowie@heggies.com.

Yours sincerely

Glyn Cowie
PROJECT CONSULTANT