Particle modelling of pollutant dispersion from the new Kwun Tong nullah – Scenario 1C

1 A 2D particle model is used to model the pollutant dilution and dispersion in Victoria Harbour near the outfall of the new Kwun Tong Nullah. A conservative pollutant, i.e. without the incorporation of decay factor, is discharged at the outfall at an arbitrary rate of 1 kg s^{-1} (equivalent to a pollution load of 86,400 kg day^{-1}). Tidal current will then convey the pollutants and diluting it in the surrounding water. The mean pollutant elevation in Victoria Harbour due to the discharge of the new Kwun Tong nullah is shown in Figures 4A.1–4A.4.

2 From the particle model result, the depth averaged pollutant elevation is reduced rapidly from the maximum of 57 mgL^{-1} down to 5 mgL^{-1}, i.e. more than 10 times dilution, within approximately 500m from the outfall (Figures 4A.1–4A.2). The top 5m layer averaged pollutant elevation revealed a similar trend (Figures 4A.3–4A.4). In particular, the pollutant elevation under the proposed concrete decking at the mouth of YTB is 15 – 20 mgL^{-1} and less than 5 mgL^{-1} in Victoria Harbour. The maximum pollutant elevations at the potentially reprovisioned Cha Kwo Ling (NCKLSPS) and Yau Tong (NYTSPS) Saltwater Pumping Stations are 24.6 mgL^{-1} and 11 mgL^{-1} respectively.

3 In order to estimate the actual increase in biochemical oxygen demand (BOD_5), SS, Ammoniacal Nitrogen and *E. Coli.*, the ratio between the actual pollution loads of each pollutant and the assumed load of 86,400 kg day^{-1} is calculated. By assuming the same ratio between the actual and the modelled pollutant elevations in the neighbouring water, the actual pollutant elevation in Victoria Harbour can be estimated.

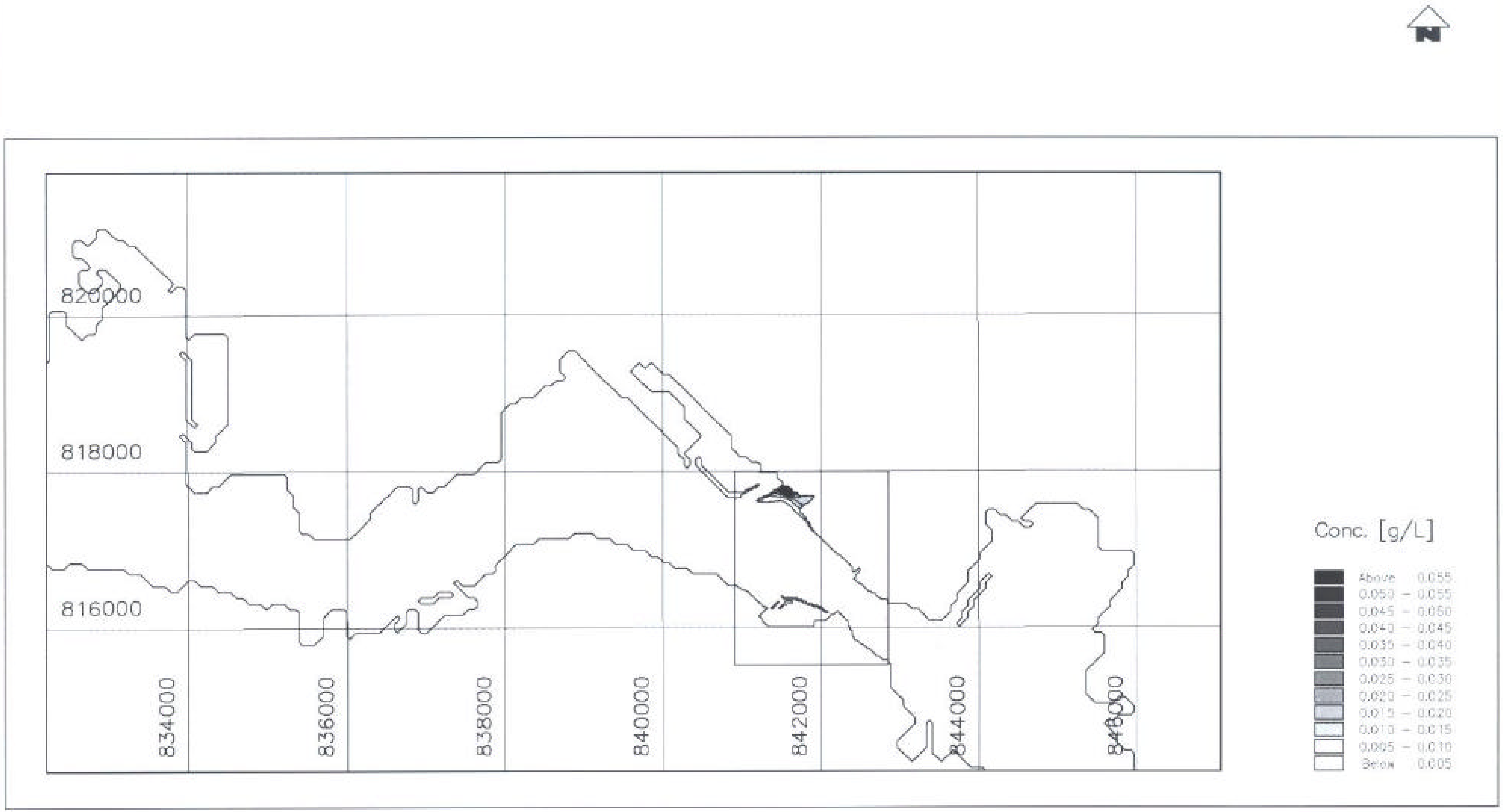
4 With reference to the modelled pollutant elevation and the effective loading at the new Kwun Tong Nullah outfall, the predicted increase in BOD_5, SS, Ammoniacal Nitrogen and *E. Coli.* are shown in Table 4A.1.

