18 June 2007

Gunns Limited
PO Box 572
Launceston Tasmania 7250

Our ref: 41/16384/359673
Your ref:

Attn: Calton Frame

Dear Calton

**Bell Bay Pulp Mill**
**Response to DTAE Questions of 18th June**

Please find below responses to the queries (from Stewart Johnston) received this morning from Richard Fawkes.

Please note that it is not possible to provide the full level of detail sought within the timeframe, as acknowledged by Stewart. However, answers to all questions other than the last have been provided.

Yours faithfully
GHD Pty Ltd

**Ross Fryar**
Manager Waterways and Coastal
07 3316 3619

# 1 Concurrency and Use of Data for Model Calibration / Verification

## 1.1 Overview

Three datasets were used in validating the model. These comprised:

- Measured and predicted tidal elevations at several locations;
- Measured currents throughout Bass Strait (but all for different times), and
- Measured tide levels and currents at the outfall site covering part of Nov / Dec 2005.

The most detailed explanation is provided in Sections 4.6 and 4.7 (i.e. pp 30 to 39) of the July 2006 report. Results were presented in Appendix D of that report.

## 1.2 Verification Process - Tides

The adopted period of simulation for the hydrodynamic modelling effort was April 2005. Calibration was initially undertaken to tide levels for this period, and subsequently for the Nov / Dec 2005 period. For the April 2005 period, predicted vs measured tides were compared at George Town, Three Hummocks, Devonport, and Burnie. Reference can be made to Figures D5 to D8.

Figure D9 then highlights the comparison of predicted vs measured tides at the outfall site for a 5 day period from Nov 22 to Nov 25, with an excellent match achieved. Since this was done after much of the modelling exercise, it was deemed a validation rather than a calibration.

## 1.3 Verification Process - Currents

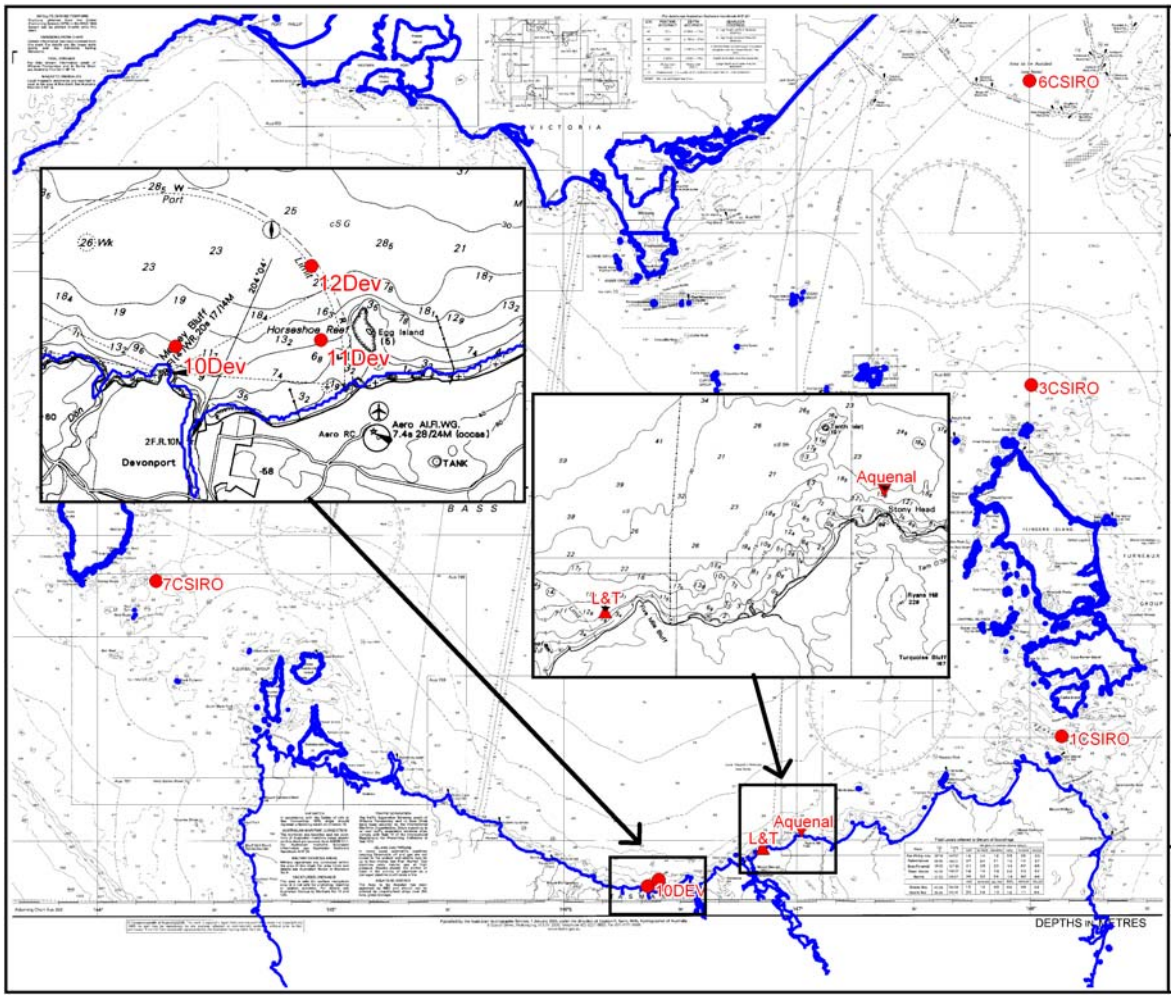
The July 2006 report states that whilst calibration to tide levels for April 2005 was achieved, no concurrent data pertaining to currents was available at the time the model was first created. For this reason, a model verification process was adopted using measured currents from a number of locations throughout Bass Strait. Figure 4.3 from the July 2006 report is reproduced below. This illustrates locations where current data was available.

