Highways Department
Western Harbour Link Office

Agreement No. CE 27/92

ROUTE 3
COUNTRY PARK SECTION
AND TING KAU BRIDGE

PRELIMINARY DESIGN STAGE 2

Country Park Section - Ting Kau Bridge

Environmental Assessment - Supplementary Paper

WAHMO Modelling Assessment

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Ting Kau Bridge

WAHMO Modelling Assessment

Supplementary Paper

Final Report

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CHAPTER 1

1. INTRODUCTION

1.1 BACKGROUND

The construction of a replacement airport at Chek Lap Kok and of port-related facilities off north-eastern Lantau Island implies a need for several major additions to the transport infrastructure in Hong Kong. Amongst such requirements is the construction of a major road crossing between the Hong Kong mainland and Tsing Yi Island. This crossing is required to serve both the airport and the port infrastructure on Lantau, and also forms an integral part of Route 3, linking Hong Kong to the PRC. Government has concluded that the most appropriate crossing involves a bridge, this extending from Ting Kau on the mainland to Tsing Yi, and thence to Lantau and also Kwai Chung and West Kowloon.

Concerns exist, however, that the presence of a bridge in this location might affect the hydraulics and water quality in the Rambler Channel, or at the beaches in the Study Area (several of which are of gazetted status). Such effects could arise from impacts of the bridge piers or of a proposed breakwater to the north-west of the Rambler Channel, which could materially influence water flows in the Channel. This could affect water quality therein by diminishing the assimilative capacity in the area.

1.2 OBJECTIVES

To address the water quality concerns, Government commissioned Freeman Fox Maunsell Consultants to undertake computer modelling studies, with the objective of predicting and assessing the impacts of the project on hydraulics and water quality and consider the project's acceptability. The modelling requirements and scenarios etc., were agreed in advance in consultation with Highway's Department and EPD. The actual modelling was carried out by Hydraulics Research Wallingford (HRW) and the Water Research Centre (WRc) in the United Kingdom, the data output being interpreted by staff of Freeman Fox Maunsell's environmental consultants, AXIS Environmental. This report summarises and discusses the results of the water quality modelling.

THE SCENARIOS TESTED

CHAPTER 2

2. THE SCENARIOS TESTED

Four modelling runs were undertaken, as follows:

2.1 EXISTING CONDITIONS

The various WAHMO sub-models (see Section 3 below) were run to predict existing hydraulics and water quality in the Study Area (Figure 1). The coastline included in these runs was taken to be that existing at 1990, with no allowance for committed or possible future reclamations (as in the Baseline Conditions; see below) and only a partially completed area for Container Terminal 7 (as was the case in 1990).

2.2 BASELINE CONDITIONS

In the Baseline runs, the WAHMO sub-models were employed to generate predictions of hydraulics and water quality in the Study Area in the presence of committed reclamations, but without the bridge or breakwater off Ting Kau. The committed reclamations assumed in the Baseline runs included a relatively minor reclamation off north-east Lantau for the port development; the infilling of Tsuen Wan Bay; and the reclamation to provide for Container Terminals 8 and 9 off north-western Stonecutters Island (CT8) and south-eastern Tsing Yi (CT9). In addition, further reclamations outside the Study Area were assumed to exist (but are unlikely to have materially affected hydraulics or water quality in the Study Area). These include reclamations for Container Terminal 10 on north and south Lantau Island; the Central and Wanchai development; the Green Island reclamation; and all other committed reclamations as modelled in the Lantau Port and Harbour Studies (LAPH) studies.

2.3 SCENARIO 1: BASELINE RECLAMATIONS PLUS BRIDGE PIERS

This scenario involved the assumption that bridge piers would be present to support the crossing between Ting Kau and Tsing Yi Island. These piers were assumed to be placed as shown in Figure 2, and it is clear from this figure that such structures could affect water flows in the north-western entrance to Rambler Channel. It was agreed with the EPD that the modelling should seek to predict impacts from the imposition of only the large central pier shown in Figure 2, i.e. that the smaller piers anticipated to be present on the coastal fringe would not be included in the modelling (as they would be most unlikely to affect hydraulics or water quality).

2.4 SCENARIO 2: BASELINE RECLAMATIONS PLUS BRIDGE PIERS AND BREAKWATER

Scenario 2 was identical to Scenario 1, with the exception of a breakwater assumed to be present attached to the central pier, as shown in Figure 3. This breakwater would provide a degree of shelter to vessels in the northern arm of the Rambler Channel.

THE MODELLING UNDERTAKEN

CHAPTER 3

3. THE MODELLING UNDERTAKEN

3.1 THE WAHMO SUB-MODELS

Modelling studies involved the use of the current versions of the Water Quality and Hydraulic Models (WAHMO), with uprating being applied to the Study Area itself to reduce the model grid size in this region, hence permitting detailed interpretation to be undertaken on a fine geographical scale. The process therefore involved the use of the following sub-models:

- the CED 100m Grid Model: This hydraulic sub-model is restricted in geographical coverage to Victoria Harbour and its surrounds. It was derived from the 250m grid square model named TIDEFLOW-2D2L, is two-layered, and possesses a grid size of 100m square; and

- the UPRATED TING KAU HYDRAULIC MODEL: For the purpose of the present study, a portion of the CED 100m grid model was uprated to a smaller grid size, permitting more detailed hydraulic predictions to be made. Uprating in this instance was to a 50m square grid size, extending over the area shown in Figure 1.

These two hydraulic sub-models provide data on currents and residual flows, which are required as a basis for water quality modelling. They have water quality counterparts, in which pollution loads are effectively superimposed upon downloaded hydraulic data to provide predictions of water quality in the study area. The two water quality sub-models employed in the present study were as follows:

- the 100m Grid Water Quality Model: Originally developed from the 250m grid QUALFLOW-2D2L sub-model, this is also two-layered but of grid size 100m square, providing predictions for a wide variety of water quality parameters in the area of Victoria Harbour and its surrounds; and

- the UPRATED TING KAU WATER QUALITY MODEL: The water quality equivalent of the uprated hydraulic sub-model discussed above, this model provides detailed water quality predictions within the Study Area shown in Figure 1, on a 50m square grid and in two layers.

The above models were run to provide output relating to neap tides only, for both the wet and dry seasons. These conditions were considered to be likely to generate "worst case" water quality predictions in the Study Area.

3.2 POLLUTION LOADING ASSUMPTIONS

To drive the water quality sub-models, assumptions were required with respect to pollution loading in the Study Area. The pollution loading assumed in the modelling essentially drives the predictions of residual pollutant concentrations within the various water masses, having taken account of water flows (incorporating both dilution and dispersion characteristics).

On the basis of an agreement with the Environmental Protection Department, it was assumed for the present study that pollutant loads would be as calculated for 1990. Data for Existing Conditions were calibrated against actual water quality in 1990, employing monitoring data from the EPD.

The only minor change made between pollution loading for the Existing Conditions and for the Baseline Conditions or Scenarios 1 and 2 was the assumption that the Kwai Chung sewage screening plant would discharge through a Y-shaped outfall at the South Tsing Yi Bridge in the Existing Conditions, and through a non-bifurcated outfall in the other three test runs, this change is due to the location of the duplicate South Tsing Yi Bridge. It should also be noted that, as a part of the Strategic Sewage Disposal Scheme (SSDS), the effluent load from the outfall will be diverted out of the southern Rambler Channel, which should result in an improvement in the local water quality.