Table 4A.1 Estimated Pollutant Elevation due to the New Kwun Tong Nullah Discharge

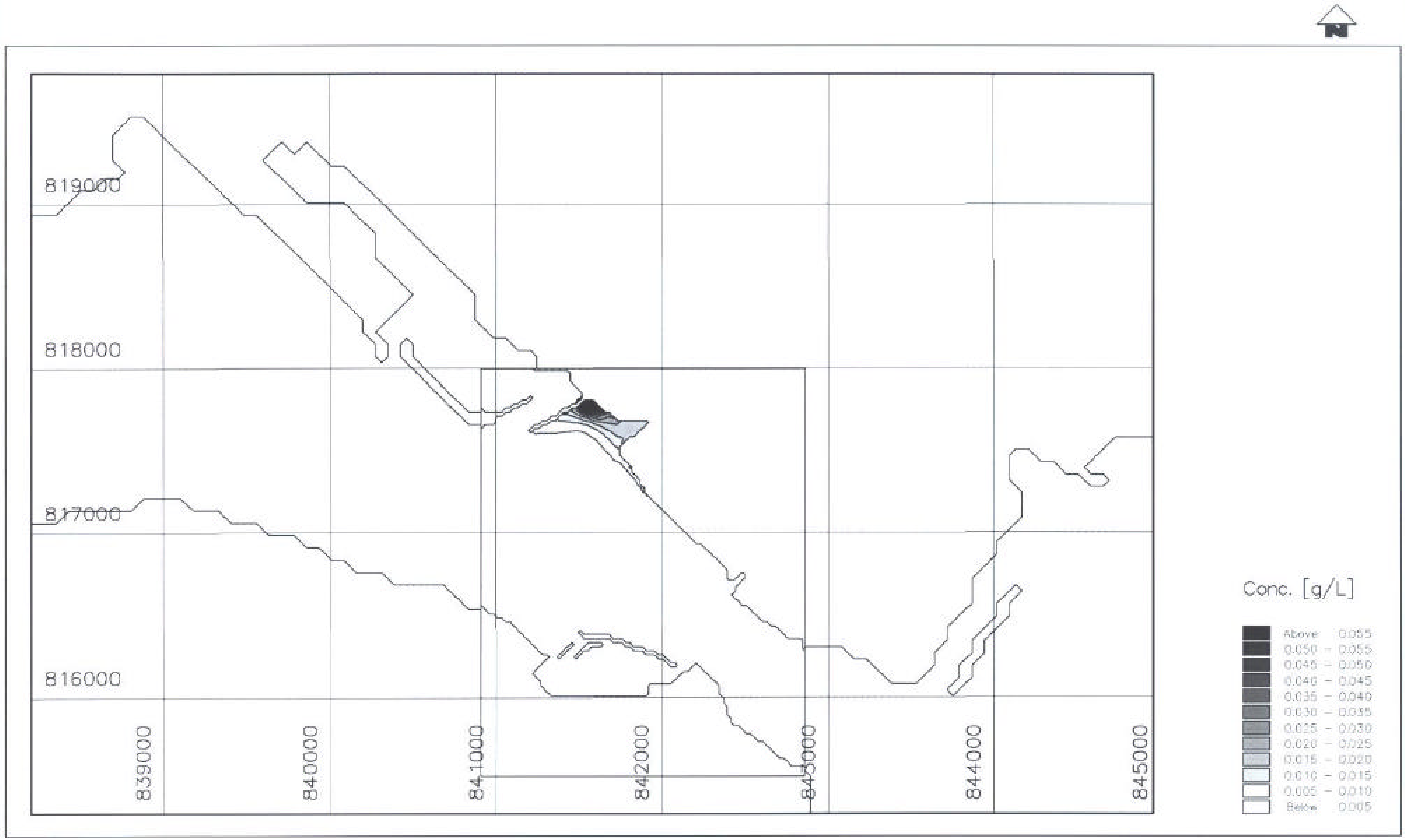
Modelled Pollutant Elevation (1) [mgL^{-1}]	BOD_5 (2) [mgL^{-1}]	SS (2) [mgL^{-1}]	Ammoniacal Nitrogen (2) [mgL^{-1}]	*E. Coli.* (2) [count per 100mL]
5	0	0.14	6.71×10^{-4}	11
10	0.01	0.28	1.34×10^{-3}	21
15	0.01	0.42	2.01×10^{-3}	32
20	0.01	0.56	2.68×10^{-3}	43
55	0.04	1.53	7.38×10^{-3}	118

