Appendix 5.2

Marine Traffic Noise Assessment Methodology and Source Term Measurement

Methodology

The following procedures will be adopted for marine traffic noise assessment. The noise generated by the vessels at stationary mode (e.g. idling) will be assessed as fixed noise sources.

General

The navigation routes located within 300m of this development area considered as the assessment area. Any representative planned sources located within the assessment area would be considered in this noise assessment, adopting the noise criteria as discussed in **Appendix 5.1**.

Operational Information of Marine Vessels

All operational information of vessels is based on either site observation or operation schedule from operators for typical days. The operational information for the existing ferry, kaito, and existing marina are summarized in the table below.

Table A5.2: Operational information for the existing ferry and marina vessels

Operation Parameters	Existing Discovery Bay Ferry	Kaito	Marina	Tug boat with barge	Sand barge	LPG container
Ferry / yacht per hour	9[1]	6[1]	3[2]	1 [4]	1 [4]	1[4]
Speed knots/h	~10	~10	5[3]	~2	~4	~4

Notes:

[1] According to operation schedule from operator.

[2] Based on site observation from typical days and weekends in Discovery Bay.

[3] According to Marine Department Notice No. 84, only speed at 5 knots per hour for yachts is allowed inside typhoon shelter. In addition, as advised by the marine traffic engineer, the speed for the marine route as indicated in **Appendix 5.1** is in 5 knots per hour.

[4] According to operation schedule from operator, the tug boat with barge from gas supplier, sand barge and LPG container vessels would arrive the pier once per month, once per month and once per week.

Apart from existing Discovery Bay ferry, Kaito and existing marina, tugboat with barge from LPG supplier, sand barge with sand loading, LPG containers for glass bottle, bounty, oil tanker and ferries/vessels petrol filling near kaito pier are also observed.

According to latest information, the ferry petrol filling will be conducted in marine based filling station outside Discovery Bay. Therefore, the operation of oil tanker and ferries / vessels petrol filling near kaito pier would be excluded in the noise assessment.

Marine Noise Source Determination

In order to determine the Sound Exposure Level (SEL) in accordance with ISO 2922-1975(E), which has been adopted in several approved EIA, such as AEIAR-178/2013, noise measurements for marine noise source terms have been conducted as below:

- Noise measurements for marine noise source terms at Discovery Bay Marina, and Discovery Bay Public Pier and Kaito Pier for the existing ferry, kaito, marina, tugboat with barge from LPG supplier, etc.
- The measurement location at Discovery Bay Marina was about 20m from the vessels.
- For the measurements at Discovery Bay Public Pier, the separation distance was about 50 – 100m, depending on the transit route.
- For the measurements at Kai To Pier, the separation distance was about 20 – 100m, depending on the transit route.

The table below summarizes the marine noise source term.

Table A5.3: Marine noise source term measurement

Description [1]	Direction	SEL at 25m, dB(A) [2]
Peng Chau Kaito (Including those via Trappist Monastery)	Approaching	71.3
	Departing	74.5
Mui Wo Kaito	Approaching	77.7
	Departing	78.6
Discovery Bay Ferry	Approaching	85.6
	Departing	86.1
Tugboat	Approaching	80.0
	Departing	80.0
Sand Barge	Approaching	77.7 [3]
	Departing	77.7
LPG Containers	Approaching	71.2
	Departing	71.2 [4]

Notes:

[1] Only non-disturbed events have been tabulated in the above table.

[2] SEL corrected to 25m at reference speed of about 5knots/h for proposed yacht and 16knots/h for existing ferry.

[3] SEL measurement was disturbed by other noisy activities, such as bus idling and oil tanker operation. Since non-disturbed events could not be measured, SEL for "Departing" has been adopted to represent that for "Approaching".

[4] SEL measurement was disturbed by other noisy activities, such as bus idling and oil tanker operation. Since non-disturbed events could not be measured, SEL for "Approaching" has been adopted to represent that for "Departing".

Prediction of Noise Impacts

The SELs summarized in the above tables are then converted to establish the facade noise levels at NSRs, taking into account various consideration such as operation time, distances, number of concurrent vessels, facade effects. A summary of equations adopted in the marine traffic noise assessment is given in the table below.

Table A5.4: Summary of equations for marine traffic noise assessment

Parameters	Equations
SEL, dB(A)	$SEL = L_{max} + 10\log(kd/V)$, where L_{max} = Measured marine traffic passby noise level, dB(A) k = Empirical constant d = Perpendicular distance between measurement location and the marine traffic, m V = Speed of the marine traffic, m/s
$L_{eq\ 1hr}$, dB(A)	$L_{eq\ 1hr} = SEL - 10\log(d_1/d) - 10\log(T) + 10\log(N) + FC + Dir$ where d_1 = Perpendicular slant distance between marine traffic and NSR, m T = Time period under consideration (3600), s N = Number of marine traffic FC = With 3 dB(A) facade correction Dir = -10dB(A) correction for without line of sight

Since all the noise sources from the marine vessels movements would not occur at the same time, it is important to analyse and establish the possible cases during a typical 1-hour period that would constitute noise impacts. The details of different scenarios have been presented in below table and **Appendix 5.3**.

Table A5.5: Summary of all observed possible cases in a standard sample period (60mins)

Case	Description [1]						
	PC	MW	DB	Yacht	TB	SB	LPG
1	√	√[2]	√	√	√[2]		
2	√	√[2]	√	√		√[2]	
3	√	√[2]	√	√			√[2]

Note:

[1] PC – Peng Chau kaito;
MW – Mui Wo kaito;
DB – Discovery Bay Ferry;
TB – Tugboat with barge from LPG supplier;
SB – Sand Barge; and
LPG – LPG Container.

[2] Marine vessels operate in daytime only.

It can be seen that the marine vessel movements for Peng Chau kaito, Mui Wo kaito and Yacht would also occur during a typical hour. The operation of sand barge, tugboat and LPG container vessels would be carried out once a season (~3 months), once per month and once per week during daytime period respectively.

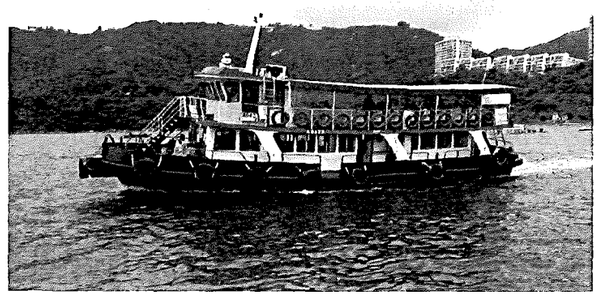
As confirmed with the facility operator, the Bounty services currently available at Area 10b will not be re-provisioned in the future construction and operational phase of the Project. Hence, berthing area for the Bounty would no longer be necessary. Therefore, bounty is not included in this noise assessment.

However, site constraints would eliminate more than one activity for vessels for the gas bottle supplier, sand barge and bounty, and tugboat with barge to occur concurrently. Besides, all these activities would not occur during night-time period as well.

Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Ferry Noise Sources (Peng Chau Line)

Event	Description	Direction	Measured L_{max}, dB(A) [1]	Approx. Distance from ferry, m [2]	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A)	SEL at 25m, dB(A)
PC1	Peng Chau Kaito	Approaching to Kaito Pier	63.4	20	9	5	72.8	N	-	-
PC3	Peng Chau Kaito	Approaching to Kaito Pier	61.9	20	7	4	72.3	N	-	-
PC5	Peng Chau Kaito	Approaching to Kaito Pier	61.1	20	10	5	69.8	Y	69.8	68.9
PC7	Peng Chau Kaito	Approaching to Kaito Pier	58.9	20	7	4	69.1	Y	69.1	68.2
PC9	Peng Chau Kaito	Approaching to Kaito Pier	60.8	20	11	6	69.2	Y	69.2	68.2
PC11	Peng Chau Kaito	Approaching to Kaito Pier	59.9	20	7	3	70.6	Y	70.6	69.6
PC13	Peng Chau Kaito	Approaching to Kaito Pier	62.3	20	8	4	72.2	Y	72.2	71.3
									Minimum	68.2
									Maximum	71.3
									Average	69.2
PC2	Peng Chau Kaito	Departure from Kaito Pier	62.1	20	10	5	71.0	Y	71.0	70.1
PC4	Peng Chau Kaito	Departure from Kaito Pier	61.7	20	9	5	71.1	Y	71.1	70.1
PC6	Peng Chau Kaito	Departure from Kaito Pier	61.6	20	8	4	71.8	Y	71.8	70.8
PC8	Peng Chau Kaito	Departure from Kaito Pier	62.3	20	14	7	69.8	Y	69.8	68.8
PC10	Peng Chau Kaito	Departure from Kaito Pier	63.3	20	5	3	75.1	N	-	-
PC12	Peng Chau Kaito	Departure from Kaito Pier	68.7	20	10	5	77.8	N	-	-
PC14	Peng Chau Kaito	Departure from Kaito Pier	60.8	20	5	2	73.1	Y	73.1	72.1
PC15	Peng Chau Kaito	Departure from Kaito Pier	64.9	20	7	4	75.4	Y	75.4	74.5
									Minimum	68.8
									Maximum	74.5
									Average	71.3

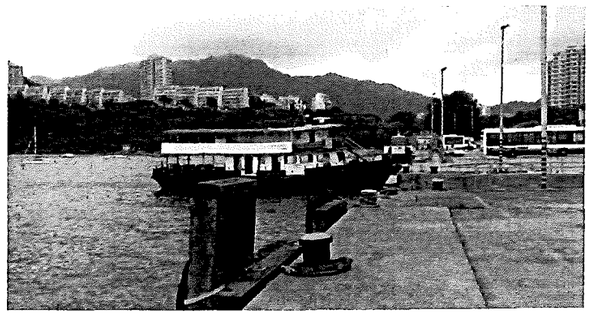
Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.
where k = 2 (empirical constant, d = perpendicular distance, v = speed in m/s



Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Ferry Noise Sources (Mui Wo Line)

Event	Description	Direction	Measured L_{max}, dB(A) [1]	Approx. Distance from ferry, m [2]	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A)	SEL at 25m, dB(A)
MW1	Mui Wo Kaito	Approaching to Kaito Pier	60.7	20	10	5	69.7	Y	69.7	68.8
MW3	Mui Wo Kaito	Approaching to Kaito Pier	61.1	20	7	3	71.8	Y	71.8	70.9
MW5	Mui Wo Kaito	Approaching to Kaito Pier	66.3	20	5	2	78.6	Y	78.6	77.7
MW7	Mui Wo Kaito	Approaching to Kaito Pier	64.7	20	5	2	76.8	Y	76.8	75.9
MW9	Mui Wo Kaito	Approaching to Kaito Pier	62.9	20	5	3	74.9	Y	74.9	73.9
MW11	Mui Wo Kaito	Approaching to Kaito Pier	69.9	20	5	2	82.0	N	-	-
									Minimum	68.8
									Maximum	77.7
									Average	73.4
MW2	Mui Wo Kaito	Departure from Kaito Pier	68.3	20	6	3	79.2	Y	79.2	78.3
MW4	Mui Wo Kaito	Departure from Kaito Pier	66.7	20	4	2	79.6	Y	79.6	78.6
MW6	Mui Wo Kaito	Departure from Kaito Pier	64.4	20	8	4	74.4	Y	74.4	73.4
MW8	Mui Wo Kaito	Departure from Kaito Pier	68.2	20	6	3	79.4	Y	79.4	78.5
MW10	Mui Wo Kaito	Departure from Kaito Pier	61.2	20	4	2	74.0	Y	74.0	73.0
MW12	Mui Wo Kaito	Departure from Kaito Pier	63.1	20	6	3	74.3	Y	74.3	73.4
									Minimum	73.0
									Maximum	78.6
									Average	75.9

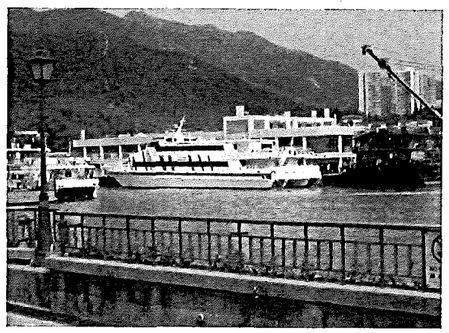
Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.
where k = 2 (empirical constant, d = perpendicular distance, v = speed in m/s

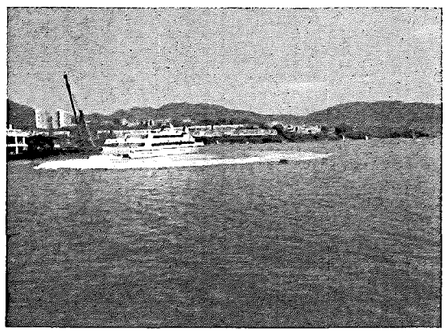


Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Ferry Noise Sources (Discovery Bay to Central Line)

Event	Description	Direction	Measured L_{max}, dB(A) [1]	Approx. Distance from ferry, m [2]	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A)	SEL at 25m, dB(A)
DB1	Discoery Bay No. 9	Approaching to DB Public Pier	64.5	50	10	5	77.5	Y	77.5	80.5
DB2	Discoery Bay No. 8	Approaching to DB Public Pier	64.2	50	6	3	79.0	Y	79.0	82.0
DB6	Discoery Bay No. 9	Approaching to DB Public Pier	69.7	50	10	5	82.6	Y	82.6	85.6
DB8	Discoery Bay No. 8	Approaching to DB Public Pier	67.1	50	11	5	79.7	Y	79.7	82.7
DB12	Discoery Bay No. 8	Approaching to DB Public Pier	64.7	50	4	2	81.1	Y	81.1	84.1
DB14	Discoery Bay No. 5	Approaching to DB Public Pier	64.8	50	6	3	80.1	N	-	-
DB16	Discoery Bay No. 7	Approaching to DB Public Pier	63.3	50	9	5	76.7	Y	76.7	79.7
DB18	Discoery Bay No. 5	Approaching to DB Public Pier	67.9	50	9	5	81.3	Y	81.3	84.3
DB4	Discoery Bay No. 1	Approaching to DB Public Pier	62.0	50	6	3	77.3	Y	77.3	80.3
DB10	Discoery Bay No. 1	Approaching to DB Public Pier	62.4	50	9	4	76.0	Y	76.0	79.0
									Minimum	79.0
									Maximum	85.6
									Average	82.0
DB3	Discoery Bay No. 8	Departure from DB Public Pier	68.1	50	9	5	81.5	Y	81.5	84.5
DB5	Discoery Bay No. 1	Departure from DB Public Pier	71.3	50	4	2	87.9	N	-	-
DB7	Discoery Bay No. 9	Departure from DB Public Pier	73.7	50	12	6	85.9	N	-	-
DB9	Discoery Bay No. 8	Departure from DB Public Pier	72.6	50	8	4	86.6	N	-	-
DB11	Discoery Bay No. 1	Departure from DB Public Pier	72.2	50	11	5	84.9	N	-	-
DB13	Discoery Bay No. 8	Departure from DB Public Pier	64.8	50	8	4	78.5	Y	78.5	81.5
DB15	Discoery Bay No. 5	Departure from DB Public Pier	64.6	50	8	4	78.4	Y	78.4	81.4
DB17	Discoery Bay No. 7	Departure from DB Public Pier	69.7	50	9	5	83.1	Y	83.1	86.1
DB19	Discoery Bay No. 5	Departure from DB Public Pier	67.8	50	9	4	81.3	Y	81.3	84.3
									Minimum	81.4
									Maximum	86.1
									Average	83.6

Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.
where k = 2 (empirical constant, d = perpendicular distance, v = speed in m/s

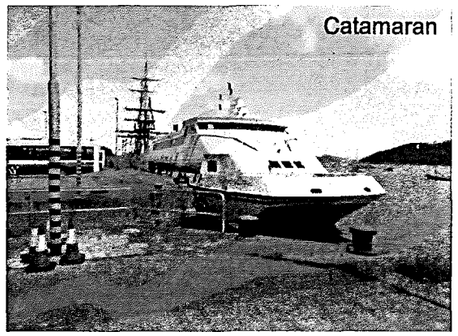


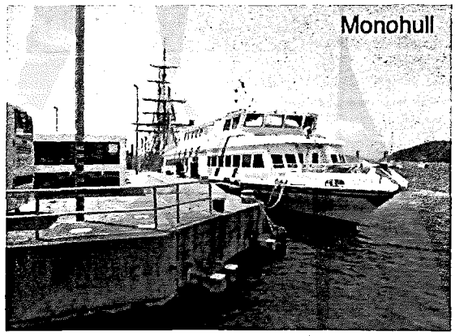


Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Ferry Noise Sources (Ferry Petrol Filling)

Event	Description	Direction	Measured L_{max}, dB(A) [1]	Approx. Distance from ferry, m [2]	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A)	SEL at 25m, dB(A)
DB(fuel)1	Monohull petrol filling	Approaching to Oil Tank at Marina Avenue	69.2	20	4	2	82.3	Y	82.3	81.3
DB(fuel)3	Catamaran petrol filling	Approaching to Oil Tank at Marina Avenue	66.1	20	3	2	79.9	Y	79.9	78.9
									Minimum	78.9
									Maximum	81.3
									Average	80.1
DB(fuel)2	Monohull petrol filling	Departure from Oil Tank at Marina Avenue	69.4	20	3	2	83.1	Y	83.1	82.1
DB(fuel)4	Catamaran petrol filling	Departure from Oil Tank at Marina Avenue	63.4	20	3	1	78.1	Y	78.1	77.1
									Minimum	77.1
									Maximum	82.1
									Average	79.6

Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.
where k = 2 (empirical constant, d = perpendicular distance, v = speed in m/s

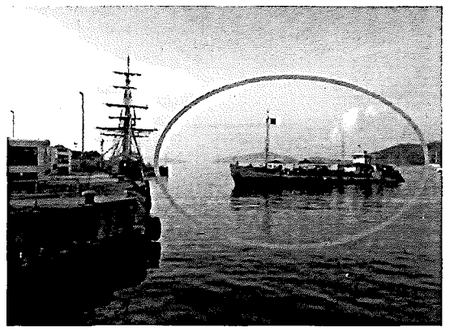




Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Ferry Noise Sources (Oil Tanker)

Event	Description	Direction	Measured L_{max}, dB(A) [1]	Approx. Distance from ferry, m [2]	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A)	SEL at 25m, dB(A)
PS1	Oil Tanker	Approaching to Oil Tank at Marina Avenue	68.9	15	13	7	75.4	Y	75.4	73.2
PS2	Oil Tanker	Departure from Oil Tank at Marina Avenue	71.7	15	5	3	82.4	Y	82.4	80.2
									Minimum	73.2
									Maximum	80.2
									Average	76.7

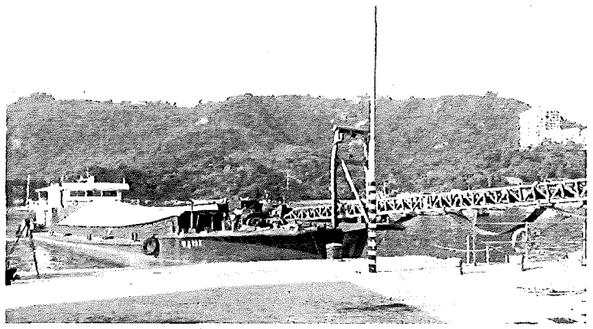
Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.
where k = 2 (empirical constant, d = perpendicular distance, v = speed in m/s



Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Ferry Noise Sources (Sand Barge)

Event	Description	Direction	Measured L_{max}, dB(A) [1]	Approx. Distance from ferry, m [2]	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A)	SEL at 25m, dB(A)
SB1	Sand Barge	Approaching to Sand Barge	68.0	15	4	2	79.3	N	-	-
SB2	Sand Barge	Departure from Sand Barge	67.4	15	3	2	80.0	Y	80.0	77.7
									Minimum	77.7
									Maximum	77.7
									Average	77.7

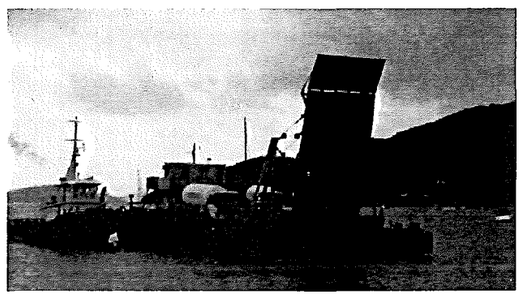
Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.



Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Ferry Noise Sources (Tug Boat with Barge)

Event	Description	Direction	Passby time, s	Travelling Distance, m	Measured L_{max}, dB(A) [1]	Approx. Distance from ferry, m [2]	Estimated Speed (km/hr)	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A)	SEL at 25m, dB(A)
TB1	Tug Boat with Barge	Approaching to Kaito Pier	204	250	68.3	15	4	2	1.2	82.2	Y	82.2	80.0
TB2	Tug Boat with Barge	Departure from Kaito Pier	204	250	67.3	15	4	2	1.2	81.2	Y	81.2	79.0
												Minimum	79.0
												Maximum	80.0
												Average	79.5

Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.
where k = 2 (empirical constant, d = perpendicular distance, v = speed in m/s



Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Marina Noise Sources

Event	Description	Direction	Measured L_{max}, dB(A) [1]	Approx. Distance from yacht, m [2]	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A) [5]	SEL at 25m, dB(A)
Yacht - 1	Sailboat 1 [6]	Out from Marina	57.6	20	7	4	68.2	Y	-	-
Yacht - 2	Speed boat 1	In to Marina	57.1	20	9	5	66.4	Y	66.4	64.5
Yacht - 3	Speed boat 2	Out from Marina	63.6	20	13	7	71.4	Y	71.4	69.5
Yacht - 4	Sailboat 2 [6]	Out from Marina	62.3	20	8	4	72.3	N	-	-
Yacht - 5	Speed boat 3	In to Marina	60.6	20	8	4	70.3	Y	70.3	68.4
Yacht -6	Waste collection boat 1	Out from Marina	58.9	20	8	4	68.6	Y	68.6	66.7
Yacht -7	Speed boat 4	Out from Marina	55.2	20	8	4	64.9	Y	64.9	62.9
Yacht -8	Speed boat 5	In to Marina	63.7	20	8	4	73.8	Y	73.8	71.8
Yacht -9	Yacht 1	In to Marina	61.7	20	8	4	71.5	Y	71.5	69.6
Yacht -10	Sailboat 3 [6]	Out from Marina	55.0	20	11	6	63.4	Y	-	-
Yacht -11	Speed boat 6	Out from Marina	65.8	20	12	6	74.0	Y	74.0	72.1
Yacht -12	Sailboat 4 [6]	Out from Marina	55.8	20	7	3	66.6	Y	-	-
Yacht -13	Waste collection boat 2	In to Marina	63.5	20	8	4	73.2	Y	73.2	71.2
Yacht - 14	Sailboat 5 [4]	Out from Marina	67.9	20	8	4	77.7	N	-	-
Yacht - 15	Sailboat 6 [6]	Out from Marina	57.1	20	8	4	67.2	Y	-	-
Yacht -16	Sailboat 7	Out from Marina	62.0	20	10	5	71.0	Y	71.0	69.1
Yacht -17	Speed boat 7 [4]	In to Marina	61.2	20	11	6	69.6	N	-	-
Yacht -18	Sailboat 8 [6]	Out from Marina	61.2	20	6	3	72.2	Y	-	-
Yacht -19	Sailboat 9 [4,6]	Out from Marina	61.2	20	7	4	71.5	N	-	-
Yacht -20	Speed boat 8 [4]	Out from Marina	61.2	20	11	6	69.6	N	-	-
Yacht -21	Sailboat 10 [4,6]	Out from Marina	56.3	20	7	4	66.6	N	-	-
Yacht -22	Sailboat 11 [6]	Out from Marina	58.0	20	10	5	67.0	Y	-	-
Yacht -23	Speed boat 9	Out from Marina	61.6	20	17	9	68.1	Y	68.1	66.2
Yacht -24	Sailboat 12 [6]	Out from Marina	57.9	20	11	6	66.4	Y	-	-
Yacht -25	Sailboat 13 [6]	Out from Marina	56.4	20	11	6	64.9	Y	-	-
Yacht -26	Speed boat 10	In to Marina	58.5	20	10	5	67.4	Y	67.4	65.5
Yacht -27	Speed boat 11 [4]	Out from Marina	60.3	20	10	5	69.1	N	-	-
Yacht -28	Speed boat 12	Out from Marina	62.8	20	10	5	71.6	Y	71.6	69.6
Yacht -29	Speed boat 13	In to Marina	59.5	20	7	4	70.0	Y	70.0	68.0
Yacht -30	Speed boat 14	In to Marina	56.7	20	10	5	65.7	Y	65.7	63.8
Yacht -31	Waste collection boat 3	In to Marina	57.0	20	8	4	66.7	Y	66.7	64.8
Yacht -32	Speed boat 15	Out from Marina	60.8	20	10	5	69.8	Y	69.8	67.9
Yacht -33	Speed boat 16	In to Marina	64.5	20	7	4	74.8	N	-	-
Yacht -34	Waste collection boat 4	In to Marina	56.8	20	8	4	66.6	Y	66.6	64.7
Yacht -35	Sailboat 14 [6]	Out from Marina	61.2	20	3	2	75.2	N	-	-
									Min.	62.9
									Maximum	72.1
									Average	67.6

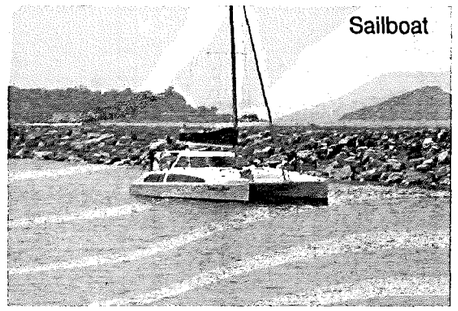
Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.

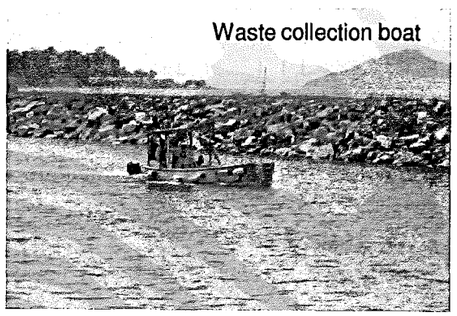
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.
where k = 2 (empirical constant, d = perpendicular distance, v = speed in m/s

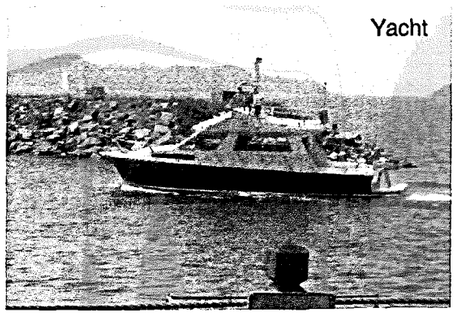
[4] Affected by noise from other marine traffic.

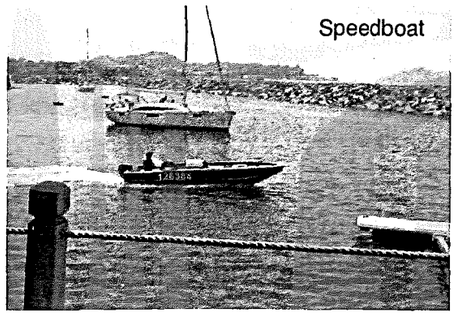
[5] Marine Department Notice No. 84 of year 2000 regarding speed limit in typhoon shelters, all vessels underway in the entrance to or within a typhoon shelter should not exceed five knots. However, yachts with speed more than 5knots per hour are still considered in the source term calculation for conservative approach.

[6] Noise events from sailboat were observed compatible to background noise level, therefore, the noise from sailboat is insignificant and concluded as no impact.


Sailboat


Waste collection boat

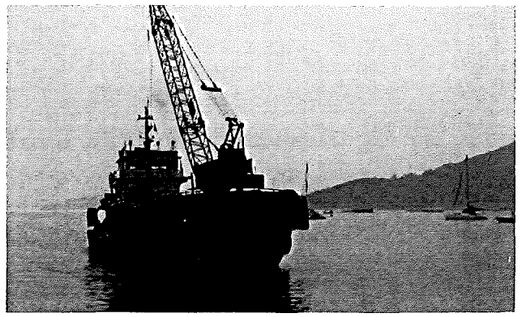

Yacht


Speedboat

Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Determination of Ferry Noise Sources (LPG container vessel)

Event	Description	Direction	Measured L_{max}, dB(A) [1]	Approx. Distance from ferry, m [2]	Speed, Knots/hr	Speed (V), m/s	Estimated SEL, dB(A) [3]	Non-Disturbed Events(Y/N)	SEL for non - disturbed events, dB(A)	SEL at 25m, dB(A)
LPG1	LPG container vessel	Approaching to LPG container vessel	62.1	15	4	2	73.4	Y	73.4	71.2
LPG2	LPG container vessel	Departure from LPG container vessel	56.7	15	3	2	69.3	N	-	-
									Minimum	71.2
									Maximum	71.2
									Average	71.2

Note:
[1] All measurement were taken at free field condition.
[2] Perpendicular distance between the reference measurement location and the source.
[3] SEL = L_{max} + 10log(kd/V) according to Equation 2.22 of Transportation Noise Reference Book, 1987.



Appendix 5.3

Predicted SPL due to Marine Traffic

Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Marine Traffic Noise Assessment
Assessment Point: **N10b-A1**

Case 1: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & Tugboat with barge in 60mins

Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
							Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	50	36	3	3	0	0	-3	39	51	51	-
		Departure	74.5	3600	2	50	36	3	3	0	0	-3	42			-
MW		Approaching	77.7	3600	1	50	36	0	3	0	0	-3	42			-
		Departure	78.6	3600	1	50	36	0	3	0	0	-3	43			-
DB		Approaching	85.6	3600	5	750	36	7	3	-10	0	-15	35			-
		Departure	86.1	3600	4	750	36	6	3	-10	0	-15	35			-
Yacht		Approaching & Departure	72.1	3600	3	135	36	5	3	0	0	-7	37			-
TB		Approaching	80.0	3600	1	30	36	0	3	0	0	-1	47			For worst case 60min scenario, activity with higher SEL would be used for assessment
		Departure	79.0	3600	-	30	-	-	3	0	0	-	-			
PC	Nighttime	Approaching	71.3	3600	1	50	36	0	3	0	0	-3	36	42	46	-
		Departure	74.5	3600	1	50	36	0	3	0	0	-3	39			-
MW		Approaching	77.7	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	750	36	5	3	-10	0	-15	33			-
		Departure	86.1	3600	3	750	36	5	3	-10	0	-15	34			-
Yacht		Approaching & Departure	72.1	3600	-	135	-	-	3	0	0	-	-			No operation during nighttime
TB		Approaching	80.0	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
		Departure	79.0	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; OT - Oil Tanker
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Case 2: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & Sand Barge in 60mins

Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
							Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	50	36	3	3	0	0	-3	39	50	51	-
		Departure	74.5	3600	2	50	36	3	3	0	0	-3	42			-
MW		Approaching	77.7	3600	1	50	36	0	3	0	0	-3	42			-
		Departure	78.6	3600	1	50	36	0	3	0	0	-3	43			-
DB		Approaching	85.6	3600	5	750	36	7	3	-10	0	-15	35			-
		Departure	86.1	3600	4	750	36	6	3	-10	0	-15	35			-
Yacht		Approaching & Departure	72.1	3600	3	135	36	5	3	0	0	-7	37			-
SB		Approaching	77.7	3600	1	30	36	0	3	0	0	-1	44			For worst case 60min scenario, activity with higher SEL would be used for assessment
		Departure	77.7	3600	-	30	-	-	3	0	0	-	-			
PC	Nighttime	Approaching	71.3	3600	1	50	36	0	3	0	0	-3	36	42	46	-
		Departure	74.5	3600	1	50	36	0	3	0	0	-3	39			-
MW		Approaching	77.7	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	750	36	5	3	-10	0	-15	33			-
		Departure	86.1	3600	3	750	36	5	3	-10	0	-15	34			-
Yacht		Approaching & Departure	72.1	3600	-	135	-	-	3	0	0	-	-			No operation during nighttime
SB		Approaching	77.7	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
		Departure	77.7	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; SB - Sand Barge
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

ject No.: 235928
ject Title: Optimization of Land Use in Discovery Bay
e: Marine Traffic Noise Assessment
sessment Point: **N10b-A1**

se 3: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & LPG container vessel in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
	Daytime / Evening time	Approaching	71.3	3600	2	50	36	3	3	0	0	-3	39	49	51	-
PC		Departure	74.5	3600	2	50	36	3	3	0	0	-3	42			-
		Approaching	77.7	3600	1	50	36	0	3	0	0	-3	42			-
MW		Departure	78.6	3600	1	50	36	0	3	0	0	-3	43			-
		Approaching	85.6	3600	5	750	36	7	3	-10	0	-15	35			-
DB		Departure	86.1	3600	4	750	36	6	3	-10	0	-15	35			-
Yacht		Approaching & Departure	72.1	3600	3	135	36	5	3	0	0	-7	37			-
		Approaching	71.2	3600	1	30	36	0	3	0	0	-1	38			
LPG		Departure	71.2	3600	1	30	36	0	3	0	0	-1	38			For worst case 60min scenario, SEL of arrival activity would be used for departure activity in the assessment
	Nighttime	Approaching	71.3	3600	1	50	36	0	3	0	0	-3	36	42	46	-
PC		Departure	74.5	3600	1	50	36	0	3	0	0	-3	39			-
		Approaching	77.7	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
MW		Departure	78.6	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
		Approaching	85.6	3600	3	750	36	5	3	-10	0	-15	33			-
DB		Departure	86.1	3600	3	750	36	5	3	-10	0	-15	34			-
Yacht		Approaching & Departure	72.1	3600	-	135	-	-	3	0	0	-	-			No operation during nighttime
		Approaching	71.2	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
LPG		Departure	71.2	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime

e:

PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; LPG - LPG container vessel

Estimated SEL at reference distance of 25m.

Time = 3600s for 1 hour period.

No. of Yacht in 1 hour (Both approaching & departure)

Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Marine Traffic Noise Assessment
Assessment Point: **N10b-A10**

Case 1: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & Tugboat with barge in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	85	36	3	3	0	0	-5	36	51	51	-
		Departure	74.5	3600	2	85	36	3	3	0	0	-5	40			-
MW		Approaching	77.7	3600	1	85	36	0	3	0	0	-5	40			-
		Departure	78.6	3600	1	85	36	0	3	0	0	-5	41			-
DB		Approaching	85.6	3600	5	830	36	7	3	0	0	-15	45			-
		Departure	86.1	3600	4	830	36	6	3	0	0	-15	44			-
Yacht		Approaching & Departure	72.1	3600	3	55	36	5	3	0	0	-3	41			-
TB		Approaching	80.0	3600	1	100	36	0	3	0	0	-6	41			For worst case 60min scenario, activity with higher SEL would be used for assessment
		Departure	79.0	3600	-	100	-	-	3	0	0	-	-			
PC	Nighttime	Approaching	71.3	3600	1	85	36	0	3	0	0	-5	33	47	46	-
		Departure	74.5	3600	1	85	36	0	3	0	0	-5	37			-
MW		Approaching	77.7	3600	-	85	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	85	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	830	36	5	3	0	0	-15	43			-
		Departure	86.1	3600	3	830	36	5	3	0	0	-15	43			-
Yacht		Approaching & Departure	72.1	3600	-	55	-	-	3	0	0	-	-			No operation during nighttime
TB		Approaching	80.0	3600	-	100	-	-	3	0	0	-	-			No operation during nighttime
		Departure	79.0	3600	-	100	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; OT - Oil Tanker
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Case 2: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & Sand Barge in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	85	36	3	3	0	0	-5	36	51	51	-
		Departure	74.5	3600	2	85	36	3	3	0	0	-5	40			-
MW		Approaching	77.7	3600	1	85	36	0	3	0	0	-5	40			-
		Departure	78.6	3600	1	85	36	0	3	0	0	-5	41			-
DB		Approaching	85.6	3600	5	830	36	7	3	0	0	-15	45			-
		Departure	86.1	3600	4	830	36	6	3	0	0	-15	44			-
Yacht		Approaching & Departure	72.1	3600	3	55	36	5	3	0	0	-3	41			-
SB		Approaching	77.7	3600	1	100	36	0	3	0	0	-6	39			For worst case 60min scenario, activity with higher SEL would be used for assessment
		Departure	77.7	3600	-	100	-	-	3	0	0	-	-			
PC	Nighttime	Approaching	71.3	3600	1	85	36	0	3	0	0	-5	33	47	46	-
		Departure	74.5	3600	1	85	36	0	3	0	0	-5	37			-
MW		Approaching	77.7	3600	-	85	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	85	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	830	36	5	3	0	0	-15	43			-
		Departure	86.1	3600	3	830	36	5	3	0	0	-15	43			-
Yacht		Approaching & Departure	72.1	3600	-	55	-	-	3	0	0	-	-			No operation during nighttime
SB		Approaching	77.7	3600	-	100	-	-	3	0	0	-	-			No operation during nighttime
		Departure	77.7	3600	-	100	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; SB - Sand Barge
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Marine Traffic Noise Assessment
Assessment Point: **N10b-A10**

Case 3: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & LPG container vessel in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	85	36	3	3	0	0	-5	36	50	51	-
		Departure	74.5	3600	2	85	36	3	3	0	0	-5	40			-
MW		Approaching	77.7	3600	1	85	36	0	3	0	0	-5	40			-
		Departure	78.6	3600	1	85	36	0	3	0	0	-5	41			-
DB		Approaching	85.6	3600	5	830	36	7	3	0	0	-15	45			-
		Departure	86.1	3600	4	830	36	6	3	0	0	-15	44			-
Yacht		Approaching & Departure	72.1	3600	3	55	36	5	3	0	0	-3	41			-
LPG		Approaching	71.2	3600	1	100	36	0	3	0	0	-6	33			For worst case 60min scenario, SEL of arrival activity would be used for departure activity in the assessment
		Departure	71.2	3600	1	100	36	0	3	0	0	-6	33			
PC	Nighttime	Approaching	71.3	3600	1	85	36	0	3	0	0	-5	33	47	46	-
		Departure	74.5	3600	1	85	36	0	3	0	0	-5	37			-
MW		Approaching	77.7	3600	-	85	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	85	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	830	36	5	3	0	0	-15	43			-
		Departure	86.1	3600	3	830	36	5	3	0	0	-15	43			-
Yacht		Approaching & Departure	72.1	3600	-	55	-	-	3	0	0	-	-			No operation during nighttime
LPG		Approaching	71.2	3600	-	100	-	-	3	0	0	-	-			No operation during nighttime
		Departure	71.2	3600	-	100	-	-	3	0	0	-	-			No operation during nighttime

Note:

[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; LPG - LPG container vessel

[2] Estimated SEL at reference distance of 25m.

[3] Time = 3600s for 1 hour period.