3.3 THE INTERPRETATION PROCESS

The interpretation of the output from the models comes in two stages. The first is the examination of the calibration and validation of the model required to give confidence in the model's ability to simulate the water quality distribution for a given effluent loading pattern and coastline. In this stage, the model results for a simulation of the existing conditions are compared with relevant observations and field data on the existing water quality. The second stage is to examine the impact on water quality of the addition of the bridge support and breakwater structures compared to the baseline reclamation scenario to which the bridge is added. The relative impact of the bridge works can then be assessed with respect to the simulation of the baseline condition rather than existing conditions. It is important to recognise that the model reacts to both the defined effluent loading pattern and reclamation layouts. In this study only the reclamation layouts were modified by the addition of Ting Kau Bridge and breakwater structures, the effluent loading pattern was unchanged for all the modelled scenarios. However, it is often the case that once the reclamation layouts are in place, the effluent loading would have changed for a number of reasons, including improvement schemes being carried out under the SSDS. As a result, the important comparisons which can be made in this study to assess the relative impacts on water quality are those between the simulated baseline case and the baseline plus bridge and breakwater cases, Scenarios 1 and 2. Comparisons between these cases and the calibration runs of the model, should only be carried with great caution and are not required for this current study.

To assist in interpretation, the WAHMO sub-models provide for two types of output on water quality. The first of these involves colour plots, which visualise water quality parameters in concentration intervals over the Study Area. The second type of output (which is often easier to interpret than the colour plots) involves concentration versus time data (CVT output) for particular selected stations. These CVT plots relate to the entire tidal cycle, and show changes in selected parameters over a full tidal cycle after the sub-models have been run to an equilibrium state.

In the present study, CVT data were preferred to colour plots as a basis for interpretation. Some 16 reference stations were selected to characterise the Study Area in terms of water quality, these being shown in Figure 1, with their coordinates listed in Table 1. The locations of these reference stations had been previously agreed with EPD. Eight of these are within the Rambler Channel, the remainder being to the west of Tsing Yi Island. Several of the reference stations were specifically selected to indicate conditions at gazetted beaches or close to fish culture zones, as these are considered particularly sensitive areas for water quality. For each of the reference stations data sets on 10 water quality parameters was provided. The water quality parameters to be modelled were previously agreed with EPD and comprised Temperature, Salinity, Dissolved Oxygen, Biochemical Oxygen Demand, Ammoniacal Nitrogen, Oxidised Nitrogen, Chlorophyll-a, *E.coli* and Suspended Solids.

The data output for the Existing and Baseline Conditions and for Scenarios 1 and 2 are reproduced in tabular form in Tables 2 to 5 (wet season, neap tides) and 6 to 9 (dry season, neap tides). CVT plots are available for these data, but are not reproduced here due to their bulk.

Interpretation:
Baseline Conditions vs. Scenarios 1 & 2

Chapter 4

4. INTERPRETATION: BASELINE CONDITIONS VERSUS SCENARIOS 1 AND 2

Comparisons of the output data in Tables 3 to 5 and 7 to 9 indicate that the impacts on water quality of either the Ting Kau Bridge piers or the proposed breakwater off Ting Kau are insignificant. None of the water quality parameters modelled shows evidence of material alteration, all changes between output values for the Baseline Conditions and for the two scenarios being less than 2% (with a few minor exceptions).

At first sight, this appears somewhat surprising however, the hydraulic data confirm such a conclusion, suggesting that the construction of the piers and breakwater has only a very minor influence on currents and residual flows in the Rambler Channel as a whole, and that any effects on currents are restricted to a very local area around the structures involved.

Tidal water flows through channels depend on a number of factors, but are principally controlled by the flows passing through the narrowest cross-section of the channel. To attempt to interpret the essential lack of change in hydraulics and water quality observed in the present studies, cross-sectional areas of the Rambler Channel have been investigated using Admiralty Charts. The results show that the Channel cross-section is at a minimum in the area of the southern Tsing Yi Bridge. This region can therefore be envisaged as exerting the major control over flows through the Channel, and any changes to cross-sectional area occurring in this region (as, for example, by marginal coastal reclamations) would certainly have a significant influence on the overall flow regimes in the Channel.

By contrast, reclamations elsewhere would exert little material impact on flows through the Channel unless they decrease the cross-sectional area of the Channel significantly and possibly to below that present at the existing "pinch point" in the region of the southern Tsing Yi Bridge. This explains the results found here, as the cross-sectional area of the Channel remaining after the construction of the bridge piers and the breakwater remains much greater than that at the "pinch point" off the southern Tsing Yi Bridge.

DISCUSSION

CHAPTER 5

5. DISCUSSION

Differences between model predictions for the Baseline Conditions and the two development Scenarios (i.e. those involving bridge piers and the breakwater off Ting Kau) are very minor and are generally insignificant, mostly less than 2%, (with one exception which is discussed below). This is considered to reflect the predominance of the channel pinch-point in the region of the southern Tsing Yi Bridge in controlling flows through the Channel, as this is the region of the Channel displaying the lowest cross-sectional area. It is therefore considered on the basis of the present modelling data that the presence of the bridge piers and the breakwater as currently proposed will have no significant impact on water quality in the Rambler Channel or the north of the Western Harbour.

One exception to this is the area around Ting Kau Bay (Stations 7 and 8) where it is predicted that the local levels of *E.coli* will change when the breakwater is in place. At Station 7 this involves a redistribution of *E.coli* from lower depths to the water surface and at Station 8 it involves an increase of some 12%. This increase is mainly due to the effluent discharge from two outfalls in the locality. The diversion and treatment of the waste water from these outfalls is to be included in the committed sewerage improvement scheme programme under the Tsuen Wan, Kwai Chung & Tsing Yi Sewerage Master Plan. However it should be noted that the earliest date for completion of the works is set at 1998, soon after the scheduled mid 1997 completion date of the Ting Kau Bridge, (although it is anticipated that if built, the breakwater will be completed upto 1 year earlier than the bridge. It is therefore considered prudent that interim measures are implemented to mitigate the local effect of the *E.coli* from these outfalls, these measures could include the diversion of flows and augmentation of the existing sewage disinfection facility.

Prior to the modelling it was anticipated that the placement of the breakwater would create an adverse impact on the water quality and hydraulics in the Study Area, however as discussed above the modelling showed that the impact on water quality and hydraulics is not significant. Consequently it was considered prudent to re-run the models to assess the sensitivity of the model results to model boundary assumptions. The second round of modelling produced slightly different results, as would be expected with the change in boundary sensitivity. However it should be noted that the differences in the results for the two sets of runs were not significant.

The insignificant differences between the results produced from the two rounds of modelling further re-enforce the conclusions given in Chapter 6.