Note:
1. Modelled pollutant elevation corresponds to an arbitrary pollutant discharge rate of 1 kg s^{-1} (86400 kg day^{-1}) at the outfall of the new Kwun Tong nullah.
2. Calculations were based on the effective loading at the outfall of the new Kwun Tong nullahas shown in Table 4.12, assuming 5% residual flows remain from expedient connections.
3. The results presented are based on the Full Reclamation option for YTB.

5 The distribution of averaged pollutant age in Victoria Harbour are shown in Figures 4A.5 to 4A.8. The result showed that the pollutants, discharging from the new Kwun Tong nullah outfall, will take an average time of 2 to 4 hours to be conveyed to and flushed out of the proposed concrete decking at YTB and into Victoria Harbour. This suggests that tidal flushing prevents the accumulation of pollutants under the decking and thus, unacceptable water quality is not expected.



Maunsell In association with WHA, DLN, EHS, MEMCL, MGS	YAU TONG BAY DEVELOPMENT ENVIRONMENTAL IMPACT ASSESSMENT STUDY IMPACT OF THE NEW KWUN TONG NULLAH (SCENARIO 1C), DEPTH AVERAGED POLLUTANT CONCENTRATION IN DRY SEASON, SPRING AND NEAP TIDES	MAIN WEALTH DEVELOPMENT LIMITED Scale: AS SHOWN Date: JUNE 99 Figure No. 4A.1



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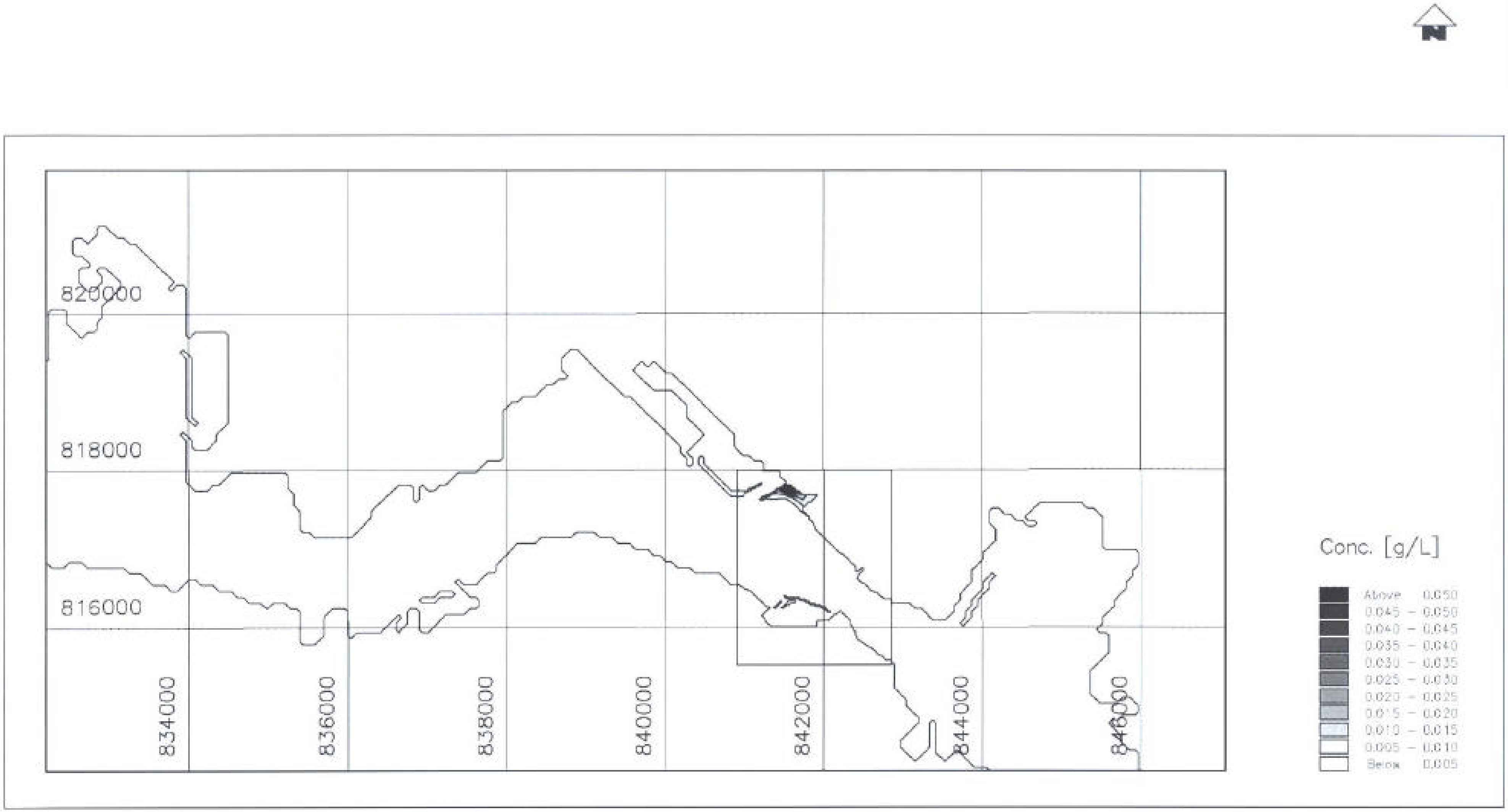
YAU TONG BAY DEVELOPMENT
ENVIRONMENTAL IMPACT ASSESSMENT STUDY