[4] No. of Yacht in 1 hour (Both approaching & departure)

[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Marine Traffic Noise Assessment
Assessment Point: **N10b-A15**

Case 1: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & Tugboat with barge in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	130	36	3	3	0	0	-7	35	50	51	-
		Departure	74.5	3600	2	130	36	3	3	0	0	-7	38			-
MW		Approaching	77.7	3600	1	130	36	0	3	0	0	-7	38			-
		Departure	78.6	3600	1	130	36	0	3	0	0	-7	39			-
DB		Approaching	85.6	3600	5	825	36	7	3	0	0	-15	45			-
		Departure	86.1	3600	4	825	36	6	3	0	0	-15	44			-
Yacht		Approaching & Departure	72.1	3600	3	45	36	5	3	0	0	-3	42			-
TB		Approaching	80.0	3600	1	130	36	0	3	0	0	-7	40			For worst case 60min scenario, activity with higher SEL would be used for assessment
		Departure	79.0	3600	-	130	-	-	3	0	0	-	-			
PC	Nighttime	Approaching	71.3	3600	1	130	36	0	3	0	0	-7	32	46	46	-
		Departure	74.5	3600	1	130	36	0	3	0	0	-7	35			-
MW		Approaching	77.7	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	825	36	5	3	0	0	-15	43			-
		Departure	86.1	3600	3	825	36	5	3	0	0	-15	43			-
Yacht		Approaching & Departure	72.1	3600	-	45	-	-	3	0	0	-	-			No operation during nighttime
TB		Approaching	80.0	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
		Departure	79.0	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; OT - Oil Tanker
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Case 2: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & Sand Barge in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	130	36	3	3	0	0	-7	35	50	51	-
		Departure	74.5	3600	2	130	36	3	3	0	0	-7	38			-
MW		Approaching	77.7	3600	1	130	36	0	3	0	0	-7	38			-
		Departure	78.6	3600	1	130	36	0	3	0	0	-7	39			-
DB		Approaching	85.6	3600	5	825	36	7	3	0	0	-15	45			-
		Departure	86.1	3600	4	825	36	6	3	0	0	-15	44			-
Yacht		Approaching & Departure	72.1	3600	3	45	36	5	3	0	0	-3	42			-
SB		Approaching	77.7	3600	1	130	36	0	3	0	0	-7	38			For worst case 60min scenario, activity with higher SEL would be used for assessment
		Departure	77.7	3600	-	130	-	-	3	0	0	-	-			
PC	Nighttime	Approaching	71.3	3600	1	130	36	0	3	0	0	-7	32	46	46	-
		Departure	74.5	3600	1	130	36	0	3	0	0	-7	35			-
MW		Approaching	77.7	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	825	36	5	3	0	0	-15	43			-
		Departure	86.1	3600	3	825	36	5	3	0	0	-15	43			-
Yacht		Approaching & Departure	72.1	3600	-	45	-	-	3	0	0	-	-			No operation during nighttime
SB		Approaching	77.7	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
		Departure	77.7	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; SB - Sand Barge
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Marine Traffic Noise Assessment
Assessment Point: **N10b-A15**

Case 3: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & LPG container vessel in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	130	36	3	3	0	0	-7	35	50	51	-
		Departure	74.5	3600	2	130	36	3	3	0	0	-7	38			-
MW		Approaching	77.7	3600	1	130	36	0	3	0	0	-7	38			-
		Departure	78.6	3600	1	130	36	0	3	0	0	-7	39			-
DB		Approaching	85.6	3600	5	825	36	7	3	0	0	-15	45			-
		Departure	86.1	3600	4	825	36	6	3	0	0	-15	44			-
Yacht		Approaching & Departure	72.1	3600	3	45	36	5	3	0	0	-3	42			-
LPG		Approaching	71.2	3600	1	130	36	0	3	0	0	-7	31			For worst case 60min scenario, SEL of arrival activity would be used for departure activity in the assessment
		Departure	71.2	3600	1	130	36	0	3	0	0	-7	31			
PC	Nighttime	Approaching	71.3	3600	1	130	36	0	3	0	0	-7	32	46	46	-
		Departure	74.5	3600	1	130	36	0	3	0	0	-7	35			-
MW		Approaching	77.7	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	825	36	5	3	0	0	-15	43			-
		Departure	86.1	3600	3	825	36	5	3	0	0	-15	43			-
Yacht		Approaching & Departure	72.1	3600	-	45	-	-	3	0	0	-	-			No operation during nighttime
LPG		Approaching	71.2	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime
		Departure	71.2	3600	-	130	-	-	3	0	0	-	-			No operation during nighttime

Note:

[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; LPG - LPG container vessel

[2] Estimated SEL at reference distance of 25m.

[3] Time = 3600s for 1 hour period.

[4] No. of Yacht in 1 hour (Both approaching & departure)

[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Project No.: 235928
Project Title: *Optimization of Land Use in Discovery Bay*
Title: Marine Traffic Noise Assessment
Assessment Point: **N10b-B1**

Case 1: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & Tugboat with barge in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	30	36	3	3	0	0	-1	41	51	51	-
		Departure	74.5	3600	2	30	36	3	3	0	0	-1	44			-
MW		Approaching	77.7	3600	1	30	36	0	3	0	0	-1	44			-
		Departure	78.6	3600	1	30	36	0	3	0	0	-1	45			-
DB		Approaching	85.6	3600	5	690	36	7	3	-10	0	-14	36			-
		Departure	86.1	3600	4	690	36	6	3	-10	0	-14	35			-
Yacht		Approaching & Departure	72.1	3600	3	190	36	5	3	0	0	-9	36			-
TB		Approaching	80.0	3600	1	50	36	0	3	0	0	-3	44			For worst case 60min scenario, activity with higher SEL would be used for assessment
		Departure	79.0	3600	-	50	-	-	3	0	0	-	-			
PC	Nighttime	Approaching	71.3	3600	1	30	36	0	3	0	0	-1	38	44	46	-
		Departure	74.5	3600	1	30	36	0	3	0	0	-1	41			-
MW		Approaching	77.7	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	690	36	5	3	-10	0	-14	33			-
		Departure	86.1	3600	3	690	36	5	3	-10	0	-14	34			-
Yacht		Approaching & Departure	72.1	3600	-	190	-	-	3	0	0	-	-			No operation during nighttime
TB		Approaching	80.0	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
		Departure	79.0	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; OT - Oil Tanker
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Case 2: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & Sand Barge in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	30	36	3	3	0	0	-1	41	51	51	-
		Departure	74.5	3600	2	30	36	3	3	0	0	-1	44			-
MW		Approaching	77.7	3600	1	30	36	0	3	0	0	-1	44			-
		Departure	78.6	3600	1	30	36	0	3	0	0	-1	45			-
DB		Approaching	85.6	3600	5	690	36	7	3	-10	0	-14	36			-
		Departure	86.1	3600	4	690	36	6	3	-10	0	-14	35			-
Yacht		Approaching & Departure	72.1	3600	3	190	36	5	3	0	0	-9	36			-
SB		Approaching	77.7	3600	1	50	36	0	3	0	0	-3	42			For worst case 60min scenario, activity with higher SEL would be used for assessment
		Departure	77.7	3600	-	50	-	-	3	0	0	-	-			
PC	Nighttime	Approaching	71.3	3600	1	30	36	0	3	0	0	-1	38	44	46	-
		Departure	74.5	3600	1	30	36	0	3	0	0	-1	41			-
MW		Approaching	77.7	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	690	36	5	3	-10	0	-14	33			-
		Departure	86.1	3600	3	690	36	5	3	-10	0	-14	34			-
Yacht		Approaching & Departure	72.1	3600	-	190	-	-	3	0	0	-	-			No operation during nighttime
SB		Approaching	77.7	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
		Departure	77.7	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; SB - Sand Barge
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Project No.: 235928
Project Title: Optimization of Land Use in Discovery Bay
Title: Marine Traffic Noise Assessment
Assessment Point: **N10b-B1**

Case 3: Peng Chau Kaito, Mui Wo Kaito, Discovery Bay Ferry & LPG container vessel in 60mins

							Correction, dB(A)						Predicted Noise Level, Leq (60min) dB(A)	Overall Noise Level, Leq (60min) dB(A)	Prevailing Noise Level, Leq (60min) dB(A) [5]	Remark
Line	Period	Headway	SEL @ 25m, dB(A)[2]	Time, s[3]	No. of Ferry[4]	Distance, m	Time	No.	Facade	Barrier	Directivity	Distance				
PC	Daytime / Evening time	Approaching	71.3	3600	2	30	36	3	3	0	0	-1	41	51	51	-
		Departure	74.5	3600	2	30	36	3	3	0	0	-1	44			-
MW		Approaching	77.7	3600	1	30	36	0	3	0	0	-1	44			-
		Departure	78.6	3600	1	30	36	0	3	0	0	-1	45			-
DB		Approaching	85.6	3600	5	690	36	7	3	-10	0	-14	36			-
		Departure	86.1	3600	4	690	36	6	3	-10	0	-14	35			-
Yacht		Approaching & Departure	72.1	3600	3	190	36	5	3	0	0	-9	36			-
LPG		Approaching	71.2	3600	1	50	36	0	3	0	0	-3	36			For worst case 60min scenario, SEL of arrival activity would be used for departure activity in the assessment
		Departure	71.2	3600	1	50	36	0	3	0	0	-3	36			
PC	Nighttime	Approaching	71.3	3600	1	30	36	0	3	0	0	-1	38	44	46	-
		Departure	74.5	3600	1	30	36	0	3	0	0	-1	41			-
MW		Approaching	77.7	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
		Departure	78.6	3600	-	30	-	-	3	0	0	-	-			No operation during nighttime
DB		Approaching	85.6	3600	3	690	36	5	3	-10	0	-14	33			-
		Departure	86.1	3600	3	690	36	5	3	-10	0	-14	34			-
Yacht		Approaching & Departure	72.1	3600	-	190	-	-	3	0	0	-	-			No operation during nighttime
LPG		Approaching	71.2	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime
		Departure	71.2	3600	-	50	-	-	3	0	0	-	-			No operation during nighttime

Note:
[1] PC - Peng Chau Kai To; MW - Mui Wo Kai To; DB - Discovery Bay Ferry; TB - Tugboat + barge; DB fuel - Discovery Bay Ferry for petrol filling; LPG - LPG container vessel
[2] Estimated SEL at reference distance of 25m.
[3] Time = 3600s for 1 hour period.
[4] No. of Yacht in 1 hour (Both approaching & departure)
[5] Measured background noise level (BNL) at free field condition , facade correction (+3 dB(A)) has been added.

Appendix 5.4

Fixed Noise Assessment Methodology and Source Term Measurement

Methodology

General

The fixed noise sources located within 300m of this development are considered as assessment area. Any representative planned located within the assessment area would be considered in this noise assessment, adopting the noise criteria as discussed in **Appendix 5.1**.

Operational Information

All operational information is based on either site observation or operation schedule from operators for typical days. Based on site observation, marine-based fixed noise sources were mainly generated from Peng Chau kaito, Mui Wo kaito, tugboat with barge, vessel for the gas bottle supplier and sand barge. As shown in **Figure 1-1**, a 8m tall solid wall next to the kaito pier, a 9.8m tall solid wall next to the goods delivery pier and a 7.8m tall solid wall at 3-storey low rise development that near the goods delivery pier will be built.

Besides, further enquiry has been made with the operators, and they confirmed that there will be installed with acoustic treatment to enclose the conveyor belt on sand barge and temporary noise barrier for crane on LPG container vessels to reduce noise impact in future operation, therefore, this acoustic treatment would be considered in the noise assessment.

In addition, ferry petrol filling will be conducted in marine base filling station outside Discovery Bay. Therefore, the operation of oil tanker and ferries / vessels petrol filling near kaito pier would be excluded in the noise assessment.

Determination of Sound Power Levels (SWLs)

In order to determine the SWL of each activity, noise measurements for each selected marine-based fixed noise sources along Marina Drive have been conducted. SWLs of each activity were predicted with standard acoustic principles for noise attenuation (such as time, distance). The calculated SWL and the locations of noise sources are presented in this appendix.

Prediction of Noise Impacts

The SELs summarized in the above tables are then converted to establish the facade noise levels at NSRs, taking into account various consideration such as operation time, distances, number of concurrent vessels, facade effects. A summary of equations adopted in the marine traffic noise assessment is given in the table below.

Table A5.6: Summary of equations for marine-based fixed noise assessment

Parameters	Equations
SWL, dB(A)	$SWL = L_{eq\ (source)} + (20\log(d)+8)$,

Parameters	Equations
	where $L_{eq\ (source)}$ = Measured marine-based fixed noise level, dB(A) d = Distance between measurement location and the fixed noise source, m
$L_{eq\ 30min}$, dB(A)	$L_{eq\ 30min} = SWL - (20\log(d_1)+8) + 20\log(t_1/T) + FC + BC$ where d_1 = Distance between fixed noise source and NSR, m t_1 = Operation time of fixed noise source within a standard assessment period of 30min T = Time period under consideration (30), min FC = With 3 dB(A) facade correction BC = barrier correction (assuming worst case scenario of 125Hz) according to Figure D.3 Screening Effects of Barriers of BS5228-1 2014, Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise

Since all the noise sources from the marine vessels would not occur at the same time, it is important to analyze and establish the possible cases during a typical 30-minute period that would constitute noise impacts. The details of different scenarios are summarized in **Appendix 5.5**.

Table A5.7: Summary of all observed possible cases within 30mins

Case	Description [1]				
	PC	MW	TB	SB	LPG
1	√	√[2]	√[2]		
2	√	√[2]		√[2]	
3	√	√[2]			√[2]

Note:

[1] PC – Peng Chau Kaito;
MW – Mui Wo Kaito;
TB – Tugboat with barge from LPG supplier;
SB – Sand barge with sand loading; and
LPG – LPG Container.

[2] Marine vessels operate in daytime only.

Legend

- Fixed Noise Measurement Locations
- Existing fixed noise sources from Pang Chau Kai To / Mui Wo Kai To
- Existing fixed noise sources from tugboat with barge
- Existing fixed noise sources from sand barge with sand loading / LPG container vessel loading and unloading
- Existing fixed noise sources from sewage pumping station

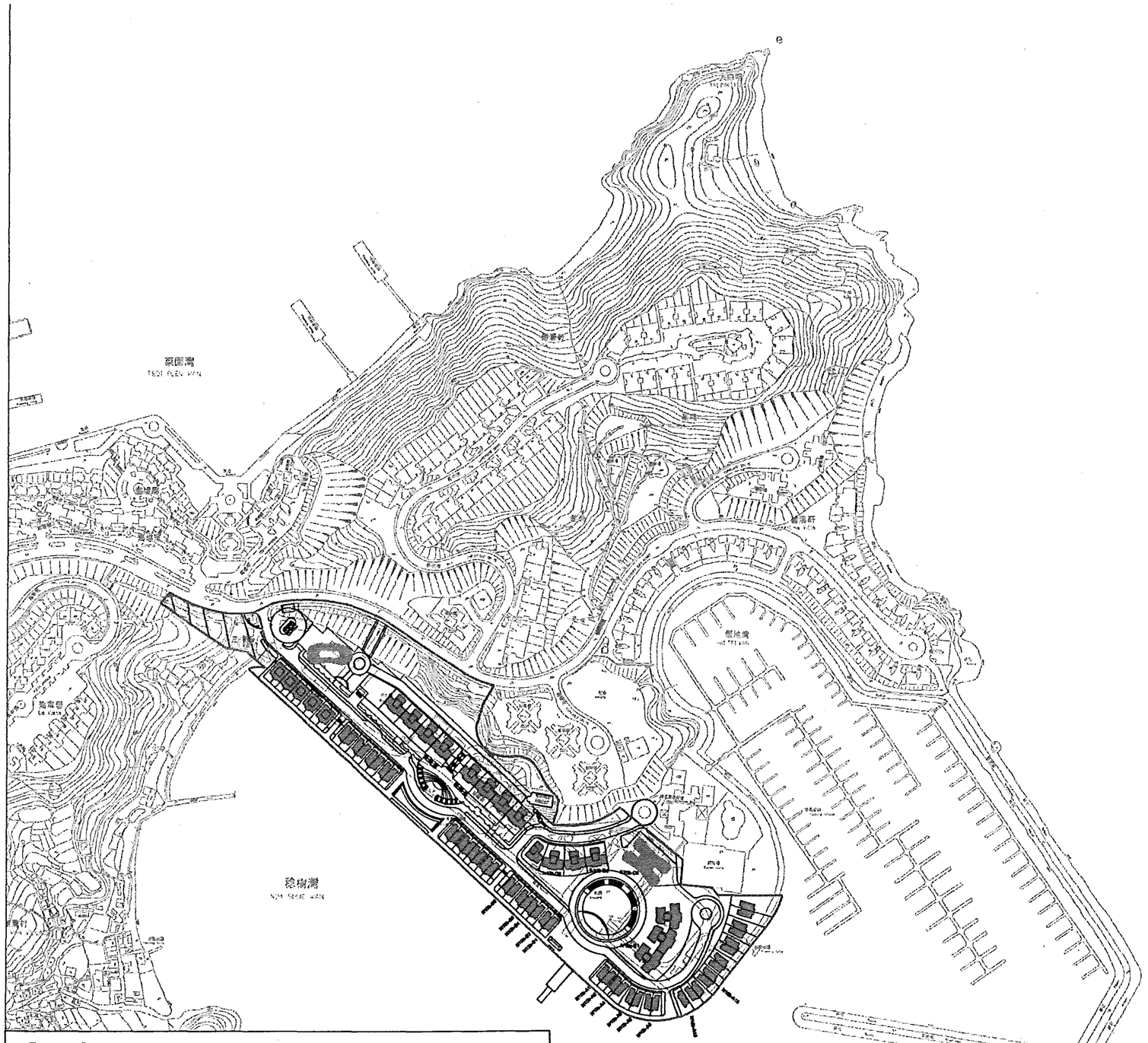
N

FNM1
FNM4
FNM5
FNM2
FNM3

0 20 40 60 80 100
METRES

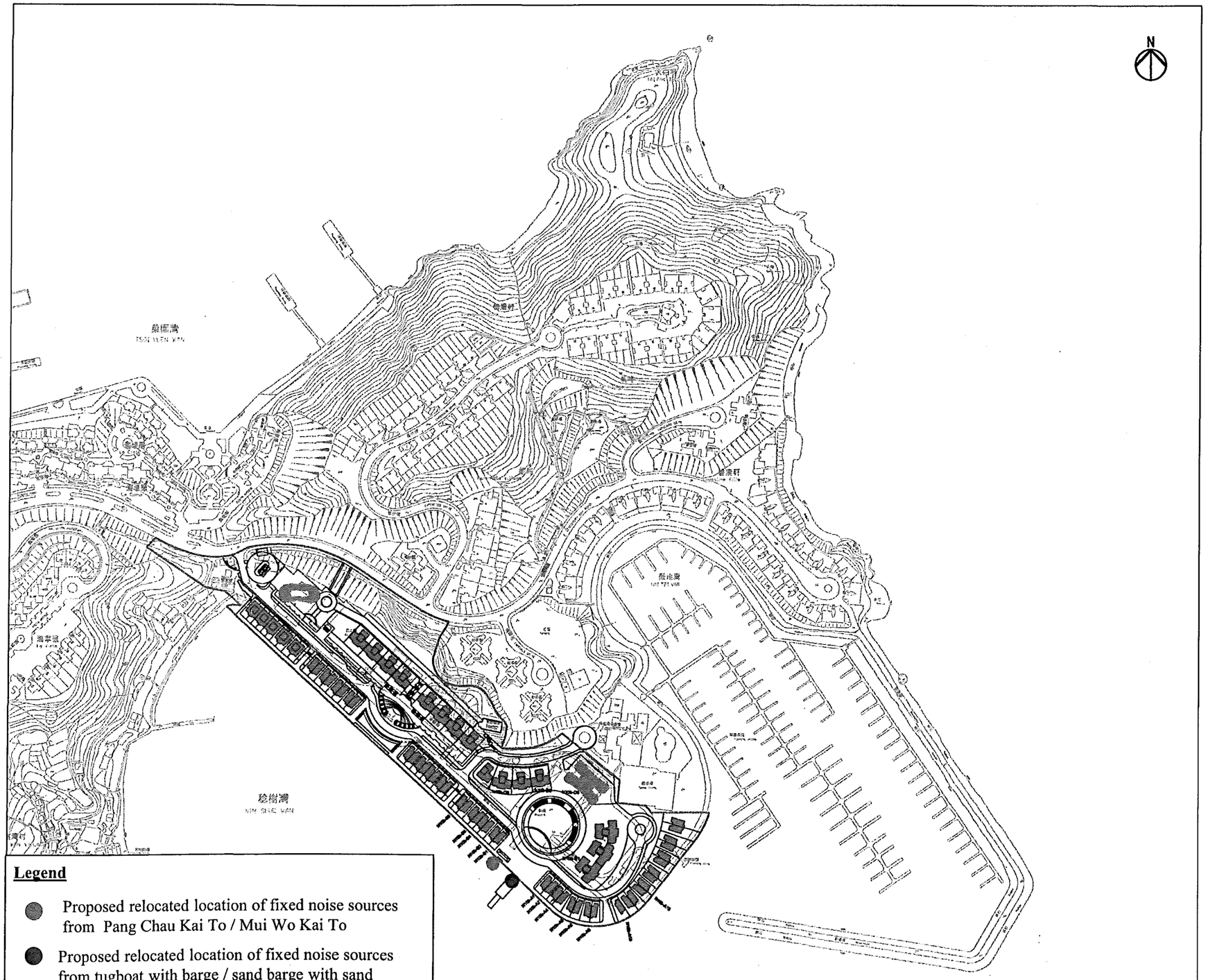
Noise Measurement Location and Existing Marine-based Fixed Noise Sources Locations