CONCLUSIONS

CHAPTER 6

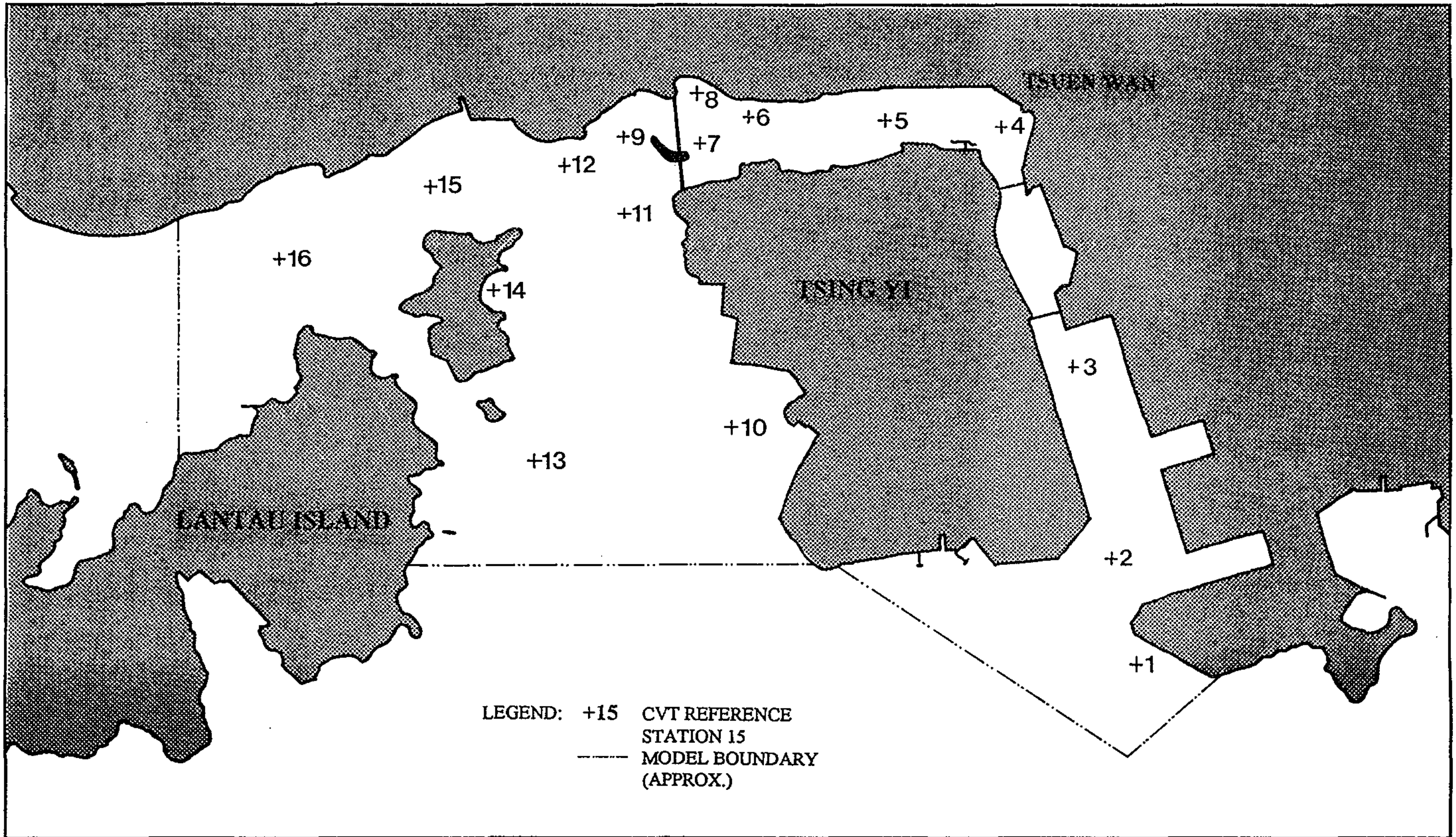
6. CONCLUSIONS

On the basis of the WAHMO Modelling the placement of bridge piers and a breakwater, separately or together, on the cental pier of the Ting Kau Bridge will not cause a significant adverse change in the water quality or hydraulic regime in the Study Area. However, some localised changes in *E.coli* concentrations near Ting Kau have been predicted. Improvement works for two local waste water outfalls are considered prudent in advance of the scheduled works as part of a Sewerage Master Plan;

No further WAHMO modelling for the Ting Kau Bridge should be necessary provided the final design of the bridge and breakwater, separately or together, and associated reclamations is not significantly different to the one used in the modelling studies. Small changes to the proposed design should not affect the acceptability, however the following are examples of when it will be necessary to carry out further water quality and hydraulic assessment testing:

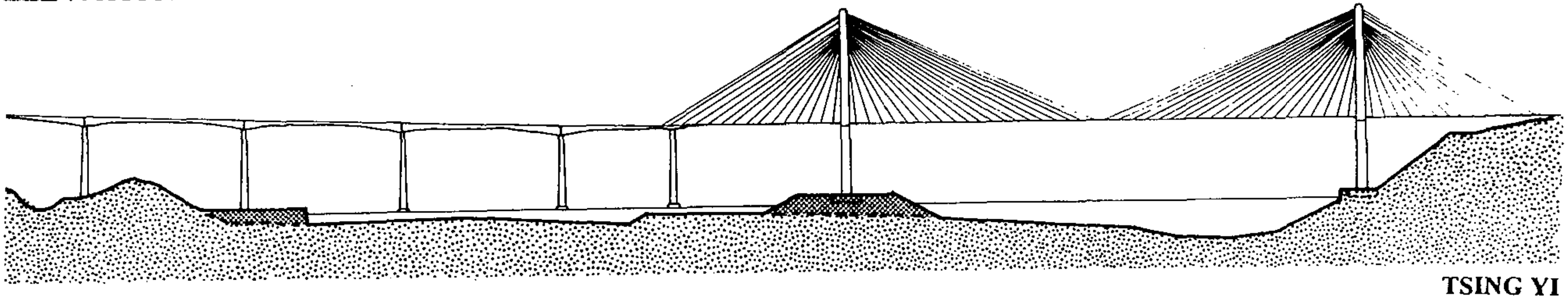
- major changes in the location of the central pier in the channel;
- increase in the size of the breakwater;
- increase in the size of the intermediate piers;
- provision of additional pier protection on the western side of the bridge; and
- reduction of the cross sectional area to (or near to) that of the existing "pinch point" in the region of the southern Tsing Yi Bridge.

FIGURES

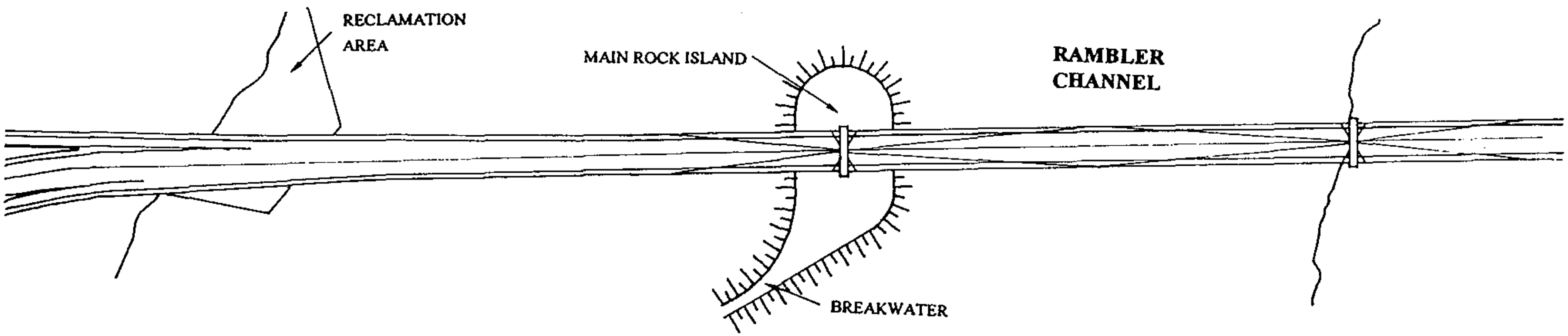


FREEMAN FOX MAUNSELL	Drg. Title : STUDY AREA; WAHMO MODEL BOUNDARY & CVT REFERENCE STATIONS	Job Title : ROUTE 3; TING KAU BRIDGE.		
		Scale : N.T.S. / Date Nov. 93	Job No. 058 004	Fig No. 1