IMPACT OF THE NEW KWUN TONG NULLAH (SCENARIO 1C), DEPTH AVERAGED POLLUTANT CONCENTRATION IN DRY SEASON, SPRING AND NEAP TIDES (ENLARGED)

MAIN WEALTH DEVELOPMENT LIMITED	
Scale: AS SHOWN	
Date: JUNE 99	Figure No. 4A.2



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YAU TONG BAY DEVELOPMENT
ENVIRONMENTAL IMPACT ASSESSMENT STUDY

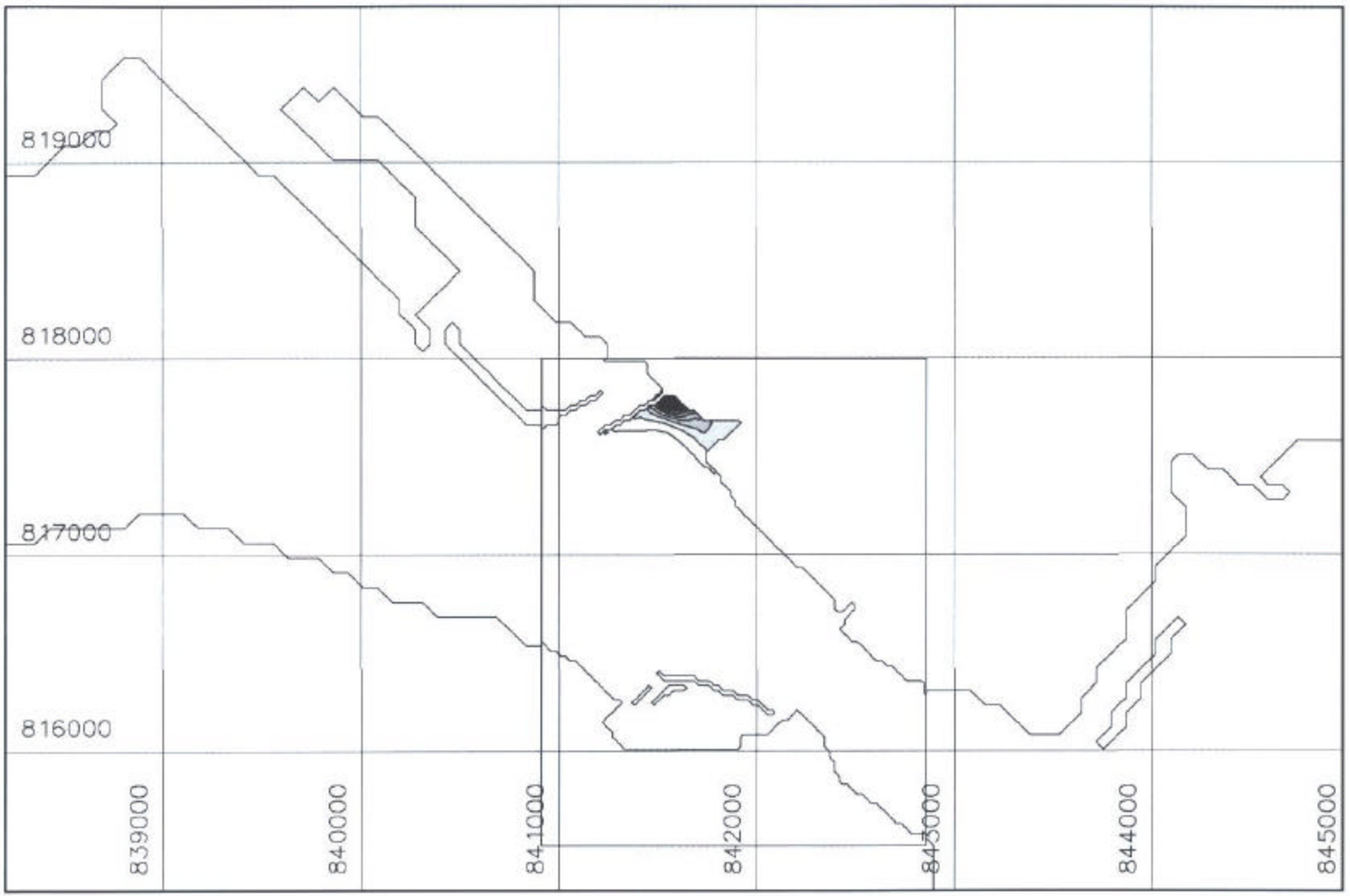
IMPACT OF THE NEW KWUN TONG NULLAH (SCENARIO 1C), TOP 5m LAYER AVERAGED POLLUTANT CONCENTRATION IN DRY SEASON, SPRING AND NEAP TIDES