Table 9 from the July 2006 report (reproduced below) highlights the dataset originally used for model verification.

| Site | Provider/dataset | Survey period | Modelled period | Figure reference |
|---|---|---|---|---|
| Devonport | CSIRO/MDEV-91 | 17th March 1992 to 03rd July 1992 | April 2005 | D-16, Appendix D |
| Eastern and western entrance of Bass Strait | CSIRO/M-BASS-CS91 | January to May 1991 | April 2005 | D-17, Appendix D |
| Stoney Head | Aquenal Pty Ltd | 14th November | April 2005 | D-19, Appendix D |

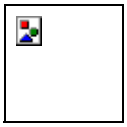
| Site | Provider/dataset | Survey period | Modelled period | Figure reference |
|---|---|---|---|---|
| | | to 29th December 2001 | | |
| Five Mile Bluff | L&T Pty Ltd | 8th December 1995 to 27th March 1996 | April 2005 | D-20, Appendix D |

Given that all datasets came from different times, a statistical analysis was employed in order to verify the model performance. That is, a statistical representation of current magnitude and direction for each location was compared to model results for the same location. Good matches were achieved.



Appendix A

# Request for Information



**15/06/2007 06:23 PM**

Hi Calton

As discussed, below are some specific queries relating to hydrodynamic modelling for which a response is requested by 3pm Monday. I apologise for the limited time available to prepare a response.

Could you please provide a response to each of the dot points below. Some I expect can be readily addressed, while others may not be able to be satisfactorily dealt with in the timeframe.

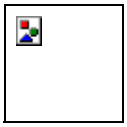
Can you please provide whatever is achievable in the time available.

With thanks

Stewart

## Hydrodynamic modelling queries

1. The data set that has been used in the model calibration of the model is not readily described in the reports. It is unclear whether historical non concurrent data have been used or whether data from the field campaign in December 2005 has been used. Clarification is requested.
2. In the model calibration section, choices are made concerning coefficients for turbulence parameterisation and bottom roughness. An explanation of the calibration is requested. Reference to literature or previous experience may support the choices made.
3. Please provide a description of how the wind stress parameterisation has been formulated and the time step chosen for the computations.
4. A number of convincing proofs of the models capability to accurately describe the circulation in the Bass Strait are presented in the model verification section. The local scale computational grid is, however, changed into a higher resolution during the progress of the project. A supplementary validation for some location in the modified grid (D-grid) is requested. It is acknowledged that this may not be achievable in the timeframe.
5. Clarification is requested as to whether the water quality model with 3 hours time step has been used in the computations of the 60 days long simulation period, or if the hydrodynamic model (presumably with much shorter time step) has been used directly for the far field dilution computations.
6. Please explain the method by which the effluent is introduced into the far field model in greater detail.
7. Clarification is requested on how the uncertainties identified in the reports concerning:
   - effect from wind, acting on the surface plume,
   - interaction from neighbouring plumes,
   - far-field build up of concentrations,



have been accounted for, discarded or incorporated.

8. Confirmation and/or evidence is requested that the far field build up of concentrations in the area is accurately described and that a steady state is reached within the 60 days simulation period.
9. To certify that the vertical grid resolution adopted is sufficient to avoid exaggerated numerical diffusion, a sensitivity analysis comparing the vertical dilution under the numerical scheme used in the analysis, to solutions obtained with alternative numerical schemes is requested. It is acknowledged that this may not be achievable in the timeframe.

Stewart Johnson

Section Head - Major Projects

Environment Division

Department of Tourism, Arts and the Environment