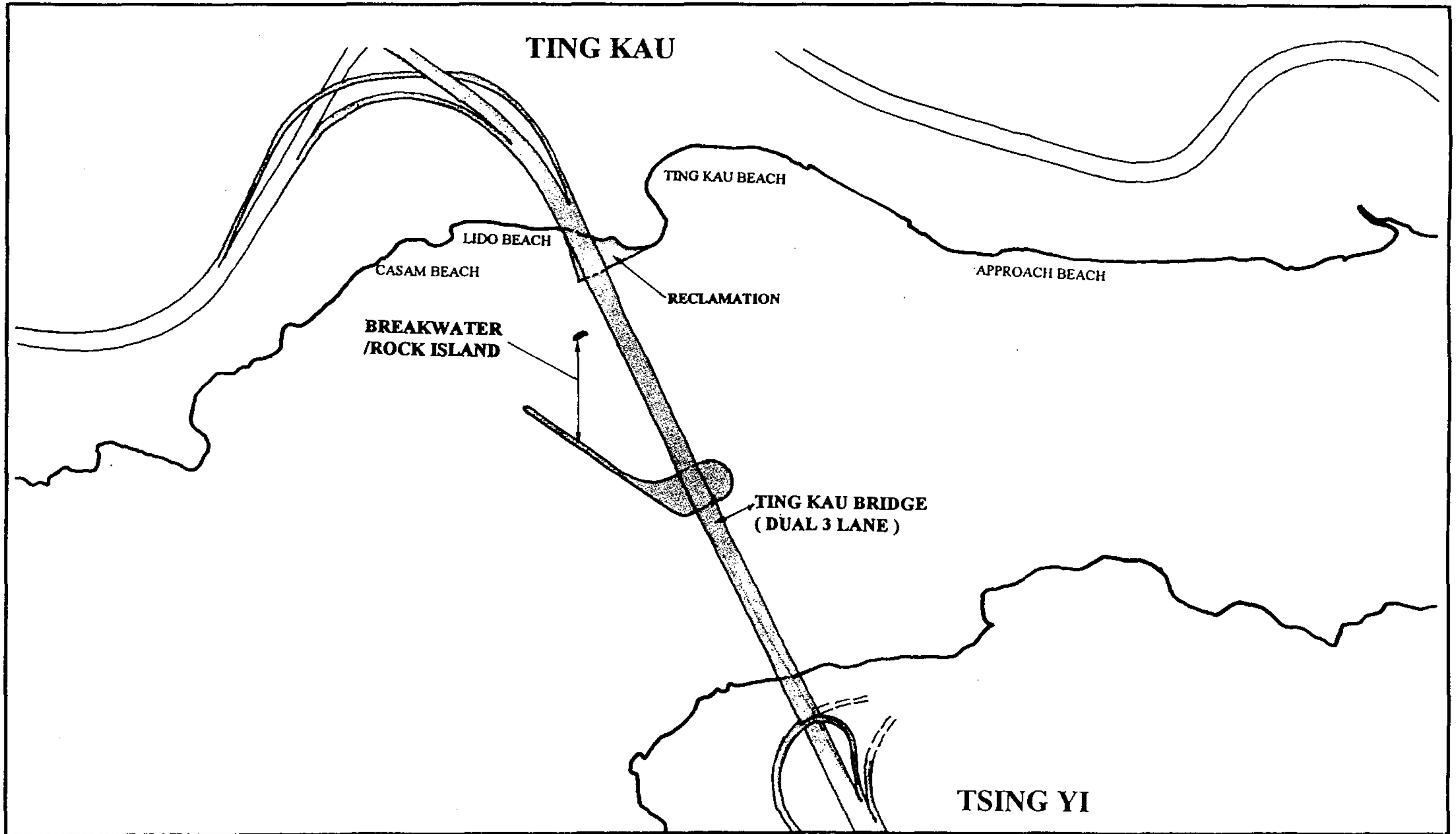
ELEVATION



PLAN



FREEMAN FOX MAUNSELL	Drg. Title : TING KAU BRIDGE; PLAN AND ELEVATION	Job Title : ROUTE 3; TING KAU BRIDGE.	
		Scale : N.T.S. / Date Nov. 93	Job No. 058 004 / Fig No. 2



FREEMAN FOX MAUNSELL	Drg. Title : TING KAU BRIDGE CENTRAL PIER & BREAKWATER	Job Title : ROUTE 3; TING KAU BRIDGE.		
		Scale : N.T.S. / Date Nov. 93	Job No. 058 004	Fig No. 3

TABLES

Table 1 CVT OUTPUT STATION COORDINATES

CVT Station Number	CVT Station Name	Coordinates (HK Metric)	
		Easting	Northing
1	South of CT 8	830700	819600
2	Midway CT8 & CT9	830280	820840
3	Tsing Yi South Bridge	830120	822840
4	East of Tseun Wan Bay	829330	825080
5	West of Tseun Wan Bay	827880	825080
6	Approach Beach	826960	825420
7	Inside TKB Breakwater	826500	825000
8	Ting Kau Bridge	826340	825480
9	Lido & Cassam Beaches	825860	825320
10	West of Tsing Yi	826460	822360
11	Outside TKB Breakwater	825600	824430
12	Gemini Beach	825220	824860
13	South Ma Wan	824900	821900
14	Ma Wan	824500	823500
15	North Ma Wan	822500	823800
16	North Lantau	823980	824580

Table 2 WET SEASON NEAP TIDES: EXISTING CASE

Station	Level	Height	Temp	Salin	DO%	BOD	Amm	OxN	OrgN	Chl	SS	*E.coli*
1	1	8.71	26.22	28.14	73.84	0.71	0.01	0.06	0.72	19.11	9.15	148
	2	3.06	26.46	28.42	59.17	0.64	0.02	0.05	0.71	18.22	7.24	237
2	1	8.84	26.46	28.37	65.73	1.39	0.07	0.10	0.73	18.41	8.24	1424
	2	3.59	26.69	28.64	53.85	0.95	0.07	0.09	0.70	16.38	5.34	2264
3	1	9.04	27.00	28.89	43.12	3.81	0.25	0.22	0.82	14.86	7.58	31943
	2	6.50	26.97	28.90	31.39	1.85	0.16	0.19	0.70	12.55	3.63	11833
4	1	9.30	27.05	28.99	48.71	2.56	0.20	0.20	0.73	11.63	5.47	15302
	2	3.41	27.05	28.99	42.27	2.30	0.08	0.21	0.72	11.28	4.49	12837
5	1	9.36	27.02	29.00	60.20	1.32	0.09	0.17	0.66	10.10	5.10	4379
	2	8.39	27.02	29.00	50.08	1.19	0.10	0.17	0.64	8.88	3.39	4749
6	1	9.39	27.01	29.00	63.41	1.00	0.06	0.15	0.66	9.60	5.54	6726
	2	2.31	27.01	29.00	55.25	0.89	0.07	0.15	0.63	8.26	4.00	3850
7	1	9.39	27.01	29.00	64.13	0.89	0.04	0.14	0.67	9.48	5.97	9341
	2	3.77	27.01	29.00	57.68	0.79	0.05	0.14	0.65	8.18	4.95	3372
8	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	[illegible]	1.
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.
9	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.
10	1	9.12	27.00	29.00	64.69	0.70	0.02	0.14	0.61	7.13	5.99	373
	2	39.02	27.00	29.00	58.26	0.63	0.02	0.15	0.54	5.02	5.00	127
11	1	9.06	27.00	29.00	63.67	0.76	0.02	0.13	0.68	9.12	6.95	1989
	2	27.29	27.00	29.00	58.93	0.70	0.02	0.14	0.62	7.37	6.21	1202
12	1	9.43	27.00	29.00	63.36	0.80	0.02	0.13	0.70	9.47	7.04	6005
	2	10.58	27.00	29.00	59.16	0.72	0.02	0.13	0.64	7.86	6.40	2359
13	1	9.13	27.00	29.00	66.21	0.68	0.02	0.14	0.60	6.85	5.79	102
	2	17.67	27.00	29.00	59.95	0.63	0.02	0.15	0.54	5.04	4.95	91
14	1	2.58	27.00	29.00	66.45	0.71	0.02	0.14	0.62	7.99	5.78	115
	2	0.00	27.00	29.00	66.45	0.71	0.02	0.14	0.62	7.99	5.78	115
15	1	9.41	27.00	29.00	66.15	0.86	0.01	0.11	0.83	13.08	9.03	335
	2	29.97	27.00	29.00	58.14	0.81	0.01	0.12	0.77	11.24	8.21	564
16	1	9.44	27.00	29.00	63.35	0.81	0.02	0.12	0.75	10.78	7.86	3954
	2	23.82	27.00	29.00	59.03	0.75	0.02	0.13	0.70	9.31	7.25	1492