MAIN WEALTH DEVELOPMENT LIMITED

Scale: AS SHOWN

Date: JUNE 99

Figure No. 4A.3



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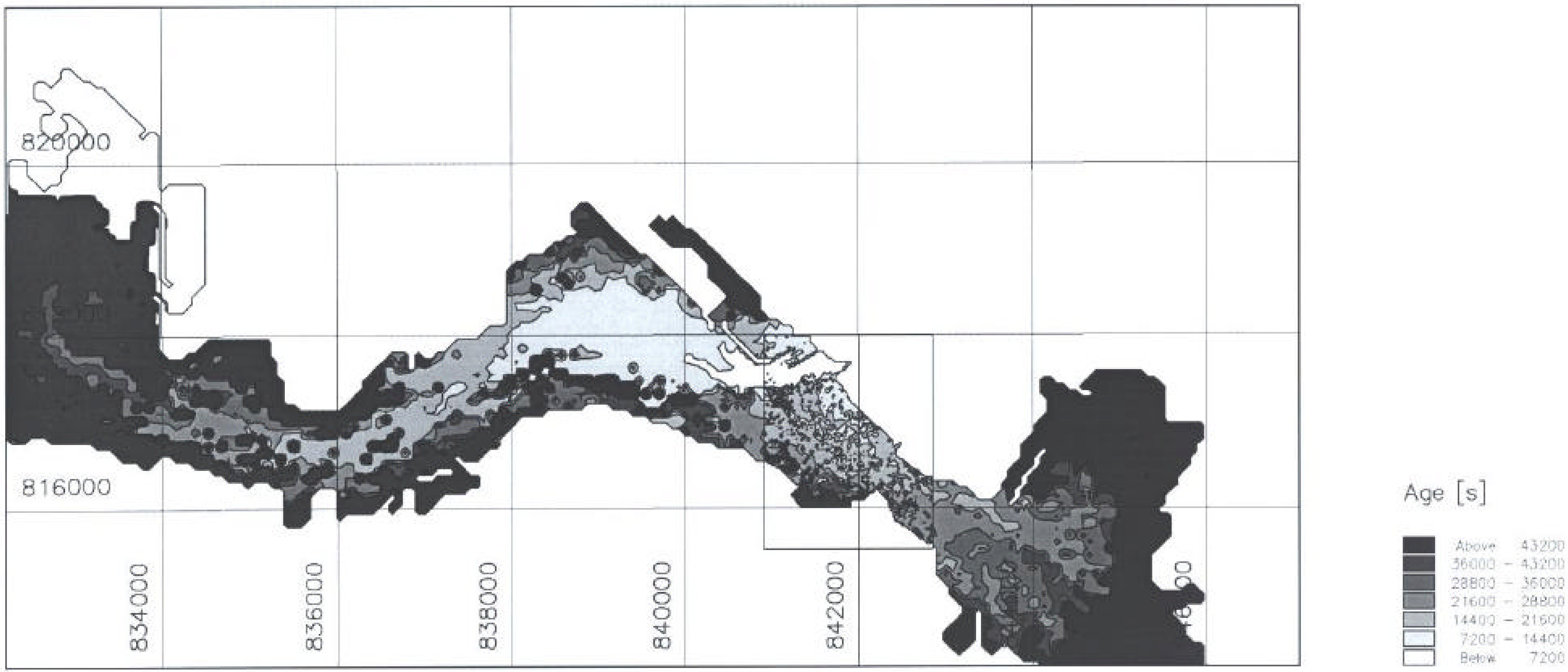
YAU TONG BAY DEVELOPMENT
ENVIRONMENTAL IMPACT ASSESSMENT STUDY

