

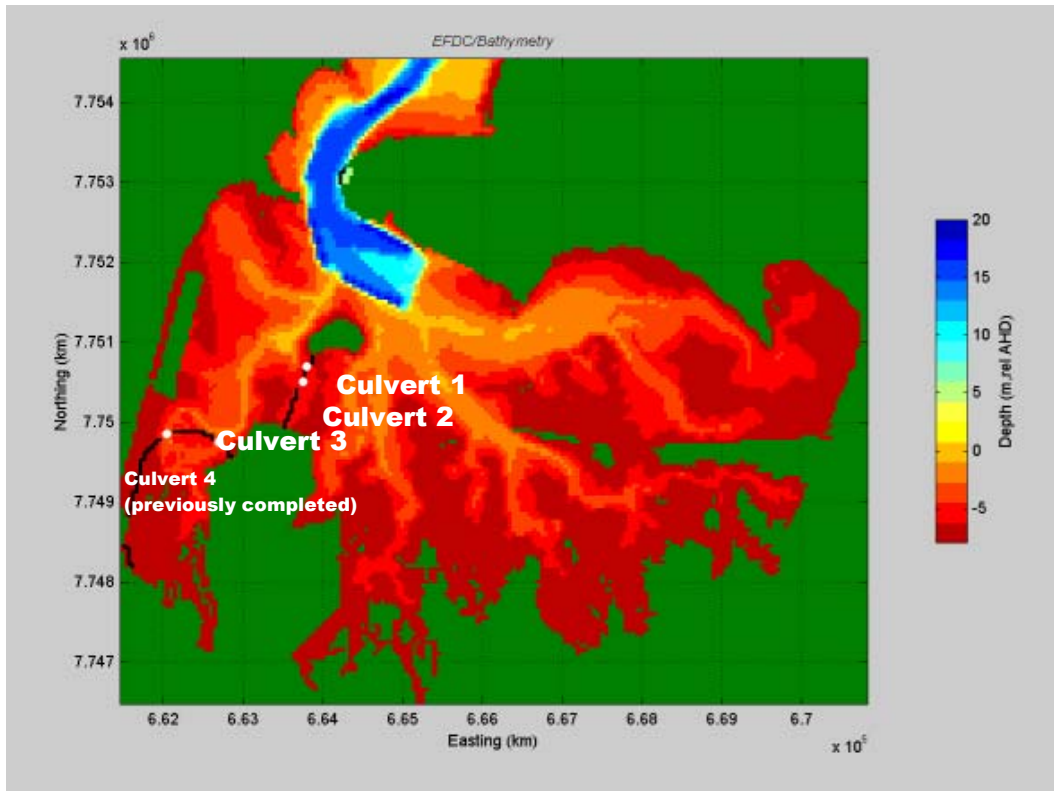


DATE	15 June 2004	PROJ NO	302/07286
TO	Graham Stafford/Ed Heyting	FAX NO	9266 0188
COMPANY	Fortescue Metals Group	PAGES	2
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FROM	Murray Burling	FILE LOC	.1.1
SUBJECT	Culverts 1-3 Concept Design - CTR 001	PRIORITY	Regular

Graham/Ed,

Culverts 1-3 Concept Design - CTR 001

In response to your request we have completed analysis of likely culvert design requirements for the remaining three culverts located in the diagram below.





Worley

Analysis included:

- Estimating flow in tidal creeks
- Examining different phases of the tide
- Calculating size and number of culverts required to maintain such flow in creeks and minimise impact to tidal inundation of mangroves.
- No allowance was made for overland flood flow

The findings of our analysis are as follows:

- 3 culverts are required with size 3600 x 3600 for Culverts 1, 2 and 3
- Scour protection will be required on either side of the culverts in the creek bed of the order of 10-20m upstream and downstream. A concrete block mattress should be sufficient. Scour protection requirements would be lessened by allowing for additional culverts.
- Scour protection is also required on the causeway banks when in the tidal zone, rubble should be sufficient for this. Design will be required to define rock sizes, stable slopes etc.

This is only a concept design and must be checked in detailed design. We also recommend a detailed survey of the creek bed; both a longitudinal survey and sections upstream, downstream and at the causeway crossing. A detailed surface hydrological assessment should also be undertaken.

We will now implement the culverts in the numerical model for use in the environmental assessment.

Please contact me on 9278 8232 if you have any queries

Yours faithfully

Murray Burling

Manager Coastal, Ocean & Simulation