Key:

Station: CVT Station Number
Level: 1 = upper layer, 2 = lower layer
Temp: Temperature °C
Salin: Salinity, PPT
DO%: Dissolved Oxygen percentage saturation
BOD: Biochemical Oxygen Demand
Amm: Ammoniacal Nitrogen
OxN: Oxidised Nitrogen
OrgN: Organic Nitrogen
Chl: Chlorophyll
SS: Suspended Solids
E.coli: Escherichia coli

Table 3 WET SEASON NEAP TIDES: BASELINE

Station	Level	Height	Temp	Salin	DO%	BOD	Amm	OxN	OrgN	Chl	SS	*E.coli*
1	1	8.71	26.34	28.27	70.19	0.75	0.02	0.06	0.71	18.92	9.17	160
	2	3.06	26.53	28.49	64.98	0.71	0.02	0.06	0.71	18.34	8.39	322
2	1	8.84	26.76	28.68	53.64	2.00	0.11	0.15	0.74	17.61	8.62	2154
	2	7.51	26.91	28.86	41.13	1.20	0.10	0.14	0.66	14.48	5.04	3223
3	1	9.04	27.11	28.98	24.62	4.76	0.33	0.29	0.84	13.56	7.72	38207
	2	6.50	27.00	29.00	11.05	2.63	0.22	0.26	0.70	11.24	4.02	16023
4	1	9.30	27.07	29.00	45.03	2.86	0.23	0.23	0.75	12.01	5.13	15930
	2	3.41	27.06	29.00	39.38	2.32	0.20	0.23	0.71	11.14	3.85	11737
5	1	9.35	27.02	29.00	60.53	1.36	0.10	0.17	0.66	10.78	4.50	3240
	2	8.39	27.02	29.00	54.38	1.11	0.09	0.17	0.64	9.34	3.32	3452
6	1	9.38	27.00	29.00	64.44	0.96	0.06	0.15	0.65	10.01	5.03	5349
	2	2.31	27.00	29.00	57.48	0.86	0.06	0.15	0.64	8.66	4.05	3221
7	1	9.38	27.00	29.00	64.67	0.87	0.04	0.14	0.66	9.72	5.60	9209
	2	3.77	27.00	29.00	58.24	0.77	0.05	0.14	0.65	8.32	4.88	3052
8	1	4.10	27.00	29.00	65.83	0.89	0.05	0.14	0.66	9.88	5.22	15609
	2	0.00	27.00	29.00	65.83	0.89	0.05	0.14	0.66	9.88	5.22	15609
9	1	9.43	27.00	29.00	64.66	0.81	0.04	0.14	0.66	9.29	5.88	8083
	2	4.94	27.00	29.00	59.35	0.75	0.04	0.13	0.65	8.30	5.36	5111
10	1	9.12	27.00	29.00	64.77	0.70	0.02	0.14	0.62	7.38	6.08	420
	2	39.02	27.00	29.00	57.99	0.63	0.02	0.15	0.54	5.09	5.04	153
11	1	9.36	27.00	29.00	63.32	0.77	0.02	0.13	0.69	9.29	6.99	2086
	2	27.29	27.00	29.00	58.47	0.70	0.03	0.14	0.63	7.40	6.19	1260
12	1	9.42	27.00	29.00	62.81	0.79	0.03	0.13	0.69	9.49	6.94	5527
	2	10.58	27.00	29.00	59.20	0.73	0.03	0.13	0.66	8.19	6.41	3081
13	1	9.13	27.00	29.00	66.24	0.68	0.02	0.14	0.59	6.75	5.71	105
	2	17.67	27.00	29.00	57.51	0.63	0.02	0.15	0.54	5.06	4.95	92
14	1	2.58	27.00	29.00	67.23	0.71	0.02	0.14	0.62	7.98	5.69	95
	2	0.00	27.00	29.00	67.23	0.71	0.02	0.14	0.62	7.98	5.69	95
15	1	9.41	27.00	29.00	66.41	0.86	0.01	0.11	0.83	13.11	9.03	320
	2	29.97	27.00	29.00	57.95	0.80	0.01	0.12	0.77	11.21	8.18	576
16	1	9.44	27.00	29.00	63.51	0.81	0.02	0.12	0.75	10.93	7.90	3235
	2	23.82	27.00	29.00	58.70	0.75	0.02	0.13	0.69	9.17	7.16	1550

Key:
- Station: CVT Station Number
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- Temp: Temperature °C
- Salin: Salinity, PPT
- DO%: Dissolved Oxygen percentage saturation
- BOD: Biochemical Oxygen Demand
- Amm: Ammoniacal Nitrogen
- OxN: Oxidised Nitrogen
- OrgN: Organic Nitrogen
- Chl: Chlorophyll
- SS: Suspended Solids
- *E.coli:* Escherichia coli

Table 4 WET SEASON NEAP TIDES: SCENARIO 1 (WITH BRIDGE AND NO BREAKWATER)