IMPACT OF THE NEW KWUN TONG NULLAH (SCENARIO 1C), TOP 5m LAYER AVERAGED POLLUTANT CONCENTRATION IN DRY SEASON, SPRING AND NEAP TIDES (ENLARGED)

MAIN WEALTH DEVELOPMENT LIMITED

Scale	Cad file
AS SHOWN	
Date	Figure No.
JUNE 99	4A.4



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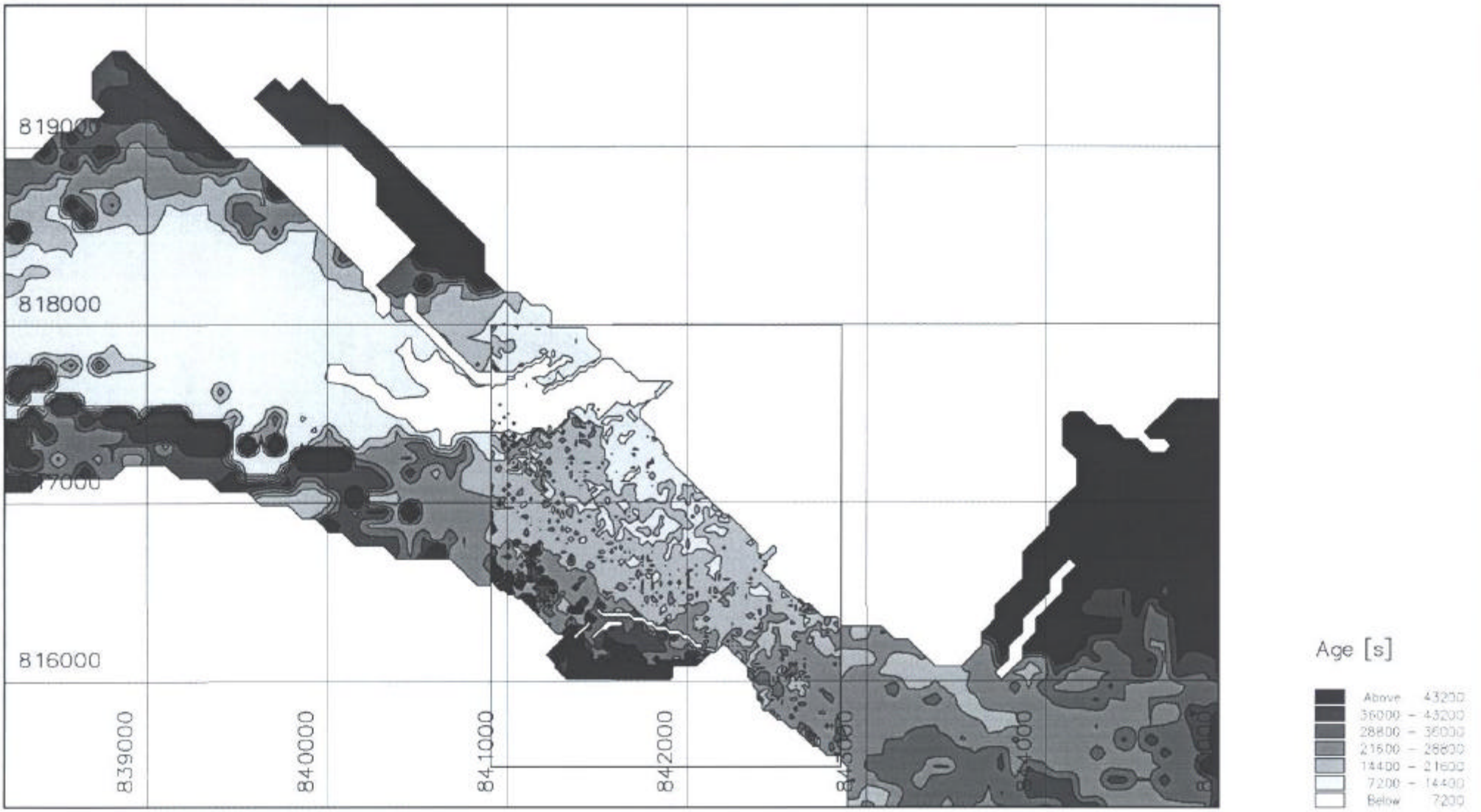
YAU TONG BAY DEVELOPMENT
ENVIRONMENTAL IMPACT ASSESSMENT STUDY