ARUP



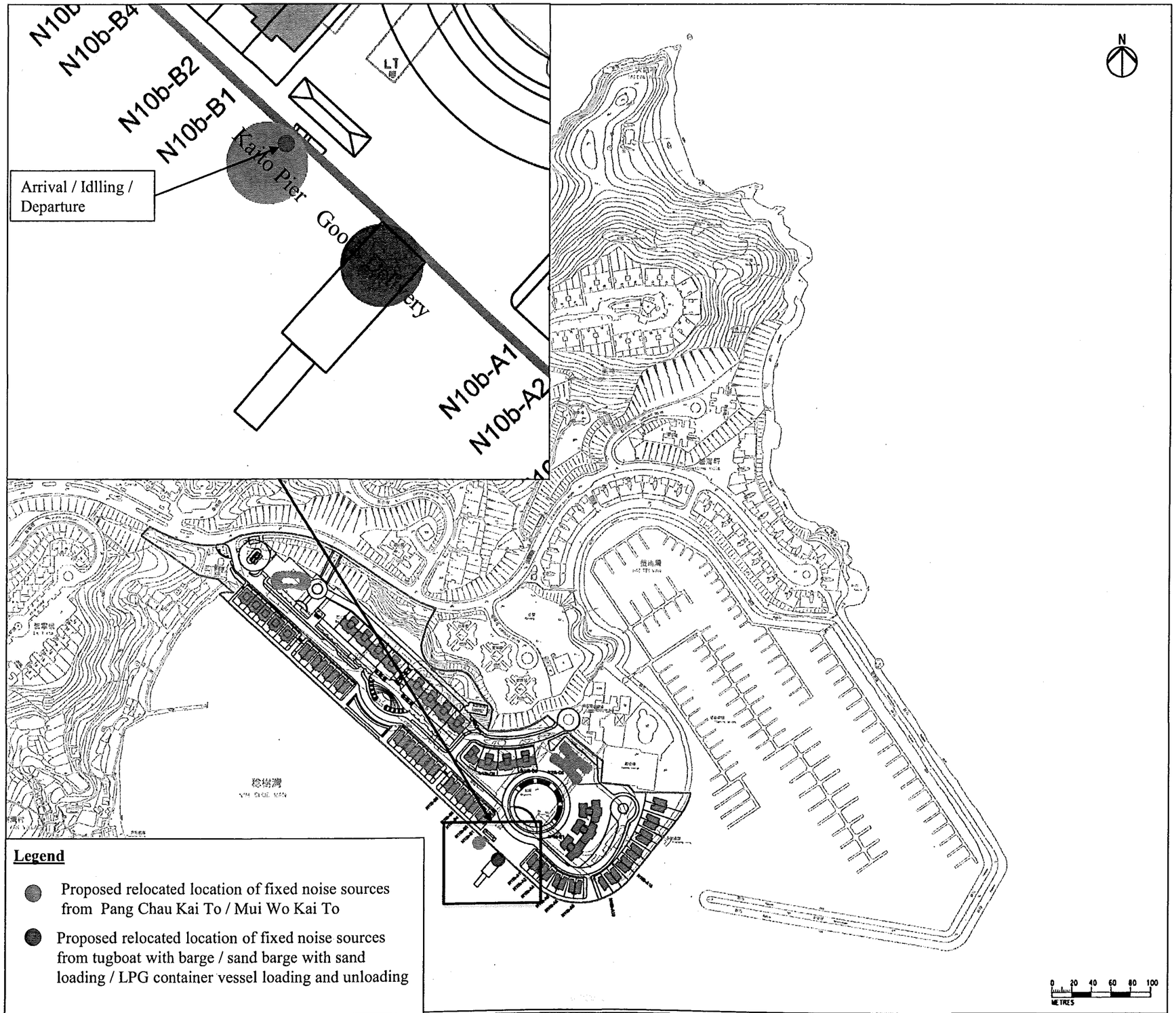
Proposed New Location for Land-Based Fixed Noise Sources

ARUP



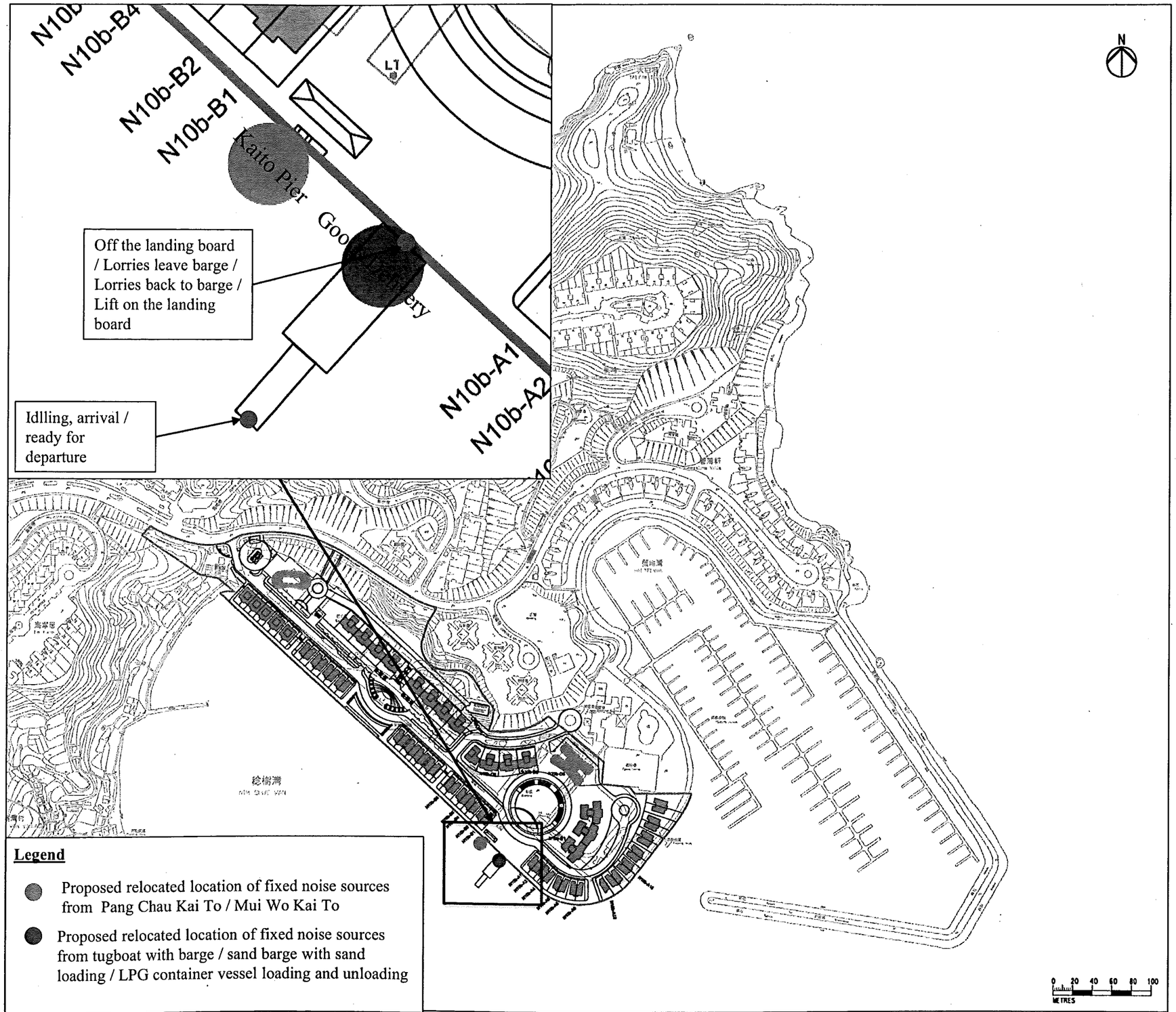
Proposed New Locations for Marine-based Fixed Noise Sources

ARUP



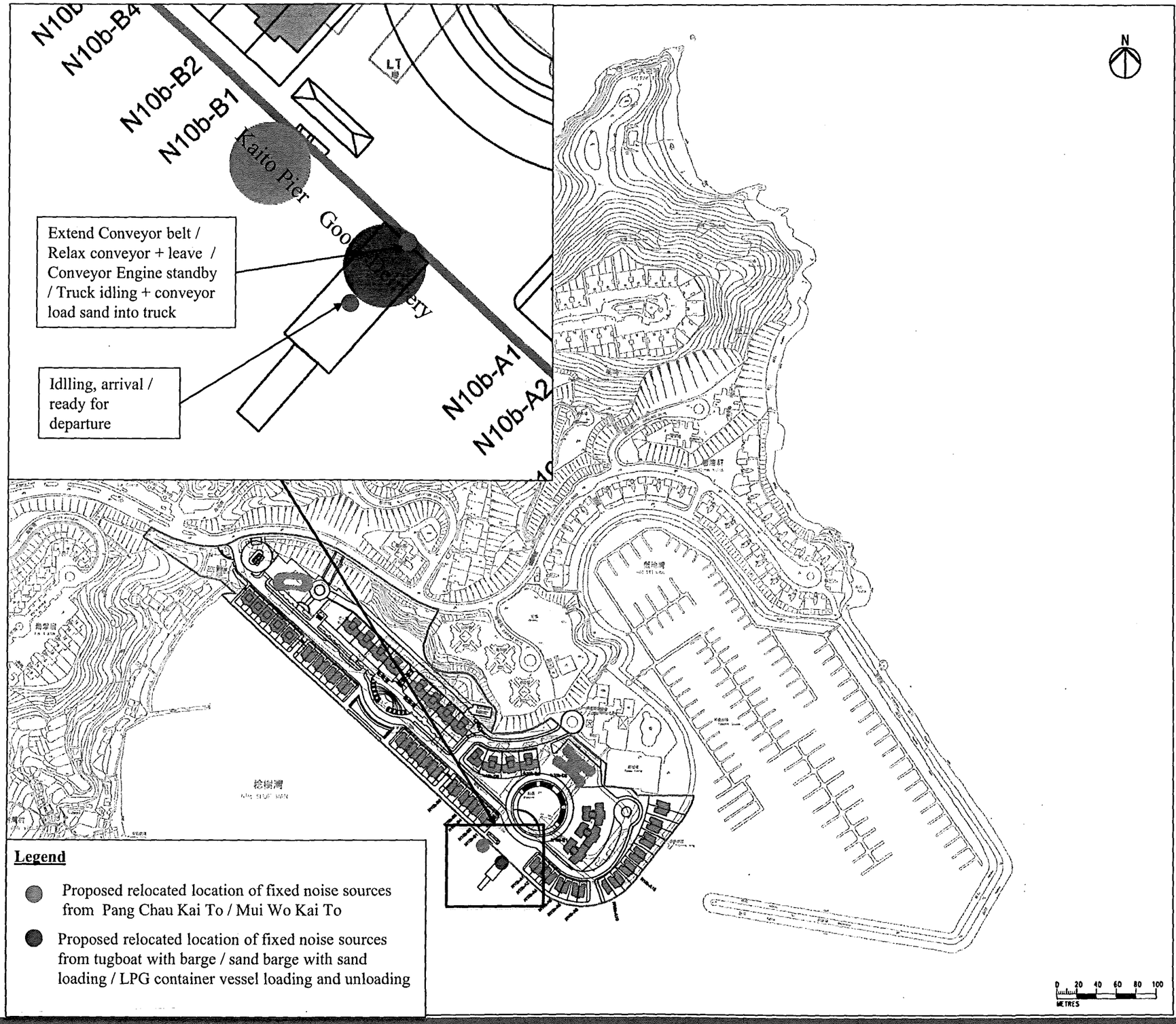
Locations of Activities for Peng Chau Kaito / Mui Wo Kaito

ARUP



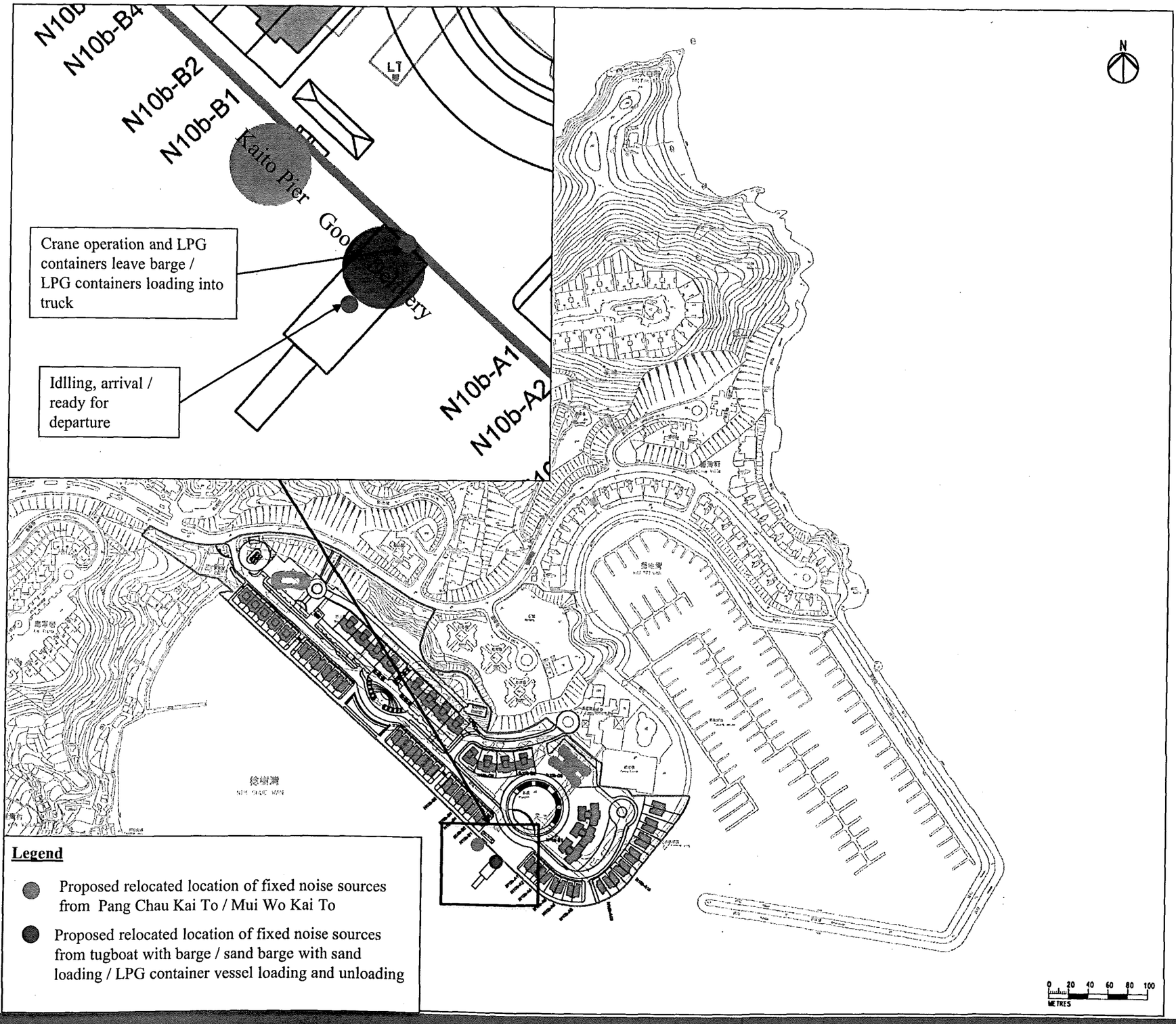
Locations of Activities for Tug Boat and Barge

ARUP



Locations of Activities for Sand Barge and Sand Loading Truck

ARUP



Locations of Activities for LPG Container Vessel and LPG Containers Loading Truck

ARUP

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of Sound Power Level (SWL) for each source

Noise Source ID	Description	Activities/Equipment	Activities ID	Measurement Distance, m	Measured SPL, dB(A)	Distance Correction, dB(A)	SWL, dB(A)	Based on observation and operator information worst operating time, min	Assumed daytime worst operating time in 30min, min	Assumed nighttime worst operating time in 30min, min	Operation Period		Remark
											Daytime	Nighttime	
PC	Peng Chau Kaito	Idlling - arrival	PC1	15.0	56.8	31.5	88	~1	1	1	Y	Y	
		Idling	PC2	15.0	56.7	31.5	88	~5	5	3	Y	Y	
		Idlling - ready for departure	PC3	15.0	59.6	31.5	91	~1	1	1	Y	Y	
MW	Mui Wo Kaito	Idlling - arrival	MW1	15.0	66	31.5	98	~1	1	0	Y	N	
		Idling	MW2	15.0	58.4	31.5	90	~5	5	0	Y	N	
		Idlling - ready for departure	MW3	15.0	66.4	31.5	98	~1	1	0	Y	N	
TB	Tug Boat + Barge	Idling for arrival	TB1	25.0	62.9	36.0	99	~10	10	0	Y	N	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
		Off the landing board	TB2	15.0	68.1	31.5	100	~1	1	0	Y	N	
		Lorries leave barge	TB3	15.0	68.3	31.5	100	~5	5	0	Y	N	
		Lorries back to barge	TB4	15.0	68.3	31.5	100	~5	5	0	Y	N	
		Lift on the landing board	TB5	15.0	66.3	31.5	98	~1	1	0	Y	N	
		Idling for departure	TB6	25.0	62.9	36.0	99	~5	5	0	Y	N	
SB	Sand Barge + Sand Loading Truck	Idling	SB1	15.0	69.8	31.5	101	~1	1	0	Y	N	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
		Extend Conveyor belt	SB2	12.0	69.5	29.6	99	~1	1	0	Y	N	
		Conveyor Engine standby	SB3	25.0	57.9	36.0	94	~30	20	0	Y	N	
		Truck idling + conveyor load sand into truck	SB4	25.0	66.8	36.0	103	~9	9	0	Y	N	
		Relax conveyor + leave	SB5	15.0	70.7	31.5	102	~1	1	0	Y	N	
LPG	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	LPG1	5.0	71.2	22.0	93	~1.5	2	0	Y	N	
		Crane operation and LPG containers leave barge	LPG2	10.0	84.3	28.0	112	~0.5	1	0	Y	N	
		LPG containers loading into truck	LPG3	5.0	73.5	22.0	95	~1	1	0	Y	N	
		Idlling	LPG4	5.0	69	22.0	91	~5	5	0	Y	N	
		Crane operation and LPG containers back to barge	LPG5	10.0	79.5	28.0	108	~0.5	1	0	Y	N	
		Idlling - ready for departure	LPG6	5.0	82.9	22.0	105	~1.5	2	0	Y	N	

Appendix 5.5

Predicted SPL of Fixed Noise Sources

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-B1

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	20	1	-34	-15	-8	0	3	34	
PC2		Idling	88	20	5	-34	-8	-8	0	3	41	
PC3		Idlling - ready for departure	91	20	1	-34	-15	-8	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	20	1	-34	-15	-8	0	3	44	
MW2		Idling	90	20	5	-34	-8	-8	0	3	43	
MW3		Idlling - ready for departure	98	20	1	-34	-15	-8	0	3	44	
TB1	Tug Boat + Barge	Idling for arrival	99	55	10	-43	-5	-5	0	3	49	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	43	1	-41	-15	-5	0	3	43	
TB3		Lorries leave barge	100	48	5	-42	-8	-5	0	3	49	
TB4		Lorries back to barge	100	43	5	-41	-8	-5	0	3	-	
TB5		Lift on the landing board	98	43	1	-41	-15	-5	0	3	-	
TB6		Idling for departure	99	55	5	-43	-8	-5	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		54
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	20	1	-34	-15	-8	0	3	34	
PC2		Idling	88	20	5	-34	-8	-8	0	3	41	
PC3		Idlling - ready for departure	91	20	1	-34	-15	-8	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	20	1	-34	-15	-8	0	3	44	
MW2		Idling	90	20	5	-34	-8	-8	0	3	43	
MW3		Idlling - ready for departure	98	20	1	-34	-15	-8	0	3	44	
SB1	Sand Barge + Truck sand loading	Idling	101	43	1	-41	-15	-5	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	43	1	-41	-15	-5	0	3	-	
SB3		Engine standby	94	43	20	-41	-2	-5	0	3	50	
SB4		Truck idling + conveyor load sand into truck	103	43	9	-41	-5	-5	-10	3	45	
SB5		Relax conveyor + leave	102	43	1	-41	-15	-5	0	3	45	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		54
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	20	1	-34	-15	-8	0	3	34	
PC2		Idling	88	20	5	-34	-8	-8	0	3	41	
PC3		Idlling - ready for departure	91	20	1	-34	-15	-8	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	20	1	-34	-15	-8	0	3	44	
MW2		Idling	90	20	5	-34	-8	-8	0	3	43	
MW3		Idlling - ready for departure	98	20	1	-34	-15	-8	0	3	44	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	43	2	-41	-12	-5	0	3	39	
LPG2		Crane operation and LPG containers leave barge	112	43	1	-41	-15	-5	-10	3	45	
LPG3		LPG containers loading into truck	95	43	1	-41	-15	-5	0	3	38	
LPG4		Idlling	91	43	5	-41	-8	-5	0	3	41	
LPG5		Crane operation and LPG containers back to barge	108	43	1	-41	-15	-5	-10	3	41	
LPG6		Idlling - ready for departure	105	43	2	-41	-12	-5	0	3	51	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		54
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-B1