Station	Level	Height	Temp	Salin	DO%	BOD	Amm	OxN	OrgN	Chl	SS	*E.coli*
1	1	8.71	26.34	28.27	70.20	0.75	0.02	0.06	0.71	18.92	9.17	160
	2	3.06	26.53	28.49	64.98	0.71	0.02	0.06	0.71	18.34	8.39	322
2	1	8.84	26.76	28.68	53.73	2.00	0.11	0.15	0.74	17.63	8.62	2152
	2	7.51	26.91	28.86	41.14	1.20	0.10	0.14	0.66	14.48	5.04	3113
3	1	9.04	27.11	28.98	24.81	4.76	0.33	0.29	0.84	13.59	7.71	38229
	2	6.50	27.08	28.98	11.96	2.63	0.22	0.26	0.69	11.25	4.02	16032
4	1	9.30	27.07	29.00	45.26	2.87	0.23	0.23	0.74	12.05	5.10	15953
	2	3.41	27.06	29.00	39.49	2.33	0.20	0.23	0.71	11.19	3.83	11772
5	1	9.35	27.02	29.00	60.71	1.37	0.10	0.17	0.66	10.83	4.46	3298
	2	8.39	27.02	29.00	54.19	1.11	0.09	0.17	0.64	9.34	3.26	3527
6	1	9.38	27.01	29.00	64.71	0.97	0.06	0.15	0.65	10.03	4.98	5531
	2	2.31	27.02	29.00	57.02	0.85	0.06	0.15	0.64	8.60	3.96	3222
7	1	9.38	27.01	29.00	65.02	0.88	0.05	0.14	0.66	9.73	5.54	9580
	2	3.77	27.00	29.00	57.73	0.76	0.05	0.14	0.64	8.25	4.82	2962
8	1	4.10	27.01	29.00	66.26	0.90	0.05	0.14	0.66	9.88	5.18	15855
	2	0.00	27.01	29.00	66.26	0.90	0.05	0.14	0.66	9.88	5.18	15855
9	1	9.43	27.00	29.00	64.85	0.82	0.04	0.14	0.66	9.29	5.92	7455
	2	4.94	27.00	29.00	59.06	0.74	0.04	0.13	0.65	8.27	5.37	4935
10	1	9.12	27.00	29.00	64.78	0.70	0.02	0.14	0.62	7.38	6.08	419
	2	39.02	27.00	29.00	58.00	0.63	0.02	0.15	0.54	5.09	5.04	153
11	1	9.36	27.00	29.00	63.31	0.77	0.02	0.13	0.69	9.29	6.99	2088
	2	27.29	27.00	29.00	58.48	0.70	0.03	0.14	0.63	7.40	6.19	1263
12	1	9.42	27.00	29.00	62.80	0.79	0.03	0.13	0.69	9.49	6.95	5616
	2	10.58	27.00	29.00	59.20	0.73	0.03	0.13	0.66	8.19	6.41	3111
13	1	9.13	27.00	29.00	66.24	0.68	0.02	0.14	0.59	6.75	5.71	106
	2	17.67	27.00	29.00	57.53	0.63	0.02	0.15	0.54	5.06	4.95	92
14	1	2.58	27.00	29.00	67.23	0.71	0.02	0.14	0.62	7.98	5.69	95
	2	0.00	27.00	29.00	67.23	0.71	0.02	0.14	0.62	7.98	5.69	95
15	1	9.41	27.00	29.00	66.40	0.86	0.01	0.11	0.83	13.11	9.03	319
	2	29.97	27.00	29.00	57.95	0.80	0.01	0.12	0.77	11.21	8.18	576
16	1	9.44	27.00	29.00	63.51	0.81	0.02	0.12	0.75	10.93	7.90	3236
	2	23.82	27.00	29.00	58.69	0.75	0.02	0.13	0.69	9.17	7.16	1550

Key:

Station:	CVT Station Number
Level:	1 = upper layer, 2 = lower layer
Temp:	Temperature °C
Salin:	Salinity, PPT
DO%:	Dissolved Oxygen percentage saturation
BOD:	Biochemical Oxygen Demand
Amm:	Ammoniacal Nitrogen
OxN:	Oxidised Nitrogen
OrgN:	Organic Nitrogen
Chl:	Chlorophyll
SS:	Suspended Solids
E.coli:	Escherichia coli

Table 5 WET SEASON NEAP TIDES: SCENARIO 2 (WITH BREAKWATER)

Station	Level	Height	Temp	Salin	DO%	BOD	Amm	OxN	OrgN	Chl	SS	*E.coli*
1	1	8.71	26.34	28.27	70.20	0.75	0.02	0.06	0.71	18.92	9.17	160
	2	3.06	26.53	28.49	64.98	0.71	0.02	0.06	0.71	18.34	8.39	322
2	1	8.84	26.76	28.68	53.68	2.00	0.11	0.15	0.74	17.64	8.62	2151
	2	7.51	26.91	28.86	41.14	1.20	0.10	0.14	0.66	14.48	5.04	3116
3	1	9.04	27.11	28.98	24.70	4.76	0.33	0.29	0.84	13.62	7.70	38260
	2	6.50	27.08	28.98	11.91	2.63	0.22	0.26	0.69	11.27	4.01	16044
4	1	9.30	27.07	29.00	45.13	2.86	0.23	0.23	0.74	12.12	5.07	15923
	2	3.41	27.06	29.00	39.41	2.32	0.20	0.23	0.70	11.25	3.79	11696
5	1	9.35	27.02	29.00	60.60	1.36	0.10	0.17	0.66	10.91	4.40	3186
	2	8.39	27.02	29.00	54.32	1.11	0.09	0.17	0.63	9.32	3.18	3452
6	1	9.38	27.01	29.00	64.52	0.97	0.06	0.15	0.65	10.13	4.92	5334
	2	2.31	27.01	29.00	57.33	0.86	0.06	0.15	0.63	8.44	3.82	3029
7	1	9.38	27.01	29.00	64.77	0.87	0.04	0.14	0.66	9.79	5.46	10447
	2	3.77	27.00	29.00	58.07	0.77	0.05	0.14	0.64	8.06	4.70	2683
8	1	4.10	27.00	29.00	65.92	0.89	0.05	0.14	0.66	10.01	5.03	17495
	2	0.00	27.00	29.00	65.92	0.89	0.05	0.14	0.66	10.01	5.03	17495
9	1	9.43	27.00	29.00	64.64	0.81	0.04	0.14	0.66	9.33	5.85	8244
	2	4.94	27.00	29.00	59.33	0.74	0.04	0.13	0.65	8.16	5.29	4703
10	1	9.12	27.00	29.00	64.77	0.70	0.02	0.14	0.62	7.38	6.07	419
	2	39.02	27.00	29.00	57.99	0.63	0.02	0.15	0.54	5.09	5.03	152
11	1	9.36	27.00	29.00	63.32	0.77	0.02	0.13	0.69	9.29	6.99	2020
	2	27.29	27.00	29.00	58.47	0.70	0.03	0.14	0.63	7.40	6.20	1239
12	1	9.42	27.00	29.00	62.80	0.79	0.03	0.13	0.69	9.50	6.95	5443
	2	10.58	27.00	29.00	59.20	0.73	0.03	0.13	0.66	8.20	6.41	3017
13	1	9.13	27.00	29.00	66.24	0.68	0.02	0.14	0.59	6.75	5.71	106
	2	17.67	27.00	29.00	57.52	0.63	0.02	0.15	0.54	5.06	4.95	91
14	1	2.58	27.00	29.00	67.23	0.71	0.02	0.14	0.62	7.99	5.69	96
	2	0.00	27.00	29.00	67.23	0.71	0.02	0.14	0.62	7.99	5.69	96
15	1	9.41	27.00	29.00	66.40	0.86	0.01	0.11	0.83	13.11	9.03	317
	2	29.97	27.00	29.00	57.95	0.80	0.01	0.12	0.77	11.21	8.18	573
16	1	9.44	27.00	29.00	63.51	0.81	0.02	0.12	0.75	10.92	7.89	3206
	2	23.82	27.00	29.00	58.70	0.75	0.02	0.13	0.69	9.17	7.16	1528

Key:
Station: CVT Station Number
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DO%: Dissolved Oxygen percentage saturation
BOD: Biochemical Oxygen Demand
Amm: Ammoniacal Nitrogen
OxN: Oxidised Nitrogen
OrgN: Organic Nitrogen
Chl: Chlorophyll
SS: Suspended Solids
E.coli: Escherichia coli