IMPACT OF THE NEW KWUN TONG NULLAH (SCENARIO 1C), DEPTH AVERAGED POLLUTANT AGE IN DRY SEASON, SPRING AND NEAP TIDES

MAIN WEALTH DEVELOPMENT LIMITED

Scale: AS SHOWN	Figure No. 4A.5
Date: JUNE 99	



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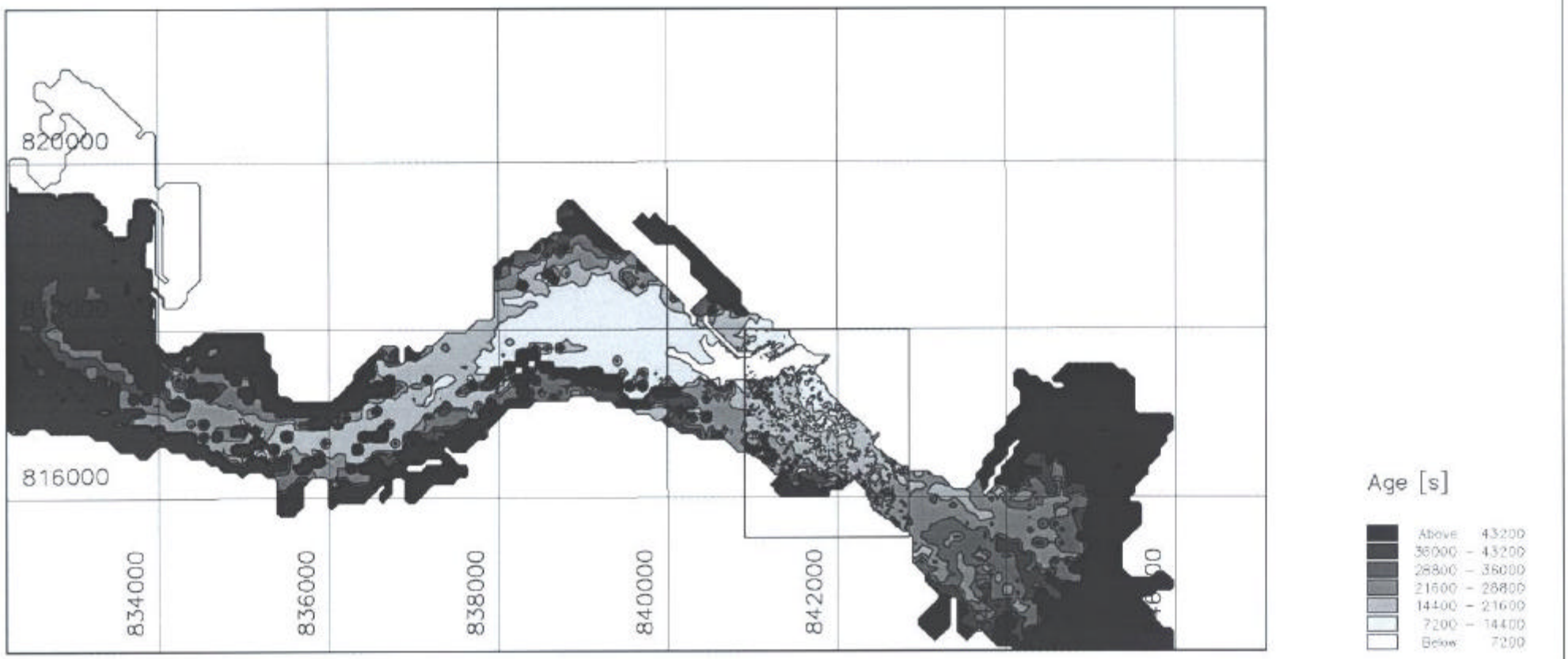
YAU TONG BAY DEVELOPMENT
ENVIRONMENTAL IMPACT ASSESSMENT STUDY

IMPACT OF THE NEW KWUN TONG NULLAH (SCENARIO 1C), DEPTH AVERAGED POLLUTANT AGE IN DRY SEASON, SPRING AND NEAP TIDES (ENLARGED)