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	20	1	-34	-15	-8	0	3	34	
PC2		Idling	88	20	3	-34	-10	-8	0	3	39	
PC3		Idlling - ready for departure	91	20	1	-34	-15	-8	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB1	Tug Boat + Barge	Idling for arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB2		Off the landing board	-	-	-	-	-	-	-	-	-	
TB3		Lorries leave barge	-	-	-	-	-	-	-	-	-	
TB4		Lorries back to barge	-	-	-	-	-	-	-	-	-	
TB5		Lift on the landing board	-	-	-	-	-	-	-	-	-	
TB6		Idling for departure	-	-	-	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		42
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	20	1	-34	-15	-8	0	3	34	
PC2		Idling	88	20	5	-34	-8	-8	0	3	41	
PC3		Idlling - ready for departure	91	20	1	-34	-15	-8	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		43
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	20	1	-34	-15	-8	0	3	34	
PC2		Idling	88	20	5	-34	-8	-8	0	3	41	
PC3		Idlling - ready for departure	91	20	1	-34	-15	-8	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		43
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-B2

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	25	1	-36	-15	-10	0	3	30	
PC2		Idling	88	25	5	-36	-8	-10	0	3	37	
PC3		Idlling - ready for departure	91	25	1	-36	-15	-10	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	25	1	-36	-15	-10	0	3	40	
MW2		Idling	90	25	5	-36	-8	-10	0	3	39	
MW3		Idlling - ready for departure	98	25	1	-36	-15	-10	0	3	40	
TB1	Tug Boat + Barge	Idling for arrival	99	61	10	-44	-5	-5	0	3	49	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	50	1	-42	-15	-5	0	3	41	
TB3		Lorries leave barge	100	54	5	-43	-8	-5	0	3	48	
TB4		Lorries back to barge	100	50	5	-42	-8	-5	0	3	-	
TB5		Lift on the landing board	98	50	1	-42	-15	-5	0	3	-	
TB6		Idling for departure	99	61	5	-44	-8	-5	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		53
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	25	1	-36	-15	-10	0	3	30	
PC2		Idling	88	25	5	-36	-8	-10	0	3	37	
PC3		Idlling - ready for departure	91	25	1	-36	-15	-10	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	25	1	-36	-15	-10	0	3	40	
MW2		Idling	90	25	5	-36	-8	-10	0	3	39	
MW3		Idlling - ready for departure	98	25	1	-36	-15	-10	0	3	40	
SB1	Sand Barge + Truck sand loading	Idling	101	50	1	-42	-15	-5	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	50	1	-42	-15	-5	0	3	-	
SB3		Engine standby	94	50	20	-42	-2	-5	0	3	48	
SB4		Truck idling + conveyor load sand into truck	103	50	9	-42	-5	-5	-10	3	44	
SB5		Relax conveyor + leave	102	50	1	-42	-15	-5	0	3	43	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		52
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	25	1	-36	-15	-10	0	3	30	
PC2		Idling	88	25	5	-36	-8	-10	0	3	37	
PC3		Idlling - ready for departure	91	25	1	-36	-15	-10	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	25	1	-36	-15	-10	0	3	40	
MW2		Idling	90	25	5	-36	-8	-10	0	3	39	
MW3		Idlling - ready for departure	98	25	1	-36	-15	-10	0	3	40	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	50	2	-42	-12	-5	0	3	37	
LPG2		Crane operation and LPG containers leave barge	112	50	1	-42	-15	-5	-10	3	43	
LPG3		LPG containers loading into truck	95	50	1	-42	-15	-5	0	3	36	
LPG4		Idlling	91	50	5	-42	-8	-5	0	3	39	
LPG5		Crane operation and LPG containers back to barge	108	50	1	-42	-15	-5	-10	3	39	
LPG6		Idlling - ready for departure	105	50	2	-42	-12	-5	0	3	49	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		52
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

roject : Discovery Bay EAS
ob No.: 235928
itle: Fixed Noise Assessment
ubtitle: Calculation of SPL at Receivers (Nighttime)
SR ID: N10b-B2

ase 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

oise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
C1	Peng Chau Kaito	Idling - arrival	88	25	1	-36	-15	-10	0	3	30	
C2		Idling	88	25	3	-36	-10	-10	0	3	35	
C3		Idling - ready for departure	91	25	1	-36	-15	-10	0	3	33	
MW1	Mui Wo Kaito	Idling - arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW3		Idling - ready for departure	-	-	-	-	-	-	-	-	-	No Nighttime operation
B1	Tug Boat + Barge	Idling for arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
B2		Off the landing board	-	-	-	-	-	-	-	-	-	
B3		Lorries leave barge	-	-	-	-	-	-	-	-	-	
B4		Lorries back to barge	-	-	-	-	-	-	-	-	-	
B5		Lift on the landing board	-	-	-	-	-	-	-	-	-	
B6		Idling for departure	-	-	-	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		38
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

ase 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

oise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
C1	Peng Chau Kaito	Idling - arrival	88	25	1	-36	-15	-10	0	3	30	
C2		Idling	88	25	5	-36	-8	-10	0	3	37	
C3		Idling - ready for departure	91	25	1	-36	-15	-10	0	3	33	
W1	Mui Wo Kaito	Idling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
W2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
W3		Idling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
B1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
B2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
B3		Engine standby	94	-	20	-	-	-	-	-	-	
B4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
B5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		39
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

ase 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

oise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
C1	Peng Chau Kaito	Idling - arrival	88	25	1	-36	-15	-10	0	3	30	
C2		Idling	88	25	5	-36	-8	-10	0	3	37	
C3		Idling - ready for departure	91	25	1	-36	-15	-10	0	3	33	
MW1	Mui Wo Kaito	Idling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
PG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
PG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
PG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
PG4		Idling	91	-	5	-	-	-	-	-	-	
PG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
PG6		Idling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		39
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-B4

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	40	1	-40	-15	-10	0	3	26	
PC2		Idling	88	40	5	-40	-8	-10	0	3	33	
PC3		Idling - ready for departure	91	40	1	-40	-15	-10	0	3	29	
MW1	Mui Wo Kaito	Idling - arrival	98	40	1	-40	-15	-10	0	3	36	
MW2		Idling	90	40	5	-40	-8	-10	0	3	35	
MW3		Idling - ready for departure	98	40	1	-40	-15	-10	0	3	36	
TB1	Tug Boat + Barge	Idling for arrival	99	75	10	-46	-5	0	0	3	52	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	66	1	-44	-15	-10	0	3	34	
TB3		Lorries leave barge	100	69	5	-45	-8	0	0	3	50	
TB4		Lorries back to barge	100	66	5	-44	-8	0	0	3	-	
TB5		Lift on the landing board	98	66	1	-44	-15	-10	0	3	-	
TB6		Idling for departure	99	75	5	-46	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		54
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	40	1	-40	-15	-10	0	3	26	
PC2		Idling	88	40	5	-40	-8	-10	0	3	33	
PC3		Idling - ready for departure	91	40	1	-40	-15	-10	0	3	29	
MW1	Mui Wo Kaito	Idling - arrival	98	40	1	-40	-15	-10	0	3	36	
MW2		Idling	90	40	5	-40	-8	-10	0	3	35	
MW3		Idling - ready for departure	98	40	1	-40	-15	-10	0	3	36	
SB1	Sand Barge + Truck sand loading	Idling	101	66	1	-44	-15	-5	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	66	1	-44	-15	-5	0	3	-	
SB3		Engine standby	94	66	20	-44	-2	-5	0	3	46	
SB4		Truck idling + conveyor load sand into truck	103	66	9	-44	-5	-5	-10	3	41	
SB5		Relax conveyor + leave	102	66	1	-44	-15	-5	0	3	41	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		49
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	40	1	-40	-15	-10	0	3	26	
PC2		Idling	88	40	5	-40	-8	-10	0	3	33	
PC3		Idling - ready for departure	91	40	1	-40	-15	-10	0	3	29	
MW1	Mui Wo Kaito	Idling - arrival	98	40	1	-40	-15	-10	0	3	36	
MW2		Idling	90	40	5	-40	-8	-10	0	3	35	
MW3		Idling - ready for departure	98	40	1	-40	-15	-10	0	3	36	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	66	2	-44	-12	-10	0	3	30	
LPG2		Crane operation and LPG containers leave barge	112	66	1	-44	-15	-5	-10	3	41	
LPG3		LPG containers loading into truck	95	66	1	-44	-15	-10	0	3	29	
LPG4		Idling	91	66	5	-44	-8	-10	0	3	32	
LPG5		Crane operation and LPG containers back to barge	108	66	1	-44	-15	-5	-10	3	37	
LPG6		Idling - ready for departure	105	67	2	-45	-12	-10	0	3	42	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		47
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

roject : Discovery Bay EAS
ob No.: 235928
itle: Fixed Noise Assessment
ubtitle: Calculation of SPL at Receivers (Nighttime)
SR ID: N10b-B4

ase 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

oise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
C1	Peng Chau Kaito	Idling - arrival	88	40	1	-40	-15	-10	0	3	26	
C2		Idling	88	40	3	-40	-10	-10	0	3	31	
C3		Idling - ready for departure	91	40	1	-40	-15	-10	0	3	29	
IW1	Mui Wo Kaito	Idling - arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
IW2		Idling	-	-	-	-	-	-	-	-	-	No Nighttime operation
IW3		Idling - ready for departure	-	-	-	-	-	-	-	-	-	No Nighttime operation
B1	Tug Boat + Barge	Idling for arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
B2		Off the landing board	-	-	-	-	-	-	-	-	-	
B3		Lorries leave barge	-	-	-	-	-	-	-	-	-	
B4		Lorries back to barge	-	-	-	-	-	-	-	-	-	
B5		Lift on the landing board	-	-	-	-	-	-	-	-	-	
B6		Idling for departure	-	-	-	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq (30min) dB(A)	34	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

ase 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

oise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
C1	Peng Chau Kaito	Idling - arrival	88	40	1	-40	-15	-10	0	3	26	
C2		Idling	88	40	5	-40	-8	-10	0	3	33	
C3		Idling - ready for departure	91	40	1	-40	-15	-10	0	3	29	
IW1	Mui Wo Kaito	Idling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
IW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
IW3		Idling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
B1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
B2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
B3		Engine standby	94	-	20	-	-	-	-	-	-	
B4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
B5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq (30min) dB(A)	35	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

ase 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

oise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
C1	Peng Chau Kaito	Idling - arrival	88	40	1	-40	-15	-10	0	3	26	
C2		Idling	88	40	5	-40	-8	-10	0	3	33	
C3		Idling - ready for departure	91	40	1	-40	-15	-10	0	3	29	
IW1	Mui Wo Kaito	Idling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
IW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
IW3		Idling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
PG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
PG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
PG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
PG4		Idling	91	-	5	-	-	-	-	-	-	
PG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
PG6		Idling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq (30min) dB(A)	35	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-B5

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	49	1	-42	-15	0	0	3	34	
PC2		Idling	88	49	5	-42	-8	0	0	3	41	
PC3		Idlling - ready for departure	91	49	1	-42	-15	0	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	49	1	-42	-15	0	0	3	44	
MW2		Idling	90	49	5	-42	-8	0	0	3	43	
MW3		Idlling - ready for departure	98	49	1	-42	-15	0	0	3	44	
TB1	Tug Boat + Barge	Idling for arrival	99	83	10	-46	-5	0	0	3	51	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	75	1	-46	-15	-10	0	3	33	
TB3		Lorries leave barge	100	77	5	-46	-8	0	0	3	49	
TB4		Lorries back to barge	100	75	5	-46	-8	0	0	3	-	
TB5		Lift on the landing board	98	75	1	-46	-15	-10	0	3	-	
TB6		Idling for departure	99	83	5	-46	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		55
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	49	1	-42	-15	0	0	3	34	
PC2		Idling	88	49	5	-42	-8	0	0	3	41	
PC3		Idlling - ready for departure	91	49	1	-42	-15	0	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	49	1	-42	-15	0	0	3	44	
MW2		Idling	90	49	5	-42	-8	0	0	3	43	
MW3		Idlling - ready for departure	98	49	1	-42	-15	0	0	3	44	
SB1	Sand Barge + Truck sand loading	Idling	101	75	1	-46	-15	-5	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	75	1	-46	-15	-5	0	3	-	
SB3		Engine standby	94	75	20	-46	-2	-5	0	3	45	
SB4		Truck idling + conveyor load sand into truck	103	75	9	-46	-5	-5	-10	3	40	
SB5		Relax conveyor + leave	102	75	1	-46	-15	-5	0	3	40	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		52
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	49	1	-42	-15	0	0	3	34	
PC2		Idling	88	49	5	-42	-8	0	0	3	41	
PC3		Idlling - ready for departure	91	49	1	-42	-15	0	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	49	1	-42	-15	0	0	3	44	
MW2		Idling	90	49	5	-42	-8	0	0	3	43	
MW3		Idlling - ready for departure	98	49	1	-42	-15	0	0	3	44	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	75	2	-46	-12	-5	0	3	34	
LPG2		Crane operation and LPG containers leave barge	112	75	1	-46	-15	-5	-10	3	40	
LPG3		LPG containers loading into truck	95	75	1	-46	-15	-5	0	3	33	
LPG4		Idlling	91	75	5	-46	-8	-5	0	3	36	
LPG5		Crane operation and LPG containers back to barge	108	75	1	-46	-15	-5	-10	3	36	
LPG6		Idlling - ready for departure	105	75	2	-46	-12	-5	0	3	46	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		52
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-B5

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	49	1	-42	-15	0	0	3	34	
PC2		Idling	88	49	3	-42	-10	0	0	3	39	
PC3		Idlling - ready for departure	91	49	1	-42	-15	0	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB1	Tug Boat + Barge	Idling for arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB2		Off the landing board	-	-	-	-	-	-	-	-	-	
TB3		Lorries leave barge	-	-	-	-	-	-	-	-	-	
TB4		Lorries back to barge	-	-	-	-	-	-	-	-	-	
TB5		Lift on the landing board	-	-	-	-	-	-	-	-	-	
TB6		Idling for departure	-	-	-	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	42	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	49	1	-42	-15	0	0	3	34	
PC2		Idling	88	49	5	-42	-8	0	0	3	41	
PC3		Idlling - ready for departure	91	49	1	-42	-15	0	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	43	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	49	1	-42	-15	0	0	3	34	
PC2		Idling	88	49	5	-42	-8	0	0	3	41	
PC3		Idlling - ready for departure	91	49	1	-42	-15	0	0	3	37	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	43	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-B8

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	72	1	-45	-15	0	0	3	31	
PC2		Idling	88	72	5	-45	-8	0	0	3	38	
PC3		Idling - ready for departure	91	72	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	72	1	-45	-15	0	0	3	41	
MW2		Idling	90	72	5	-45	-8	0	0	3	40	
MW3		Idling - ready for departure	98	72	1	-45	-15	0	0	3	41	
TB1	Tug Boat + Barge	Idling for arrival	99	103	10	-48	-5	0	0	3	49	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	97	1	-48	-15	0	0	3	40	
TB3		Lorries leave barge	100	99	5	-48	-8	0	0	3	47	
TB4		Lorries back to barge	100	97	5	-48	-8	0	0	3	-	
TB5		Lift on the landing board	98	97	1	-48	-15	0	0	3	-	
TB6		Idling for departure	99	103	5	-48	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		53
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	72	1	-45	-15	0	0	3	31	
PC2		Idling	88	72	5	-45	-8	0	0	3	38	
PC3		Idling - ready for departure	91	72	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	72	1	-45	-15	0	0	3	41	
MW2		Idling	90	72	5	-45	-8	0	0	3	40	
MW3		Idling - ready for departure	98	72	1	-45	-15	0	0	3	41	
SB1	Sand Barge + Truck sand loading	Idling	101	97	1	-48	-15	-5	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	97	1	-48	-15	-5	0	3	-	
SB3		Engine standby	94	97	20	-48	-2	-5	0	3	43	
SB4		Truck idling + conveyor load sand into truck	103	97	9	-48	-5	-5	-10	3	38	
SB5		Relax conveyor + leave	102	97	1	-48	-15	-5	0	3	37	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		49
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	72	1	-45	-15	0	0	3	31	
PC2		Idling	88	72	5	-45	-8	0	0	3	38	
PC3		Idling - ready for departure	91	72	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	72	1	-45	-15	0	0	3	41	
MW2		Idling	90	72	5	-45	-8	0	0	3	40	
MW3		Idling - ready for departure	98	72	1	-45	-15	0	0	3	41	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	97	2	-48	-12	-5	0	3	32	
LPG2		Crane operation and LPG containers leave barge	112	97	1	-48	-15	-5	-10	3	37	
LPG3		LPG containers loading into truck	95	97	1	-48	-15	-5	0	3	30	
LPG4		Idling	91	97	5	-48	-8	-5	0	3	33	
LPG5		Crane operation and LPG containers back to barge	108	97	1	-48	-15	-5	-10	3	33	
LPG6		Idling - ready for departure	105	97	2	-48	-12	-5	0	3	44	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		49
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-B8

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	72	1	-45	-15	0	0	3	31	
PC2		Idling	88	72	3	-45	-10	0	0	3	36	
PC3		Idlling - ready for departure	91	72	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB1	Tug Boat + Barge	Idling for arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB2		Off the landing board	-	-	-	-	-	-	-	-	-	
TB3		Lorries leave barge	-	-	-	-	-	-	-	-	-	
TB4		Lorries back to barge	-	-	-	-	-	-	-	-	-	
TB5		Lift on the landing board	-	-	-	-	-	-	-	-	-	
TB6		Idling for departure	-	-	-	-	-	-	-	-	-	
					Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)						39	
					Nighttime criterion (ANL-5), dB(A)						45	
					Exceedance, dB(A)						-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	72	1	-45	-15	0	0	3	31	
PC2		Idling	88	72	5	-45	-8	0	0	3	38	
PC3		Idlling - ready for departure	91	72	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
					Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)						40	
					Nighttime criterion (ANL-5), dB(A)						45	
					Exceedance, dB(A)						-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	72	1	-45	-15	0	0	3	31	
PC2		Idling	88	72	5	-45	-8	0	0	3	38	
PC3		Idlling - ready for departure	91	72	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
					Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)						40	
					Nighttime criterion (ANL-5), dB(A)						45	
					Exceedance, dB(A)						-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-D1

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	76	1	-46	-15	0	0	3	31	
PC2		Idling	88	76	5	-46	-8	0	0	3	38	
PC3		Idling - ready for departure	91	76	1	-46	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	76	1	-46	-15	0	0	3	41	
MW2		Idling	90	76	5	-46	-8	0	0	3	40	
MW3		Idling - ready for departure	98	76	1	-46	-15	0	0	3	41	
TB1	Tug Boat + Barge	Idling for arrival	99	79	10	-46	-5	0	0	3	51	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	58	1	-43	-15	0	0	3	45	
TB3		Lorries leave barge	100	68	5	-45	-8	0	0	3	51	
TB4		Lorries back to barge	100	58	5	-43	-8	0	0	3	-	
TB5		Lift on the landing board	98	58	1	-43	-15	0	0	3	-	
TB6		Idling for departure	99	79	5	-46	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		55
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	76	1	-46	-15	0	0	3	31	
PC2		Idling	88	76	5	-46	-8	0	0	3	38	
PC3		Idling - ready for departure	91	76	1	-46	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	76	1	-46	-15	0	0	3	41	
MW2		Idling	90	76	5	-46	-8	0	0	3	40	
MW3		Idling - ready for departure	98	76	1	-46	-15	0	0	3	41	
SB1	Sand Barge + Truck sand loading	Idling	101	58	1	-43	-15	0	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	58	1	-43	-15	0	0	3	-	
SB3		Engine standby	94	58	20	-43	-2	0	0	3	52	
SB4		Truck idling + conveyor load sand into truck	103	58	9	-43	-5	0	-10	3	48	
SB5		Relax conveyor + leave	102	58	1	-43	-15	0	0	3	47	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		55
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	76	1	-46	-15	0	0	3	31	
PC2		Idling	88	76	5	-46	-8	0	0	3	38	
PC3		Idling - ready for departure	91	76	1	-46	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	76	1	-46	-15	0	0	3	41	
MW2		Idling	90	76	5	-46	-8	0	0	3	40	
MW3		Idling - ready for departure	98	76	1	-46	-15	0	0	3	41	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	58	2	-43	-12	0	0	3	41	
LPG2		Crane operation and LPG containers leave barge	112	58	1	-43	-15	0	-10	3	47	
LPG3		LPG containers loading into truck	95	58	1	-43	-15	0	0	3	40	
LPG4		Idling	91	58	5	-43	-8	0	0	3	43	
LPG5		Crane operation and LPG containers back to barge	108	58	1	-43	-15	0	-10	3	43	
LPG6		Idling - ready for departure	105	58	2	-43	-12	0	0	3	53	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		55
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-D1