Table 6 DRY SEASON NEAP TIDES: EXISTING CASE

Station	Level	Height	Temp	Salin	DO%	BOD	Amm	OxN	OrgN	Chl	SS	*E.coli*
1	1	9.29	17.54	31.80	75.71	0.39	0.13	0.03	0.21	0.91	5.64	94
	2	2.41	17.52	31.76	75.34	0.38	0.13	0.03	0.21	0.91	5.60	107
2	1	9.29	17.79	32.06	69.74	1.18	0.17	0.07	0.28	1.01	4.99	1233
	2	3.07	17.80	32.07	69.55	1.18	0.17	0.07	0.28	1.01	5.97	21951
3	1	9.29	18.17	32.46	58.20	3.53	0.30	0.15	0.46	1.15	5.97	21951
	2	6.18	18.17	33.45	57.20	3.40	0.23	0.15	0.46	1.14	5.67	22807
4	1	9.30	18.14	32.62	69.10	2.39	0.23	0.12	0.38	1.09	5.43	12417
	2	3.34	18.13	32.62	68.79	2.34	0.23	0.12	0.38	1.08	5.29	12820
5	1	9.31	18.07	32.68	75.89	1.27	0.13	0.09	0.29	1.00	4.86	3837
	2	8.37	18.07	32.68	75.65	1.26	0.14	0.09	0.29	0.988	4.78	4567
6	1	9.30	18.05	32.69	77.83	1.00	0.11	0.08	0.27	0.95	5.08	6321
	2	2.32	18.04	32.69	77.61	1.00	0.11	0.08	0.27	0.94	4.99	5907
7	1	9.31	18.03	32.70	78.59	0.91	0.10	0.07	0.25	0.93	5.93	7760
	2	3.78	18.03	32.70	78.45	0.90	0.10	0.07	0.25	0.91	5.22	5614
8	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.
9	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.
10	1	9.30	18.01	32.70	79.80	0.82	0.10	0.07	0.26	0.91	5.40	391
	2	38.78	18.00	32.70	79.56	0.82	0.10	0.07	0.26	0.89	5.42	568
11	1	9.31	18.01	32.70	79.71	0.83	0.10	0.06	0.23	0.90	6.19	2079
	2	27.28	18.00	32.70	79.50	0.83	0.10	0.06	0.23	0.88	6.21	2247
12	1	9.30	18.01	32.70	79.62	0.85	0.10	0.06	0.23	0.90	6.25	6263
	2	10.64	18.01	32.70	79.47	0.84	0.10	0.06	0.23	0.89	6.25	6043
13	1	9.30	18.01	32.70	79.84	0.82	0.10	0.08	0.28	0.91	4.86	98
	2	17.44	18.00	32.70	79.65	0.82	0.10	0.08	0.28	0.90	4.84	130
14	1	2.52	18.02	32.70	80.14	0.82	0.10	0.08	0.27	0.93	4.75	104
	2	0.00	18.02	32.70	80.14	0.82	0.10	0.08	0.27	0.93	4.75	104
15	1	9.30	18.00	32.70	79.84	0.82	0.10	0.06	0.22	0.90	6.55	308
	2	30.01	18.00	32.70	79.68	0.82	0.10	0.06	0.22	0.89	6.60	342
16	1	9.29	18.01	32.70	79.95	0.83	0.10	0.06	0.23	0.90	6.33	2033
	2	23.89	18.00	32.70	79.59	0.82	0.10	0.06	0.23	0.89	6.37	1291

Key:
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- OxN: Oxidised Nitrogen
- OrgN: Organic Nitrogen
- Chl: Chlorophyll
- SS: Suspended Solids
- *E.coli:* Escherichia coli

Table 7 DRY SEASON NEAP TIDES: BASELINE

Station	Level	Height	Temp	Salin	DO%	BOD	Amm	OxN	OrgN	Chl	SS	*E.coli*
1	1	9.29	17.53	31.67	71.96	0.54	0.14	0.05	0.23	0.95	5.30	111
	2	2.41	17.52	31.66	71.77	0.53	0.13	0.05	0.23	0.94	5.27	120
2	1	9.29	17.99	32.10	60.02	1.89	0.22	0.12	0.34	1.11	4.82	1528
	2	6.99	18.00	32.11	59.51	1.88	0.22	0.12	0.34	1.09	8.65	1973
3	1	9.29	18.25	32.27	48.14	4.30	0.37	0.19	0.53	1.26	5.95	27167
	2	5.18	18.25	32.27	46.94	4.18	0.36	0.19	0.53	1.25	5.68	27473
4	1	9.30	18.17	32.54	65.30	2.73	0.27	0.14	0.41	1.19	4.83	13396
	2	3.34	18.17	32.54	64.90	2.67	0.26	0.14	0.41	1.19	4.66	14054
5	1	9.30	18.09	32.65	74.99	1.28	0.14	0.10	0.29	1.06	4.14	2496
	2	8.37	18.09	32.65	74.74	1.27	0.14	0.10	0.29	1.05	4.03	2990
6	1	9.30	18.06	32.68	77.81	0.96	0.11	0.08	0.26	0.98	4.51	4713
	2	2.32	18.05	32.68	77.51	0.96	0.11	0.08	0.26	0.98	4.42	4340
7	1	9.30	18.04	32.69	78.50	0.89	0.10	0.08	0.25	0.95	5.01	7670
	2	3.78	18.03	32.69	78.41	0.88	0.10	0.08	0.25	0.93	4.87	5173
8	1	4.03	18.04	32.69	78.87	0.91	0.11	0.08	0.26	0.96	4.66	14566
	2	0.00	18.04	32.69	78.87	0.91	0.11	0.08	0.26	0.96	4.66	14566
9	1	9.30	18.03	32.70	78.90	0.87	0.10	0.07	0.25	0.93	5.26	6972
	2	5.00	18.03	32.70	78.90	0.86	0.10	0.07	0.24	0.92	5.08	8518
10	1	9.30	18.01	32.70	79.79	0.82	0.10	0.07	0.26	0.91	5.39	410
	2	38.78	18.00	32.70	79.54	0.82	0.10	0.07	0.26	0.89	5.41	611
11	1	9.30	18.01	32.70	79.69	0.83	0.10	0.06	0.23	0.90	6.17	2134
	2	27.28	18.00	32.70	79.48	0.83	0.10	0.06	0.23	0.89	6.19	2362
12	1	9.30	18.01	32.70	79.57	0.85	0.10	0.06	0.23	0.90	6.15	5615
	2	10.64	18.01	32.70	79.44	0.84	0.10	0.06	0.23	0.89	6.16	5437
13	1	9.30	18.01	32.70	79.83	0.82	0.10	0.08	0.28	0.91	4.83	106
	2	17.44	18.00	32.70	79.65	0.82	0.10	0.08	0.28	0.90	4.83	137
14	1	2.52	18.02	32.70	80.31	0.82	0.10	0.08	0.27	0.94	4.74	102
	2	0.00	18.02	32.70	80.31	0.82	0.10	0.08	0.27	0.94	4.74	102
15	1	9.30	18.00	32.70	79.83	0.82	0.10	0.06	0.22	0.90	6.56	307
	2	30.01	18.00	32.70	79.68	0.82	0.10	0.06	0.22	0.89	6.61	346
16	1	9.30	18.01	32.70	79.95	0.83	0.10	0.06	0.23	0.90	6.33	1723
	2	23.89	18.00	32.70	79.58	0.82	0.10	0.06	0.23	0.89	6.37	1159

Key:
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- OxN: Oxidised Nitrogen
- OrgN: Organic Nitrogen
- Chl: Chlorophyll
- SS: Suspended Solids
- *E.coli:* Escherichia coli

Table 8 DRY SEASON NEAP TIDES: SCENARIO 1 (WITH BRIDGE AND NO BREAKWATER)