MAIN WEALTH DEVELOPMENT LIMITED

Scale	Cad Ref.
AS SHOWN	
Date	Figure No.
JUNE 99	4A.6



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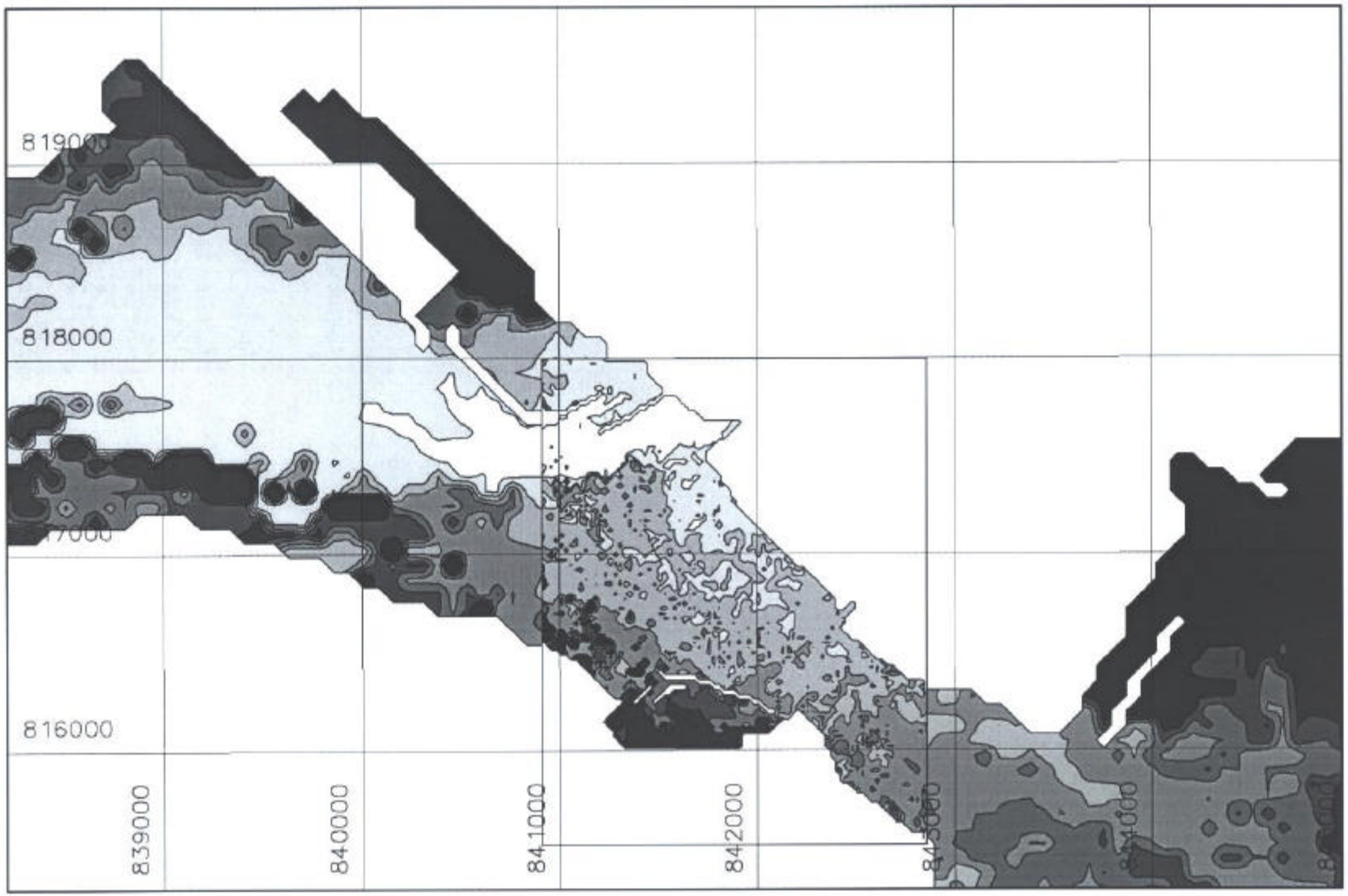
YAU TONG BAY DEVELOPMENT
ENVIRONMENTAL IMPACT ASSESSMENT STUDY

IMPACT OF THE NEW KWUN TONG NULLAH (SCENARIO 1C), TOP 5m LAYER AVERAGED POLLUTANT AGE IN DRY SEASON, SPRING AND NEAP TIDES

MAIN WEALTH DEVELOPMENT LIMITED

Scale: AS SHOWN
Date: JUNE 99
Figure No. 4A.7



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YAU TONG BAY DEVELOPMENT
ENVIRONMENTAL IMPACT ASSESSMENT STUDY

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MAIN WEALTH DEVELOPMENT LIMITED

Scale	Cad Ref.
AS SHOWN	
Date	Figure No.
JUNE 99	4A.8

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