BMT WBM Pty Ltd
Level 8, 200 Creek Street
Brisbane Qld 4000
Australia
PO Box 203, Spring Hill 4004

Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421

www.bmtwbm.com.au

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9 March 2016

NRM North
2/63-65 Cameron St
Launceston
TAS 7250

Attention: Amanda Locatelli

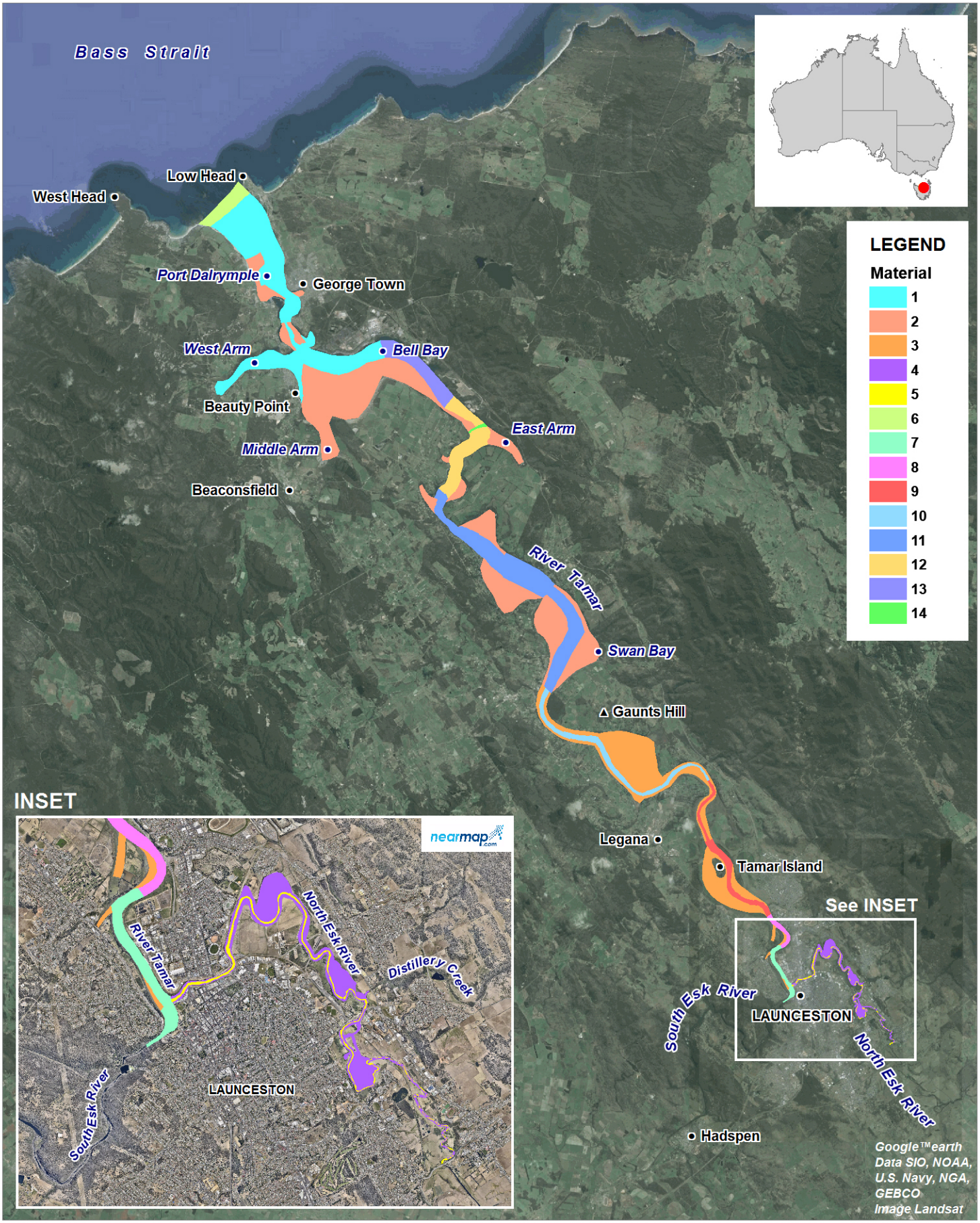
Dear Amanda

RE: 3D TAMAR ESTUARY WATER QUALITY CALIBRATION MODEL - SEDIMENT FLUXES

We wish to clarify a technical matter with regard to the above. Specifically, it has come to our attention that there is a belief (not within NRM) that only one sediment nutrient and oxygen flux rate was used across the entire Tamar estuary model during its calibration. That is to say, there is a belief that there is no spatial differentiation between sediment types and their corresponding fluxes in the calibration model, and that uniform fluxes were applied everywhere within the calibrated ('base case') model.

This belief is incorrect. In fact, there were a total of 14 different sediment zones applied across the calibration model, each with their own flux properties. The spatial distribution of these zones is presented in Figure 1, and the zones are colour coded to the numeric key. It is evident from the figure that, for example, different sediment zones (and hence flux rates) were applied in deeper water coarse sediment zones compared to shallow muddier intertidal zones. Clear differentiation of the sediment characteristics of the channel and intertidal areas in the North Esk, for example, is also evident. Doing so is consistent with industry best practise.

In order to support implementation of spatially distributed sediment flux zones across the model, our modelling team undertook a literature review of actual (measured) estuarine sediment flux rates so that the modelled sediment zones could be appropriately populated. Table 1 presents the outcomes of that literature review (as minimums and maximums), together with the rates adopted by our modelling team, for comparison purposes. The table demonstrates that the fluxes adopted in development of the 3D Tamar estuary model are consistent with the literature. Table 2 presents the complete suite of sediment flux parameters used in the model across all 14 zones.



Title:

Material Distribution

Figure: 1

Rev: A

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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0km 5 10
Scale - Main Map

0km 2 4
Scale - Inset

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Table 1 Literature and model sediment fluxes (maximums and minimums, mmol/m^2/d)

Reference	Fsed_oxgen		Fsed_ammonia		Fsed_nitrate		Fsed_phosphate	
	Min	Max	Min	Max	Min	Max	Min	Max
AED2 Manual	-79	-48	5	25	-7.2	7.1	0	4
Chesapeake Bay[1]			0.14	3.92			-0.096	0.96
Narrangansett Bay[2]			-0.014	1.26			-0.224	0.992
Neuse and South Rivers[3]			0	2.1			-0.192	1.088
Potomac Estuary[4]			-0.56	5.04			-0.608	3.968
Patuxent Estuary[5]			-0.49	7.42			0.032	7.04
Tamar Estuary 3d Model	-40	0	0.3	15	0.001	6	0	0.001

Table 2 Adopted sediment fluxes (mmol/m^2/d)

Material Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Fsed_oxy	-40	0	-10.0	-40.0	-70.0	000.0	0	-20.0	-30.0	-30.0	-10.0	-10	-20	-20
Fsed_rsi	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fsed_amm	0.5	2.5	2.5	3	0.3	0.3	15	15	15	3	1.8	1.75	1.5	1.5
Fsed_nit	0.001	1.5	2.5	2.5	0.3	0.3	1	1	4	6	6	5	5	5
Fsed_frp	0	0	0	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001
Fsed_pon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fsed_don	0.55	0.55	0.5	1	0.75	0.75	0.5	0.5	1	0.5	0.05	0.05	0.05	0.05
Fsed_pop	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fsed_poc	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fsed_doc	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fsed_dic	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Please let me know if you need anything further. I will be happy to assist.

Yours Faithfully
BMT WBM

Dr Michael Barry
Senior Principal
Technology and Innovation Manager