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	76	1	-46	-15	0	0	3	31	
PC2		Idling	88	76	3	-46	-10	0	0	3	35	
PC3		Idlling - ready for departure	91	76	1	-46	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB1	Tug Boat + Barge	Idling for arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB2		Off the landing board	-	-	-	-	-	-	-	-	-	
TB3		Lorries leave barge	-	-	-	-	-	-	-	-	-	
TB4		Lorries back to barge	-	-	-	-	-	-	-	-	-	
TB5		Lift on the landing board	-	-	-	-	-	-	-	-	-	
TB6		Idling for departure	-	-	-	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		38
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	76	1	-46	-15	0	0	3	31	
PC2		Idling	88	76	5	-46	-8	0	0	3	38	
PC3		Idlling - ready for departure	91	76	1	-46	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		40
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	76	1	-46	-15	0	0	3	31	
PC2		Idling	88	76	5	-46	-8	0	0	3	38	
PC3		Idlling - ready for departure	91	76	1	-46	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		40
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-D5

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	110	1	-49	-15	0	0	3	27	
PC2		Idling	88	110	5	-49	-8	0	0	3	34	
PC3		Idling - ready for departure	91	110	1	-49	-15	0	0	3	30	
MW1	Mui Wo Kaito	Idling - arrival	98	110	1	-49	-15	0	0	3	37	
MW2		Idling	90	110	5	-49	-8	0	0	3	36	
MW3		Idling - ready for departure	98	110	1	-49	-15	0	0	3	37	
TB1	Tug Boat + Barge	Idling for arrival	99	136	10	-51	-5	0	0	3	47	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	111	1	-49	-15	0	0	3	39	
TB3		Lorries leave barge	100	123	5	-50	-8	0	0	3	45	
TB4		Lorries back to barge	100	111	5	-49	-8	0	0	3	-	
TB5		Lift on the landing board	98	111	1	-49	-15	0	0	3	-	
TB6		Idling for departure	99	136	5	-51	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	50	
										Daytime criterion (ANL-5), dB(A)	55	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	110	1	-49	-15	0	0	3	27	
PC2		Idling	88	110	5	-49	-8	0	0	3	34	
PC3		Idling - ready for departure	91	110	1	-49	-15	0	0	3	30	
MW1	Mui Wo Kaito	Idling - arrival	98	110	1	-49	-15	0	0	3	37	
MW2		Idling	90	110	5	-49	-8	0	0	3	36	
MW3		Idling - ready for departure	98	110	1	-49	-15	0	0	3	37	
SB1	Sand Barge + Truck sand loading	Idling	101	111	1	-49	-15	0	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	111	1	-49	-15	0	0	3	-	
SB3		Engine standby	94	111	20	-49	-2	0	0	3	46	
SB4		Truck idling + conveyor load sand into truck	103	111	9	-49	-5	0	-10	3	42	
SB5		Relax conveyor + leave	102	111	1	-49	-15	0	0	3	41	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	50	
										Daytime criterion (ANL-5), dB(A)	55	
										Exceedance, dB(A)	-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	110	1	-49	-15	0	0	3	27	
PC2		Idling	88	110	5	-49	-8	0	0	3	34	
PC3		Idling - ready for departure	91	110	1	-49	-15	0	0	3	30	
MW1	Mui Wo Kaito	Idling - arrival	98	110	1	-49	-15	0	0	3	37	
MW2		Idling	90	110	5	-49	-8	0	0	3	36	
MW3		Idling - ready for departure	98	110	1	-49	-15	0	0	3	37	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	111	2	-49	-12	0	0	3	35	
LPG2		Crane operation and LPG containers leave barge	112	111	1	-49	-15	0	-10	3	41	
LPG3		LPG containers loading into truck	95	111	1	-49	-15	0	0	3	34	
LPG4		Idling	91	111	5	-49	-8	0	0	3	37	
LPG5		Crane operation and LPG containers back to barge	108	111	1	-49	-15	0	-10	3	37	
LPG6		Idling - ready for departure	105	111	2	-49	-12	0	0	3	47	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	50	
										Daytime criterion (ANL-5), dB(A)	55	
										Exceedance, dB(A)	-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-D5

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	110	1	-49	-15	0	0	3	27	
PC2		Idling	88	110	3	-49	-10	0	0	3	32	
PC3		Idlling - ready for departure	91	110	1	-49	-15	0	0	3	30	
MW1	Mui Wo Kaito	Idlling - arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	-	-	-	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB1	Tug Boat + Barge	Idling for arrival	-	-	-	-	-	-	-	-	-	No Nighttime operation
TB2		Off the landing board	-	-	-	-	-	-	-	-	-	
TB3		Lorries leave barge	-	-	-	-	-	-	-	-	-	
TB4		Lorries back to barge	-	-	-	-	-	-	-	-	-	
TB5		Lift on the landing board	-	-	-	-	-	-	-	-	-	
TB6		Idling for departure	-	-	-	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		35
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	110	1	-49	-15	0	0	3	27	
PC2		Idling	88	110	5	-49	-8	0	0	3	34	
PC3		Idlling - ready for departure	91	110	1	-49	-15	0	0	3	30	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		36
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	110	1	-49	-15	0	0	3	27	
PC2		Idling	88	110	5	-49	-8	0	0	3	34	
PC3		Idlling - ready for departure	91	110	1	-49	-15	0	0	3	30	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	No Nighttime operation
MW2		Idling	90	-	5	-	-	-	-	-	-	No Nighttime operation
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	No Nighttime operation
LG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LG4		Idlling	91	-	5	-	-	-	-	-	-	
LG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		36
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-D6

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	82	1	-46	-15	0	0	3	30	
PC2		Idling	88	82	5	-46	-8	0	0	3	37	
PC3		Idlling - ready for departure	91	82	1	-46	-15	0	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	82	1	-46	-15	0	0	3	40	
MW2		Idling	90	82	5	-46	-8	0	0	3	39	
MW3		Idlling - ready for departure	98	82	1	-46	-15	0	0	3	40	
TB1	Tug Boat + Barge	Idling for arrival	99	114	10	-49	-5	0	0	3	48	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	92	1	-47	-15	0	0	3	41	
TB3		Lorries leave barge	100	102	5	-48	-8	0	0	3	47	
TB4		Lorries back to barge	100	92	5	-47	-8	0	0	3	-	
TB5		Lift on the landing board	98	92	1	-47	-15	0	0	3	-	
TB6		Idling for departure	99	114	5	-49	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		52
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	82	1	-46	-15	0	0	3	30	
PC2		Idling	88	82	5	-46	-8	0	0	3	37	
PC3		Idlling - ready for departure	91	82	1	-46	-15	0	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	82	1	-46	-15	0	0	3	40	
MW2		Idling	90	82	5	-46	-8	0	0	3	39	
MW3		Idlling - ready for departure	98	82	1	-46	-15	0	0	3	40	
SB1	Sand Barge + Truck sand loading	Idling	101	92	1	-47	-15	0	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	92	1	-47	-15	0	0	3	-	
SB3		Engine standby	94	92	20	-47	-2	0	0	3	48	
SB4		Truck idling + conveyor load sand into truck	103	92	9	-47	-5	0	-10	3	43	
SB5		Relax conveyor + leave	102	92	1	-47	-15	0	0	3	43	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		51
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	82	1	-46	-15	0	0	3	30	
PC2		Idling	88	82	5	-46	-8	0	0	3	37	
PC3		Idlling - ready for departure	91	82	1	-46	-15	0	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	82	1	-46	-15	0	0	3	40	
MW2		Idling	90	82	5	-46	-8	0	0	3	39	
MW3		Idlling - ready for departure	98	82	1	-46	-15	0	0	3	40	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	92	2	-47	-12	0	0	3	37	
LPG2		Crane operation and LPG containers leave barge	112	92	1	-47	-15	0	-10	3	43	
LPG3		LPG containers loading into truck	95	92	1	-47	-15	0	0	3	36	
LPG4		Idlling	91	92	5	-47	-8	0	0	3	39	
LPG5		Crane operation and LPG containers back to barge	108	92	1	-47	-15	0	-10	3	39	
LPG6		Idlling - ready for departure	105	92	2	-47	-12	0	0	3	49	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		52
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-D6

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	82	1	-46	-15	0	0	3	30	
PC2		Idling	88	82	5	-46	-8	0	0	3	37	
PC3		Idlling - ready for departure	91	82	1	-46	-15	0	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
TB1	Tug Boat + Barge	Idling for arrival	99	-	10	-	-	-	-	-	-	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	-	1	-	-	-	-	-	-	
TB3		Lorries leave barge	100	-	5	-	-	-	-	-	-	
TB4		Lorries back to barge	100	-	5	-	-	-	-	-	-	
TB5		Lift on the landing board	98	-	1	-	-	-	-	-	-	
TB6		Idling for departure	99	-	5	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	39	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	82	1	-46	-15	0	0	3	30	
PC2		Idling	88	82	5	-46	-8	0	0	3	37	
PC3		Idlling - ready for departure	91	82	1	-46	-15	0	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	39	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	82	1	-46	-15	0	0	3	30	
PC2		Idling	88	82	5	-46	-8	0	0	3	37	
PC3		Idlling - ready for departure	91	82	1	-46	-15	0	0	3	33	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	39	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-D8

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	70	1	-45	-15	0	0	3	31	
PC2		Idling	88	70	5	-45	-8	0	0	3	38	
PC3		Idling - ready for departure	91	70	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	70	1	-45	-15	0	0	3	41	
MW2		Idling	90	70	5	-45	-8	0	0	3	40	
MW3		Idling - ready for departure	98	70	1	-45	-15	0	0	3	41	
TB1	Tug Boat + Barge	Idling for arrival	99	106	10	-49	-5	0	0	3	49	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	90	1	-47	-15	0	0	3	41	
TB3		Lorries leave barge	100	97	5	-48	-8	0	0	3	47	
TB4		Lorries back to barge	100	90	5	-47	-8	0	0	3	-	
TB5		Lift on the landing board	98	90	1	-47	-15	0	0	3	-	
TB6		Idling for departure	99	106	5	-49	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		53
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	70	1	-45	-15	0	0	3	31	
PC2		Idling	88	70	5	-45	-8	0	0	3	38	
PC3		Idling - ready for departure	91	70	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	70	1	-45	-15	0	0	3	41	
MW2		Idling	90	70	5	-45	-8	0	0	3	40	
MW3		Idling - ready for departure	98	70	1	-45	-15	0	0	3	41	
SB1	Sand Barge + Truck sand loading	Idling	101	90	1	-47	-15	0	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	90	1	-47	-15	0	0	3	-	
SB3		Engine standby	94	90	20	-47	-2	0	0	3	48	
SB4		Truck idling + conveyor load sand into truck	103	90	9	-47	-5	0	-10	3	44	
SB5		Relax conveyor + leave	102	90	1	-47	-15	0	0	3	43	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		52
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	70	1	-45	-15	0	0	3	31	
PC2		Idling	88	70	5	-45	-8	0	0	3	38	
PC3		Idling - ready for departure	91	70	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idling - arrival	98	70	1	-45	-15	0	0	3	41	
MW2		Idling	90	70	5	-45	-8	0	0	3	40	
MW3		Idling - ready for departure	98	70	1	-45	-15	0	0	3	41	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	90	2	-47	-12	0	0	3	37	
LPG2		Crane operation and LPG containers leave barge	112	90	1	-47	-15	0	-10	3	43	
LPG3		LPG containers loading into truck	95	90	1	-47	-15	0	0	3	36	
LPG4		Idling	91	90	5	-47	-8	0	0	3	39	
LPG5		Crane operation and LPG containers back to barge	108	90	1	-47	-15	0	-10	3	39	
LPG6		Idling - ready for departure	105	90	2	-47	-12	0	0	3	49	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		52
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-D8

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	70	1	-45	-15	0	0	3	31	
PC2		Idling	88	70	5	-45	-8	0	0	3	38	
PC3		Idlling - ready for departure	91	70	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
TB1	Tug Boat + Barge	Idling for arrival	99	-	10	-	-	-	-	-	-	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	-	1	-	-	-	-	-	-	
TB3		Lorries leave barge	100	-	5	-	-	-	-	-	-	
TB4		Lorries back to barge	100	-	5	-	-	-	-	-	-	
TB5		Lift on the landing board	98	-	1	-	-	-	-	-	-	
TB6		Idling for departure	99	-	5	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	40	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	70	1	-45	-15	0	0	3	31	
PC2		Idling	88	70	5	-45	-8	0	0	3	38	
PC3		Idlling - ready for departure	91	70	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	40	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	70	1	-45	-15	0	0	3	31	
PC2		Idling	88	70	5	-45	-8	0	0	3	38	
PC3		Idlling - ready for departure	91	70	1	-45	-15	0	0	3	34	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
LG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LG4		Idlling	91	-	5	-	-	-	-	-	-	
LG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	40	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-A1

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	50	1	-42	-15	-10	0	3	24	
PC2		Idling	88	50	5	-42	-8	-10	0	3	31	
PC3		Idlling - ready for departure	91	50	1	-42	-15	-10	0	3	27	
MW1	Mui Wo Kaito	Idlling - arrival	98	50	1	-42	-15	-10	0	3	34	
MW2		Idling	90	50	5	-42	-8	-10	0	3	33	
MW3		Idlling - ready for departure	98	50	1	-42	-15	-10	0	3	34	
TB1	Tug Boat + Barge	Idling for arrival	99	41	10	-40	-5	-10	0	3	47	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	25	1	-36	-15	-10	0	3	42	
TB3		Lorries leave barge	100	32	5	-38	-8	-10	0	3	47	
TB4		Lorries back to barge	100	25	5	-36	-8	-10	0	3	-	
TB5		Lift on the landing board	98	25	1	-36	-15	-10	0	3	-	
TB6		Idling for departure	99	41	5	-40	-8	-10	0	3	-	
										Predicted Overall Noise Level, $L_{eq\ (30min)}$ dB(A)		51	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	50	1	-42	-15	-10	0	3	24	
PC2		Idling	88	50	5	-42	-8	-10	0	3	31	
PC3		Idlling - ready for departure	91	50	1	-42	-15	-10	0	3	27	
MW1	Mui Wo Kaito	Idlling - arrival	98	50	1	-42	-15	-10	0	3	34	
MW2		Idling	90	50	5	-42	-8	-10	0	3	33	
MW3		Idlling - ready for departure	98	50	1	-42	-15	-10	0	3	34	
SB1	Sand Barge + Truck sand loading	Idling	101	25	1	-36	-15	-10	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	25	1	-36	-15	-10	0	3	-	
SB3		Engine standby	94	25	20	-36	-2	-10	-10	3	39	
SB4		Truck idling + conveyor load sand into truck	103	25	9	-36	-5	-10	-10	3	45	
SB5		Relax conveyor + leave	102	25	1	-36	-15	-10	0	3	44	
										Predicted Overall Noise Level, $L_{eq\ (30min)}$ dB(A)		49	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	50	1	-42	-15	-10	0	3	24	
PC2		Idling	88	50	5	-42	-8	-10	0	3	31	
PC3		Idlling - ready for departure	91	50	1	-42	-15	-10	0	3	27	
MW1	Mui Wo Kaito	Idlling - arrival	98	50	1	-42	-15	-10	0	3	34	
MW2		Idling	90	50	5	-42	-8	-10	0	3	33	
MW3		Idlling - ready for departure	98	50	1	-42	-15	-10	0	3	34	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	25	2	-36	-12	-10	0	3	38	
LPG2		Crane operation and LPG containers leave barge	112	25	1	-36	-15	-10	-10	3	44	
LPG3		LPG containers loading into truck	95	25	1	-36	-15	-10	0	3	37	
LPG4		Idlling	91	25	5	-36	-8	-10	0	3	40	
LPG5		Crane operation and LPG containers back to barge	108	25	1	-36	-15	-10	-10	3	40	
LPG6		Idlling - ready for departure	105	25	2	-36	-12	-10	0	3	50	
										Predicted Overall Noise Level, $L_{eq\ (30min)}$ dB(A)		52	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-A1

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	50	1	-42	-15	-10	0	3	24	
PC2		Idling	88	50	5	-42	-8	-10	0	3	31	
PC3		Idling - ready for departure	91	50	1	-42	-15	-10	0	3	27	
MW1	Mui Wo Kaito	Idling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idling - ready for departure	98	-	1	-	-	-	-	-	-	
TB1	Tug Boat + Barge	Idling for arrival	99	-	10	-	-	-	-	-	-	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	-	1	-	-	-	-	-	-	
TB3		Lorries leave barge	100	-	5	-	-	-	-	-	-	
TB4		Lorries back to barge	100	-	5	-	-	-	-	-	-	
TB5		Lift on the landing board	98	-	1	-	-	-	-	-	-	
TB6		Idling for departure	99	-	5	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	33	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	50	1	-42	-15	-10	0	3	24	
PC2		Idling	88	50	5	-42	-8	-10	0	3	31	
PC3		Idling - ready for departure	91	50	1	-42	-15	-10	0	3	27	
MW1	Mui Wo Kaito	Idling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idling - ready for departure	98	-	1	-	-	-	-	-	-	
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	33	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	50	1	-42	-15	-10	0	3	24	
PC2		Idling	88	50	5	-42	-8	-10	0	3	31	
PC3		Idling - ready for departure	91	50	1	-42	-15	-10	0	3	27	
MW1	Mui Wo Kaito	Idling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idling - ready for departure	98	-	1	-	-	-	-	-	-	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	33	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Project : *Discovery Bay EAS*
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-A2

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	56	1	-43	-15	-10	0	3	23	
PC2		Idling	88	56	5	-43	-8	-10	0	3	30	
PC3		Idlling - ready for departure	91	56	1	-43	-15	-10	0	3	26	
MW1	Mui Wo Kaito	Idlling - arrival	98	56	1	-43	-15	-10	0	3	33	
MW2		Idling	90	56	5	-43	-8	-10	0	3	32	
MW3		Idlling - ready for departure	98	56	1	-43	-15	-10	0	3	33	
TB1	Tug Boat + Barge	Idling for arrival	99	45	10	-41	-5	-10	0	3	46	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	31	1	-38	-15	-10	0	3	40	
TB3		Lorries leave barge	100	37	5	-39	-8	-10	0	3	46	
TB4		Lorries back to barge	100	31	5	-38	-8	-10	0	3	-	
TB5		Lift on the landing board	98	31	1	-38	-15	-10	0	3	-	
TB6		Idling for departure	99	45	5	-41	-8	-10	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		50	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	56	1	-43	-15	-10	0	3	23	
PC2		Idling	88	56	5	-43	-8	-10	0	3	30	
PC3		Idlling - ready for departure	91	56	1	-43	-15	-10	0	3	26	
MW1	Mui Wo Kaito	Idlling - arrival	98	56	1	-43	-15	-10	0	3	33	
MW2		Idling	90	56	5	-43	-8	-10	0	3	32	
MW3		Idlling - ready for departure	98	56	1	-43	-15	-10	0	3	33	
SB1	Sand Barge + Truck sand loading	Idling	101	31	1	-38	-15	-10	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	31	1	-38	-15	-10	0	3	-	
SB3		Engine standby	94	31	20	-38	-2	-10	0	3	47	
SB4		Truck idling + conveyor load sand into truck	103	31	9	-38	-5	-10	-10	3	43	
SB5		Relax conveyor + leave	102	31	1	-38	-15	-10	0	3	42	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		50	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Case 3 *Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck*