Station	Level	Height	Temp	Salin	DO%	BOD	Amm	OxN	OrgN	Chl	SS	*E.coli*
1	1	9.29	17.53	31.67	72.33	0.54	0.14	0.05	0.23	0.95	5.30	111
	2	2.41	17.52	31.66	72.16	0.53	0.13	0.05	0.23	0.94	5.27	120
2	1	9.29	17.99	32.10	60.02	1.89	0.22	0.12	0.34	1.11	4.82	1527
	2	6.99	18.00	32.11	59.51	1.88	0.22	0.12	0.34	1.09	4.64	1972
3	1	9.29	18.25	32.27	48.93	4.30	0.37	0.19	0.53	1.27	5.93	27158
	2	5.18	18.25	32.26	47.73	4.18	0.36	0.19	0.53	1.26	5.66	27464
4	1	9.30	18.17	32.53	65.40	2.73	0.27	0.14	0.41	1.20	4.80	13391
	2	3.34	18.17	32.53	65.00	2.67	0.25	0.14	0.41	1.19	4.63	14047
5	1	9.30	18.09	32.65	74.95	1.28	0.14	0.10	0.29	1.07	4.11	2537
	2	8.37	18.09	32.65	74.74	1.27	0.14	0.10	0.29	1.05	4.00	3038
6	1	9.30	18.06	32.68	77.77	0.96	0.11	0.08	0.26	0.99	4.47	4902
	2	2.32	18.05	32.68	77.48	0.96	0.11	0.08	0.26	0.98	4.38	4488
7	1	9.30	18.04	32.69	78.55	0.90	0.10	0.08	0.25	0.95	4.96	8102
	2	3.78	18.03	32.69	78.39	0.88	0.10	0.08	0.25	0.93	4.85	5285
8	1	4.03	18.05	32.69	78.83	0.92	0.11	0.08	0.26	0.96	4.61	14953
	2	0.00	18.05	32.69	78.83	0.92	0.11	0.08	0.26	0.96	4.61	14953
9	1	9.30	18.03	32.70	79.10	0.86	0.10	0.07	0.25	0.93	5.26	6393
	2	5.00	18.03	32.70	78.91	0.86	0.10	0.07	0.25	0.92	5.10	7984
10	1	9.30	18.01	32.70	79.79	0.82	0.10	0.07	0.26	0.91	5.39	410
	2	38.78	18.00	32.70	79.54	0.82	0.10	0.07	0.26	0.89	5.41	611
11	1	9.30	18.01	32.70	79.69	0.83	0.10	0.06	0.23	0.90	6.17	2139
	2	27.28	18.01	32.70	79.48	0.83	0.10	0.06	0.23	0.89	6.19	2370
12	1	9.30	18.01	32.70	79.57	0.85	0.10	0.06	0.23	0.90	6.15	5626
	2	10.64	18.01	32.70	79.44	0.84	0.10	0.06	0.23	0.89	6.16	5452
13	1	9.30	18.01	32.70	79.83	0.82	0.10	0.08	0.28	0.91	4.83	107
	2	17.44	18.00	32.70	79.65	0.82	0.10	0.08	0.28	0.90	4.83	137
14	1	2.52	18.02	32.70	80.31	0.82	0.10	0.08	0.27	0.94	4.74	103
	2	0.00	18.02	32.70	80.31	0.82	0.10	0.08	0.27	0.94	4.74	103
15	1	9.30	18.00	32.70	79.83	0.82	0.10	0.06	0.22	0.90	5.56	307
	2	30.01	18.00	32.70	79.68	0.82	0.10	0.06	0.22	0.89	6.61	346
16	1	9.30	18.01	32.70	79.75	0.83	0.10	0.06	0.23	0.90	6.33	1721
	2	23.89	18.00	32.70	79.58	0.82	0.10	0.06	0.23	0.89	6.37	1159

Key:
- Station: CVT Station Number
- Level: 1 = upper layer, 2 = lower layer
- Temp: Temperature °C
- Salin: Salinity, PPT
- DO%: Dissolved Oxygen percentage saturation
- BOD: Biochemical Oxygen Demand
- Amm: Ammoniacal Nitrogen
- OxN: Oxidised Nitrogen
- OrgN: Organic Nitrogen
- Chl: Chlorophyll
- SS: Suspended Solids
- *E.coli:* Escherichia coli

Table 9 DRY SEASON NEAP TIDES: SCENARIO 2 (WITH BREAKWATER)

Station	Level	Height	Temp	Salin	DO%	BOD	Amm	OxN	OrgN	Chl	SS	*E.coli*
1	1	9.29	17.53	31.67	72.33	0.54	0.14	0.05	0.23	0.95	5.30	111
	2	2.41	17.52	31.68	72.16	0.53	0.13	0.05	0.23	0.94	5.27	120
2	1	9.29	17.99	32.10	61.69	1.89	0.22	0.12	0.34	1.11	4.82	1527
	2	6.99	18.00	32.11	60.71	1.88	0.22	0.12	0.34	1.09	4.64	1971
3	1	9.29	18.25	32.26	48.93	4.30	0.37	0.19	0.53	1.27	5.93	27155
	2	6.18	18.25	32.26	47.75	4.18	0.36	0.19	0.53	1.12	5.66	27462
4	1	9.30	18.17	32.53	65.40	2.73	0.27	0.14	0.41	1.20	4.78	13380
	2	3.34	18.17	32.53	65.00	2.67	0.27	0.14	0.41	1.18	4.61	14034
5	1	9.30	18.09	32.65	74.94	1.28	0.14	0.10	0.29	1.07	4.08	2421
	2	8.37	18.09	32.65	74.70	1.27	0.14	0.10	0.29	1.05	3.97	2899
6	1	9.30	18.06	32.68	77.74	0.96	0.11	0.08	0.26	0.99	4.44	4604
	2	2.32	18.06	32.68	77.46	0.96	0.11	0.08	0.26	0.98	4.36	4184
7	1	9.31	18.04	32.69	78.54	0.90	0.10	0.08	0.25	0.95	4.92	8213
	2	3.78	18.04	32.69	78.41	0.88	0.10	0.08	0.25	0.93	4.84	5169
8	1	4.03	18.05	32.69	78.77	0.92	0.11	0.08	0.26	0.97	4.50	15696
	2	0.00	18.05	32.69	78.77	0.92	0.11	0.08	0.26	0.97	4.50	15696
9	1	9.30	18.03	32.70	79.06	0.87	0.10	0.07	0.25	0.93	5.22	6885
	2	5.00	18.03	32.70	78.89	0.87	0.10	0.07	0.25	0.92	5.04	8418
10	1	9.30	18.01	32.70	79.79	0.82	0.10	0.07	0.26	0.91	5.39	409
	2	38.78	18.00	32.70	79.54	0.82	0.10	0.07	0.26	0.89	5.41	610
11	1	9.30	18.01	32.70	79.69	0.83	0.10	0.06	0.23	0.90	6.17	2109
	2	27.28	18.01	32.70	79.48	0.83	0.10	0.06	0.23	0.89	6.19	2358
12	1	9.30	18.01	32.70	79.57	0.84	0.10	0.06	0.23	0.90	6.17	5593
	2	10.64	18.01	32.70	79.44	0.84	0.10	0.06	0.23	0.89	6.17	5459
13	1	9.30	18.01	32.70	79.83	0.82	0.10	0.08	0.28	0.91	4.83	106
	2	17.44	18.00	32.70	79.65	0.82	0.10	0.08	0.28	0.90	4.83	137
14	1	2.52	18.02	32.70	80.31	0.82	0.10	0.08	0.27	0.94	4.74	103
	2	0.00	18.02	32.70	80.31	0.82	0.10	0.08	0.27	0.94	4.74	103
15	1	9.30	18.00	32.70	79.83	0.82	0.10	0.06	0.22	0.90	6.56	306
	2	30.01	18.00	32.70	79.68	0.82	0.10	0.06	0.22	0.89	6.61	345
16	1	9.30	18.01	32.70	79.75	0.83	0.10	0.06	0.23	0.90	6.33	1716
	2	23.89	18.00	32.70	79.58	0.82	0.10	0.06	0.23	0.89	6.37	1157

Key:
- Station: CVT Station Number
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- *E.coli*: Escherichia coli