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	56	1	-43	-15	-10	0	3	23	
PC2		Idling	88	56	5	-43	-8	-10	0	3	30	
PC3		Idlling - ready for departure	91	56	1	-43	-15	-10	0	3	26	
MW1	Mui Wo Kaito	Idlling - arrival	98	56	1	-43	-15	-10	0	3	33	
MW2		Idling	90	56	5	-43	-8	-10	0	3	32	
MW3		Idlling - ready for departure	98	56	1	-43	-15	-10	0	3	33	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	31	2	-38	-12	-10	0	3	36	
LPG2		Crane operation and LPG containers leave barge	112	31	1	-38	-15	-10	-10	3	42	
LPG3		LPG containers loading into truck	95	31	1	-38	-15	-10	0	3	35	
LPG4		Idlling	91	31	5	-38	-8	-10	0	3	38	
LPG5		Crane operation and LPG containers back to barge	108	31	1	-38	-15	-10	-10	3	38	
LPG6		Idlling - ready for departure	105	31	2	-38	-12	-10	0	3	48	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		51	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-A2

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	56	1	-43	-15	-10	0	3	23	
PC2		Idling	88	56	5	-43	-8	-10	0	3	30	
PC3		Idlling - ready for departure	91	56	1	-43	-15	-10	0	3	26	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
TB1	Tug Boat + Barge	Idling for arrival	99	-	10	-	-	-	-	-	-	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	-	1	-	-	-	-	-	-	
TB3		Lorries leave barge	100	-	5	-	-	-	-	-	-	
TB4		Lorries back to barge	100	-	5	-	-	-	-	-	-	
TB5		Lift on the landing board	98	-	1	-	-	-	-	-	-	
TB6		Idling for departure	99	-	5	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	32	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	56	1	-43	-15	-10	0	3	23	
PC2		Idling	88	56	5	-43	-8	-10	0	3	30	
PC3		Idlling - ready for departure	91	56	1	-43	-15	-10	0	3	26	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	No Nighttime operation
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	32	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	56	1	-43	-15	-10	0	3	23	
PC2		Idling	88	56	5	-43	-8	-10	0	3	30	
PC3		Idlling - ready for departure	91	56	1	-43	-15	-10	0	3	26	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	No Nighttime operation
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	32	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-A4

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	73	1	-45	-15	-10	0	3	21	
PC2		Idling	88	73	5	-45	-8	-10	0	3	28	
PC3		Idling - ready for departure	91	73	1	-45	-15	-10	0	3	24	
MW1	Mui Wo Kaito	Idling - arrival	98	73	1	-45	-15	-10	0	3	31	
MW2		Idling	90	73	5	-45	-8	-10	0	3	30	
MW3		Idling - ready for departure	98	73	1	-45	-15	-10	0	3	31	
TB1	Tug Boat + Barge	Idling for arrival	99	57	10	-43	-5	-10	0	3	44	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	46	1	-41	-15	-10	0	3	37	
TB3		Lorries leave barge	100	51	5	-42	-8	-10	0	3	43	
TB4		Lorries back to barge	100	46	5	-41	-8	-10	0	3	-	
TB5		Lift on the landing board	98	46	1	-41	-15	-10	0	3	-	
TB6		Idling for departure	99	57	5	-43	-8	-10	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		47	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	73	1	-45	-15	-10	0	3	21	
PC2		Idling	88	73	5	-45	-8	-10	0	3	28	
PC3		Idling - ready for departure	91	73	1	-45	-15	-10	0	3	24	
MW1	Mui Wo Kaito	Idling - arrival	98	73	1	-45	-15	-10	0	3	31	
MW2		Idling	90	73	5	-45	-8	-10	0	3	30	
MW3		Idling - ready for departure	98	73	1	-45	-15	-10	0	3	31	
SB1	Sand Barge + Truck sand loading	Idling	101	46	1	-41	-15	-10	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	46	1	-41	-15	-10	0	3	-	
SB3		Engine standby	94	46	20	-41	-2	-10	0	3	44	
SB4		Truck idling + conveyor load sand into truck	103	46	9	-41	-5	-10	-10	3	40	
SB5		Relax conveyor + leave	102	46	1	-41	-15	-10	0	3	39	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		47	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	73	1	-45	-15	-10	0	3	21	
PC2		Idling	88	73	5	-45	-8	-10	0	3	28	
PC3		Idling - ready for departure	91	73	1	-45	-15	-10	0	3	24	
MW1	Mui Wo Kaito	Idling - arrival	98	73	1	-45	-15	-10	0	3	31	
MW2		Idling	90	73	5	-45	-8	-10	0	3	30	
MW3		Idling - ready for departure	98	73	1	-45	-15	-10	0	3	31	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	46	2	-41	-12	-10	0	3	33	
LPG2		Crane operation and LPG containers leave barge	112	46	1	-41	-15	-10	-10	3	39	
LPG3		LPG containers loading into truck	95	46	1	-41	-15	-10	0	3	32	
LPG4		Idling	91	46	5	-41	-8	-10	0	3	35	
LPG5		Crane operation and LPG containers back to barge	108	46	1	-41	-15	-10	-10	3	35	
LPG6		Idling - ready for departure	105	46	2	-41	-12	-10	0	3	45	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		47	
										Daytime criterion (ANL-5), dB(A)		55	
										Exceedance, dB(A)		-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-A4

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	73	1	-45	-15	-10	0	3	21	
PC2		Idling	88	73	5	-45	-8	-10	0	3	28	
PC3		Idling - ready for departure	91	73	1	-45	-15	-10	0	3	24	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
TB1	Tug Boat + Barge	Idling for arrival	99	-	10	-	-	-	-	-	-	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	-	1	-	-	-	-	-	-	
TB3		Lorries leave barge	100	-	5	-	-	-	-	-	-	
TB4		Lorries back to barge	100	-	5	-	-	-	-	-	-	
TB5		Lift on the landing board	98	-	1	-	-	-	-	-	-	
TB6		Idling for departure	99	-	5	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	30	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	73	1	-45	-15	-10	0	3	21	
PC2		Idling	88	73	5	-45	-8	-10	0	3	28	
PC3		Idling - ready for departure	91	73	1	-45	-15	-10	0	3	24	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	30	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	73	1	-45	-15	-10	0	3	21	
PC2		Idling	88	73	5	-45	-8	-10	0	3	28	
PC3		Idling - ready for departure	91	73	1	-45	-15	-10	0	3	24	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	30	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-A5

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	84	1	-46	-15	-5	0	3	25	
PC2		Idling	88	84	5	-46	-8	-5	0	3	32	
PC3		Idling - ready for departure	91	84	1	-46	-15	-5	0	3	28	
MW1	Mui Wo Kaito	Idling - arrival	98	84	1	-46	-15	-5	0	3	35	
MW2		Idling	90	84	5	-46	-8	-5	0	3	34	
MW3		Idling - ready for departure	98	84	1	-46	-15	-5	0	3	35	
TB1	Tug Boat + Barge	Idling for arrival	99	67	10	-45	-5	0	0	3	53	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	58	1	-43	-15	-10	0	3	35	
TB3		Lorries leave barge	100	62	5	-44	-8	0	0	3	51	
TB4		Lorries back to barge	100	58	5	-43	-8	0	0	3	-	
TB5		Lift on the landing board	98	58	1	-43	-15	-10	0	3	-	
TB6		Idling for departure	99	67	5	-45	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		55
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	84	1	-46	-15	-5	0	3	25	
PC2		Idling	88	84	5	-46	-8	-5	0	3	32	
PC3		Idling - ready for departure	91	84	1	-46	-15	-5	0	3	28	
MW1	Mui Wo Kaito	Idling - arrival	98	84	1	-46	-15	-5	0	3	35	
MW2		Idling	90	84	5	-46	-8	-5	0	3	34	
MW3		Idling - ready for departure	98	84	1	-46	-15	-5	0	3	35	
SB1	Sand Barge + Truck sand loading	Idling	101	58	1	-43	-15	-5	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	58	1	-43	-15	-5	0	3	-	
SB3		Engine standby	94	58	20	-43	-2	-5	0	3	47	
SB4		Truck idling + conveyor load sand into truck	103	58	9	-43	-5	-5	-10	3	43	
SB5		Relax conveyor + leave	102	58	1	-43	-15	-5	0	3	42	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		50
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	84	1	-46	-15	-5	0	3	25	
PC2		Idling	88	84	5	-46	-8	-5	0	3	32	
PC3		Idling - ready for departure	91	84	1	-46	-15	-5	0	3	28	
MW1	Mui Wo Kaito	Idling - arrival	98	84	1	-46	-15	-5	0	3	35	
MW2		Idling	90	84	5	-46	-8	-5	0	3	34	
MW3		Idling - ready for departure	98	84	1	-46	-15	-5	0	3	35	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	58	2	-43	-12	-5	0	3	36	
LPG2		Crane operation and LPG containers leave barge	112	58	1	-43	-15	-5	-10	3	42	
LPG3		LPG containers loading into truck	95	58	1	-43	-15	-5	0	3	35	
LPG4		Idling	91	58	5	-43	-8	-5	0	3	38	
LPG5		Crane operation and LPG containers back to barge	108	58	1	-43	-15	-5	-10	3	38	
LPG6		Idling - ready for departure	105	58	2	-43	-12	-5	0	3	48	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		50
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

oject : Discovery Bay EAS
ɔb No.: 235928
ɪle: Fixed Noise Assessment
ıbtitle: Calculation of SPL at Receivers (Nighttime)
ɜR ID: N10b-A5

ɪse 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

ɔise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
ɔ1	Peng Chau Kaito	Idlling - arrival	88	84	1	-46	-15	-5	0	3	25	
ɔ2		Idling	88	84	5	-46	-8	-5	0	3	32	
ɔ3		Idlling - ready for departure	91	84	1	-46	-15	-5	0	3	28	
W1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
W2		Idling	90	-	5	-	-	-	-	-	-	
W3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
31	Tug Boat + Barge	Idling for arrival	99	-	10	-	-	-	-	-	-	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
32		Off the landing board	100	-	1	-	-	-	-	-	-	
33		Lorries leave barge	100	-	5	-	-	-	-	-	-	
34		Lorries back to barge	100	-	5	-	-	-	-	-	-	
35		Lift on the landing board	98	-	1	-	-	-	-	-	-	
36		Idling for departure	99	-	5	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		34
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

ase 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

oise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
C1	Peng Chau Kaito	Idlling - arrival	88	84	1	-46	-15	-5	0	3	25	
C2		Idling	88	84	5	-46	-8	-5	0	3	32	
C3		Idlling - ready for departure	91	84	1	-46	-15	-5	0	3	28	
IW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
IW2		Idling	90	-	5	-	-	-	-	-	-	
IW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
ıB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
ıB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
ıB3		Engine standby	94	-	20	-	-	-	-	-	-	
ıB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
ıB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		34
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

ɔase 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

ɔoise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
ɔC1	Peng Chau Kaito	Idlling - arrival	88	84	1	-46	-15	-5	0	3	25	
ɔC2		Idling	88	84	5	-46	-8	-5	0	3	32	
ɔC3		Idlling - ready for departure	91	84	1	-46	-15	-5	0	3	28	
ɯW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
ɯW2		Idling	90	-	5	-	-	-	-	-	-	
ɯW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		34
										Nighttime criterion (ANL-5), dB(A)		45
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-A6

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	90	1	-47	-15	0	0	3	29	
PC2		Idling	88	90	5	-47	-8	0	0	3	36	
PC3		Idling - ready for departure	91	90	1	-47	-15	0	0	3	32	
MW1	Mui Wo Kaito	Idling - arrival	98	90	1	-47	-15	0	0	3	39	
MW2		Idling	90	90	5	-47	-8	0	0	3	38	
MW3		Idling - ready for departure	98	90	1	-47	-15	0	0	3	39	
TB1	Tug Boat + Barge	Idling for arrival	99	74	10	-45	-5	0	0	3	52	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	65	1	-44	-15	0	0	3	44	
TB3		Lorries leave barge	100	68	5	-45	-8	0	0	3	51	
TB4		Lorries back to barge	100	65	5	-44	-8	0	0	3	-	
TB5		Lift on the landing board	98	65	1	-44	-15	0	0	3	-	
TB6		Idling for departure	99	74	5	-45	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		55
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	90	1	-47	-15	0	0	3	29	
PC2		Idling	88	90	5	-47	-8	0	0	3	36	
PC3		Idling - ready for departure	91	90	1	-47	-15	0	0	3	32	
MW1	Mui Wo Kaito	Idling - arrival	98	90	1	-47	-15	0	0	3	39	
MW2		Idling	90	90	5	-47	-8	0	0	3	38	
MW3		Idling - ready for departure	98	90	1	-47	-15	0	0	3	39	
SB1	Sand Barge + Truck sand loading	Idling	101	65	1	-44	-15	-5	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	65	1	-44	-15	-5	0	3	-	
SB3		Engine standby	94	65	20	-44	-2	-5	0	3	46	
SB4		Truck idling + conveyor load sand into truck	103	65	9	-44	-5	-5	-10	3	42	
SB5		Relax conveyor + leave	102	65	1	-44	-15	-5	0	3	41	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		50
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idling - arrival	88	90	1	-47	-15	0	0	3	29	
PC2		Idling	88	90	5	-47	-8	0	0	3	36	
PC3		Idling - ready for departure	91	90	1	-47	-15	0	0	3	32	
MW1	Mui Wo Kaito	Idling - arrival	98	90	1	-47	-15	0	0	3	39	
MW2		Idling	90	90	5	-47	-8	0	0	3	38	
MW3		Idling - ready for departure	98	90	1	-47	-15	0	0	3	39	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idling - arrival	93	65	2	-44	-12	-5	0	3	35	
LPG2		Crane operation and LPG containers leave barge	112	65	1	-44	-15	-5	-10	3	41	
LPG3		LPG containers loading into truck	95	65	1	-44	-15	-5	0	3	34	
LPG4		Idling	91	65	5	-44	-8	-5	0	3	37	
LPG5		Crane operation and LPG containers back to barge	108	65	1	-44	-15	-5	-10	3	37	
LPG6		Idling - ready for departure	105	65	2	-44	-12	-5	0	3	47	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		50
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-A6

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	90	1	-47	-15	0	0	3	29	
PC2		Idling	88	90	5	-47	-8	0	0	3	36	
PC3		Idlling - ready for departure	91	90	1	-47	-15	0	0	3	32	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
TB1	Tug Boat + Barge	Idling for arrival	99	-	10	-	-	-	-	-	-	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	-	1	-	-	-	-	-	-	
TB3		Lorries leave barge	100	-	5	-	-	-	-	-	-	
TB4		Lorries back to barge	100	-	5	-	-	-	-	-	-	
TB5		Lift on the landing board	98	-	1	-	-	-	-	-	-	
TB6		Idling for departure	99	-	5	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	38	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	90	1	-47	-15	0	0	3	29	
PC2		Idling	88	90	5	-47	-8	0	0	3	36	
PC3		Idlling - ready for departure	91	90	1	-47	-15	0	0	3	32	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	No Nighttime operation
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	38	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	90	1	-47	-15	0	0	3	29	
PC2		Idling	88	90	5	-47	-8	0	0	3	36	
PC3		Idlling - ready for departure	91	90	1	-47	-15	0	0	3	32	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	38	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Daytime)
NSR ID: N10b-A8

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	107	1	-49	-15	0	0	3	28	
PC2		Idling	88	107	5	-49	-8	0	0	3	35	
PC3		Idlling - ready for departure	91	107	1	-49	-15	0	0	3	31	
MW1	Mui Wo Kaito	Idlling - arrival	98	107	1	-49	-15	0	0	3	38	
MW2		Idling	90	107	5	-49	-8	0	0	3	37	
MW3		Idlling - ready for departure	98	107	1	-49	-15	0	0	3	38	
TB1	Tug Boat + Barge	Idling for arrival	99	91	10	-47	-5	0	0	3	50	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	82	1	-46	-15	0	0	3	42	
TB3		Lorries leave barge	100	86	5	-47	-8	0	0	3	49	
TB4		Lorries back to barge	100	82	5	-46	-8	0	0	3	-	
TB5		Lift on the landing board	98	82	1	-46	-15	0	0	3	-	
TB6		Idling for departure	99	91	5	-47	-8	0	0	3	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		53
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	107	1	-49	-15	0	0	3	28	
PC2		Idling	88	107	5	-49	-8	0	0	3	35	
PC3		Idlling - ready for departure	91	107	1	-49	-15	0	0	3	31	
MW1	Mui Wo Kaito	Idlling - arrival	98	107	1	-49	-15	0	0	3	38	
MW2		Idling	90	107	5	-49	-8	0	0	3	37	
MW3		Idlling - ready for departure	98	107	1	-49	-15	0	0	3	38	
SB1	Sand Barge + Truck sand loading	Idling	101	82	1	-46	-15	-5	0	3	-	For worst case 30 minutes scenario, SB3, SB4 &SB5 have selected for assessment.
SB2		Extend Conveyor belt	99	82	1	-46	-15	-5	0	3	-	
SB3		Engine standby	94	82	20	-46	-2	-5	0	3	44	
SB4		Truck idling + conveyor load sand into truck	103	82	9	-46	-5	-5	-10	3	39	
SB5		Relax conveyor + leave	102	82	1	-46	-15	-5	0	3	39	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		48
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	107	1	-49	-15	0	0	3	28	
PC2		Idling	88	107	5	-49	-8	0	0	3	35	
PC3		Idlling - ready for departure	91	107	1	-49	-15	0	0	3	31	
MW1	Mui Wo Kaito	Idlling - arrival	98	107	1	-49	-15	0	0	3	38	
MW2		Idling	90	107	5	-49	-8	0	0	3	37	
MW3		Idlling - ready for departure	98	107	1	-49	-15	0	0	3	38	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	82	2	-46	-12	-5	0	3	33	
LPG2		Crane operation and LPG containers leave barge	112	82	1	-46	-15	-5	-10	3	39	
LPG3		LPG containers loading into truck	95	82	1	-46	-15	-5	0	3	32	
LPG4		Idlling	91	82	5	-46	-8	-5	0	3	35	
LPG5		Crane operation and LPG containers back to barge	108	82	1	-46	-15	-5	-10	3	35	
LPG6		Idlling - ready for departure	105	82	2	-46	-12	-5	0	3	45	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)		48
										Daytime criterion (ANL-5), dB(A)		55
										Exceedance, dB(A)		-

Project : Discovery Bay EAS
Job No.: 235928
Title: Fixed Noise Assessment
Subtitle: Calculation of SPL at Receivers (Nighttime)
NSR ID: N10b-A8

Case 1 Peng Chau Kaito, Mui Wo Kaito & Tug Boat with Barge

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	107	1	-49	-15	0	0	3	28	
PC2		Idling	88	107	5	-49	-8	0	0	3	35	
PC3		Idlling - ready for departure	91	107	1	-49	-15	0	0	3	31	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
TB1	Tug Boat + Barge	Idling for arrival	99	-	10	-	-	-	-	-	-	For worst case 30 minutes scenario, TB1, TB2 & TB3 have selected for assessment.
TB2		Off the landing board	100	-	1	-	-	-	-	-	-	
TB3		Lorries leave barge	100	-	5	-	-	-	-	-	-	
TB4		Lorries back to barge	100	-	5	-	-	-	-	-	-	
TB5		Lift on the landing board	98	-	1	-	-	-	-	-	-	
TB6		Idling for departure	99	-	5	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	37	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Case 2 Peng Chau Kaito, Mui Wo Kaito & Sand Barge + Truck sand loading

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	107	1	-49	-15	0	0	3	28	
PC2		Idling	88	107	5	-49	-8	0	0	3	35	
PC3		Idlling - ready for departure	91	107	1	-49	-15	0	0	3	31	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
SB1	Sand Barge + Truck sand loading	Idling	101	-	1	-	-	-	-	-	-	No Nighttime operation
SB2		Extend Conveyor belt	99	-	1	-	-	-	-	-	-	
SB3		Engine standby	94	-	20	-	-	-	-	-	-	
SB4		Truck idling + conveyor load sand into truck	103	-	9	-	-	-	-	-	-	
SB5		Relax conveyor + leave	102	-	1	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	37	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

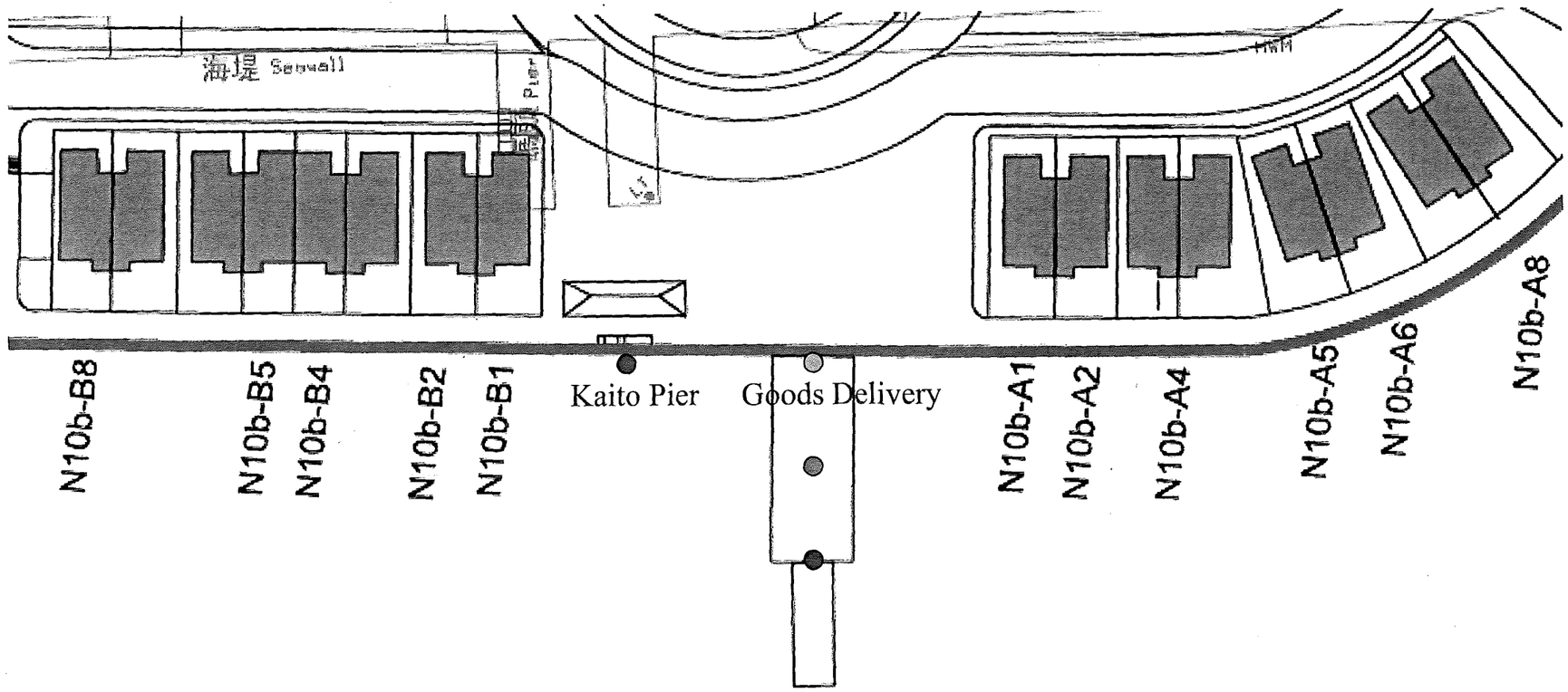
Case 3 Peng Chau Kaito, Mui Wo Kaito & LPG Container Vessel + LPG Containers Loading Truck

Noise Source ID	Description	Activities/Equipment	SWL, dB(A)	Shortest separation distance (m)	Worst operating time (min)	Correction, dB(A)					Predicted SPL, dB(A)	Remark
						Distance	Time	Screening	Mitigation	Facade		
PC1	Peng Chau Kaito	Idlling - arrival	88	107	1	-49	-15	0	0	3	28	
PC2		Idling	88	107	5	-49	-8	0	0	3	35	
PC3		Idlling - ready for departure	91	107	1	-49	-15	0	0	3	31	
MW1	Mui Wo Kaito	Idlling - arrival	98	-	1	-	-	-	-	-	-	
MW2		Idling	90	-	5	-	-	-	-	-	-	
MW3		Idlling - ready for departure	98	-	1	-	-	-	-	-	-	
LPG1	LPG Container Vessel + LPG Containers Loading Truck	Idlling - arrival	93	-	2	-	-	-	-	-	-	No Nighttime operation
LPG2		Crane operation and LPG containers leave barge	112	-	1	-	-	-	-	-	-	
LPG3		LPG containers loading into truck	95	-	1	-	-	-	-	-	-	
LPG4		Idlling	91	-	5	-	-	-	-	-	-	
LPG5		Crane operation and LPG containers back to barge	108	-	1	-	-	-	-	-	-	
LPG6		Idlling - ready for departure	105	-	2	-	-	-	-	-	-	
										Predicted Overall Noise Level, Leq $_{(30min)}$dB(A)	37	
										Nighttime criterion (ANL-5), dB(A)	45	
										Exceedance, dB(A)	-	

Mitigated (Barrier)

Daytime		Noise Impact, dB(A)	Exceedance	Noise Impact, dB(A)	Exceedance	Noise Impact, dB(A)	Exceedance
NSR	Criteria	Case 1	Case 1	Case 2	Case 2	Case 3	Case 3
N10b-B1	55	54	-	54	-	54	-
N10b-B2	55	53	-	52	-	52	-
N10b-B4	55	54	-	49	-	47	-
N10b-B5	55	55	-	52	-	52	-
N10b-B8	55	53	-	49	-	49	-
N10b-D1	55	55	-	55	-	55	-
N10b-D5	55	50	-	50	-	50	-
N10b-D6	55	52	-	51	-	52	-
N10b-D8	55	53	-	52	-	52	-
N10b-A1	55	51	-	49	-	52	-
N10b-A2	55	50	-	50	-	51	-
N10b-A4	55	47	-	47	-	47	-
N10b-A5	55	55	-	50	-	50	-
N10b-A6	55	55	-	50	-	50	-
N10b-A8	55	53	-	48	-	48	-

Nighttime		Noise Impact, dB(A)	Exceedance	Noise Impact, dB(A)	Exceedance	Noise Impact, dB(A)	Exceedance
NSR	Criteria	Case 1	Case 1	Case 2	Case 2	Case 3	Case 3
N10b-B1	45	42	-	43	-	43	-
N10b-B2	45	38	-	39	-	39	-
N10b-B4	45	34	-	35	-	35	-
N10b-B5	45	42	-	43	-	43	-
N10b-B8	45	39	-	40	-	40	-
N10b-D1	45	38	-	40	-	40	-
N10b-D5	45	35	-	36	-	36	-
N10b-D6	45	39	-	39	-	39	-
N10b-D8	45	40	-	40	-	40	-
N10b-A1	45	33	-	33	-	33	-
N10b-A2	45	32	-	32	-	32	-
N10b-A4	45	30	-	30	-	30	-
N10b-A5	45	34	-	34	-	34	-
N10b-A6	45	38	-	38	-	38	-
N10b-A8	45	37	-	37	-	37	-



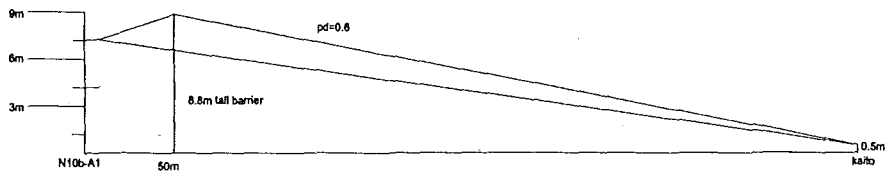
Legend

- Proposed relocated location of fixed noise sources from Pang Chau Kai To / Mui Wo Kai To
- Proposed relocated location of fixed noise sources from operation of landing board / conveyor / crane / loading and unloading of LPG containers into truck
- Proposed relocated location of fixed noise sources from loading and unloading of lorry / LPG container vessel / sand barge
- Proposed relocated location of fixed noise sources from tug boat

Existing Marine-based Fixed Noise Sources Locations

ARUP

N10b-A1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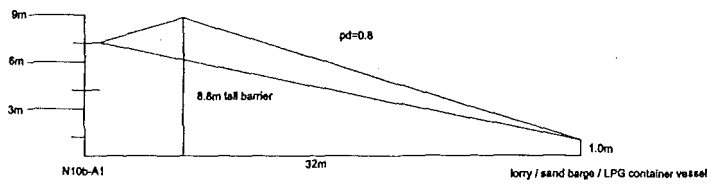
6m
3m
pd=0.6
8.8m tall barrier
N10b-A1
50m
0.5m
kaito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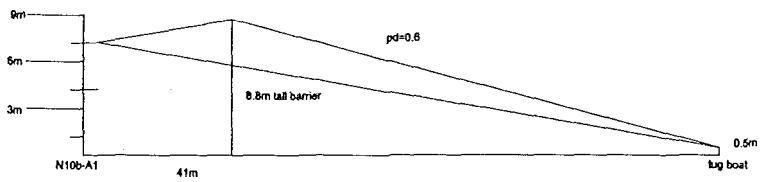
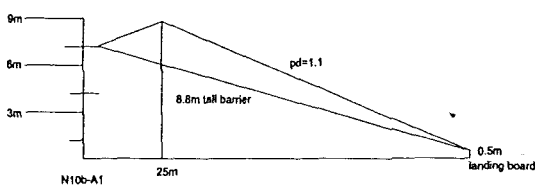
6m
3m
pd=0.8
8.8m tall barrier
N10b-A1
32m
1.0m
lorry / sand barge / LPG container vessel


9m
6m
3m
pd=0.6
8.8m tall barrier
N10b-A1
41m
0.5m
tug boat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6m
3m
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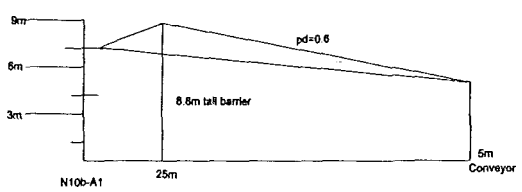
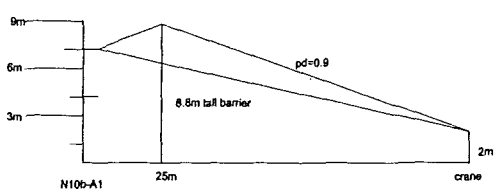
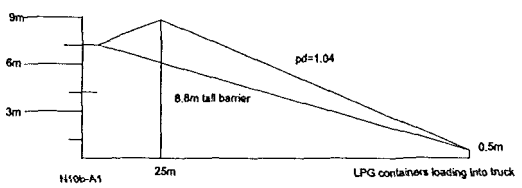
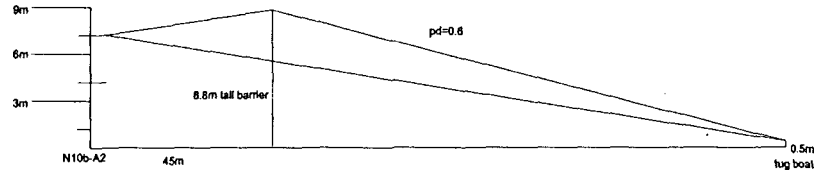
8.8m tall barrier
N10b-A1
25m
0.5m
landing board

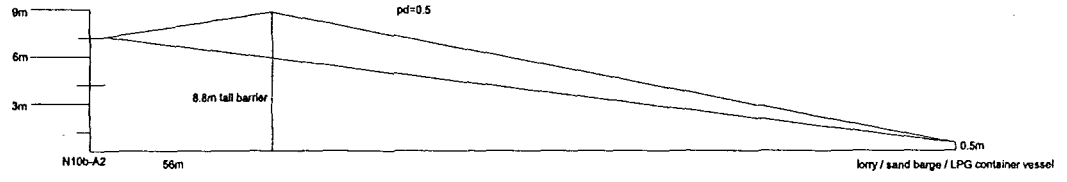

9m
6m
3m
pd=0.6
8.8m tall barrier
N10b-A1
25m
5m
Conveyor

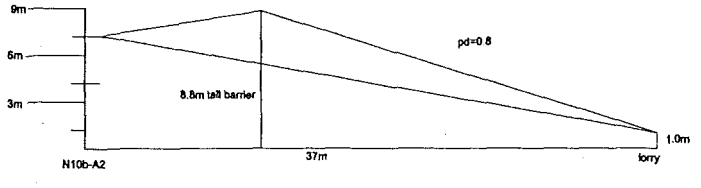

9m
6m
3m
pd=0.9
8.8m tall barrier
N10b-A1
25m
2m
crane

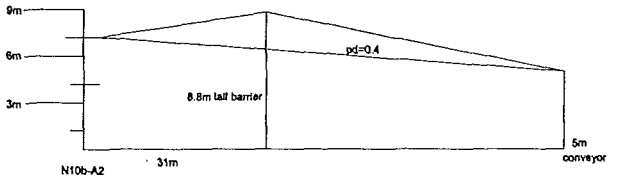

9m
6m
3m
pd=1.04
8.8m tall barrier
N10b-A1
25m
0.5m
LPG containers loading into truck

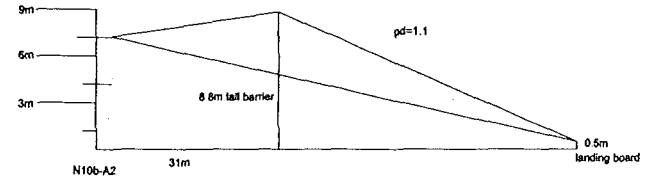
N10b-A2

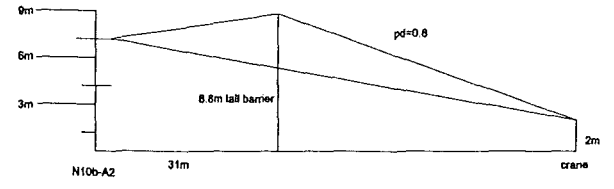

9m
6m
3m
pd=0.6
8.8m tall barrier
N10b-A2
45m
0.5m
tug boat

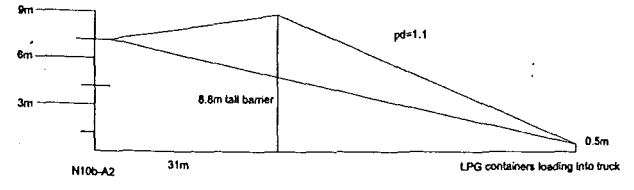

9m
6m
3m
pd=0.5
8.8m tall barrier
N10b-A2
56m
0.5m
lorry / sand barge / LPG container vessel


9m
6m
3m
pd=0.8
8.8m tall barrier
N10b-A2
37m
1.0m
lorry

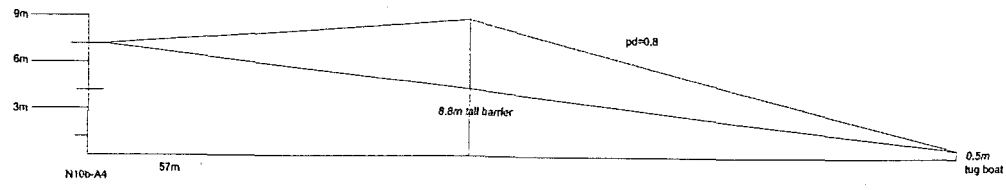

9m
6m
3m
pd=0.4
8.8m tall barrier
N10b-A2
31m
5m
conveyor

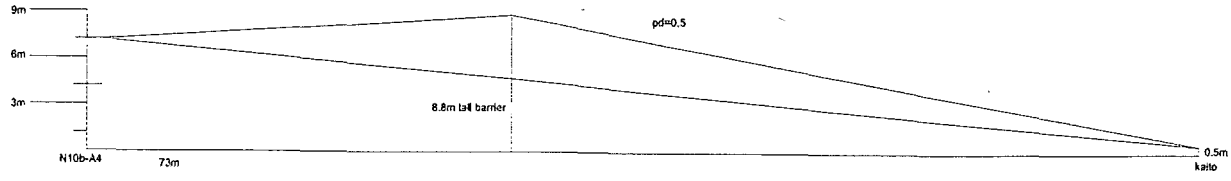

9m
6m
3m
pd=1.1
8.8m tall barrier
N10b-A2
31m
0.5m
landing board

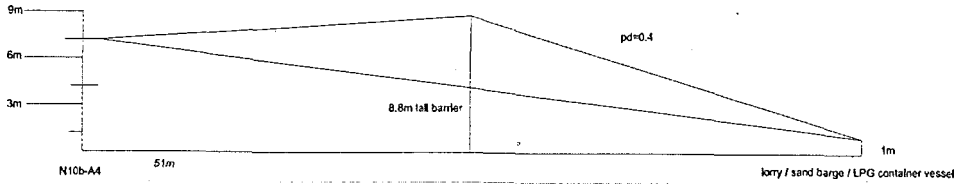

9m
6m
3m
pd=0.8
8.8m tall barrier
N10b-A2
31m
2m
crane

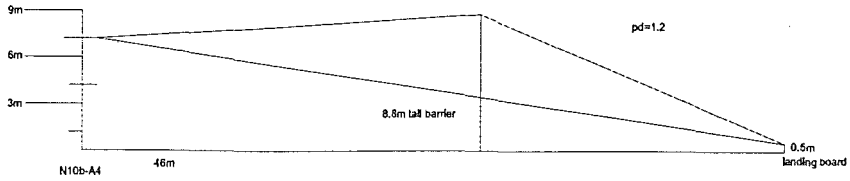

9m
6m
3m
pd=1.1
8.8m tall barrier
N10b-A2
31m
0.5m
LPG containers loading into truck

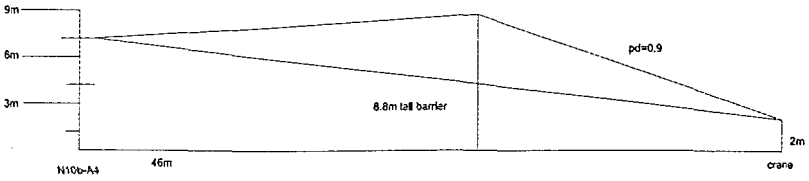
N10b-A4

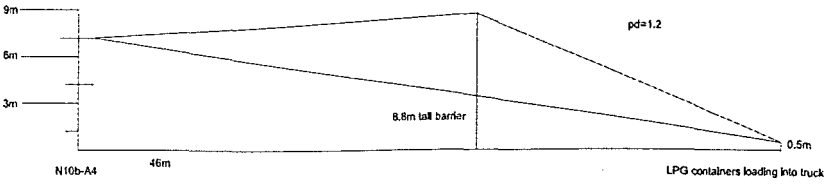

9m
6m
3m
pd=0.8
8.8m tall barrier
0.5m
tug boat
N10b-A4
57m


9m
6m
3m
pd=0.5
8.8m tall barrier
0.5m
kaito
N10b-A4
73m

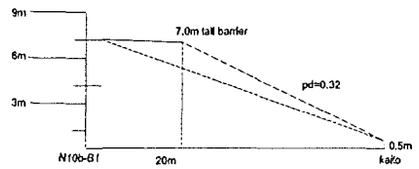

9m
6m
3m
pd=0.4
8.8m tall barrier
1m
lorry / sand barge / LPG container vessel
N10b-A4
51m

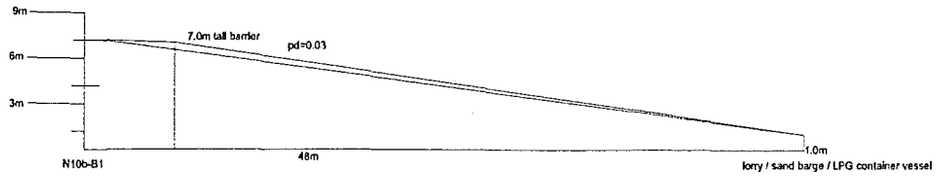

9m
6m
3m
pd=1.2
8.8m tall barrier
0.5m
landing board
N10b-A4
46m

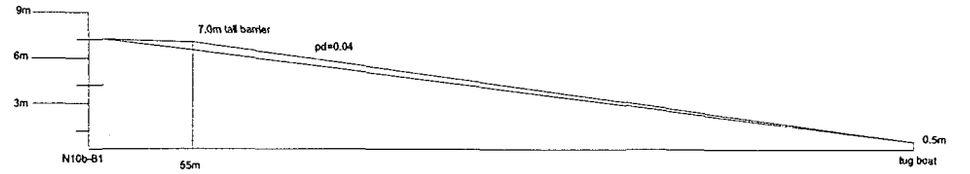

9m
6m
3m
pd=0.9
8.8m tall barrier
2m
crane
N10b-A4
46m

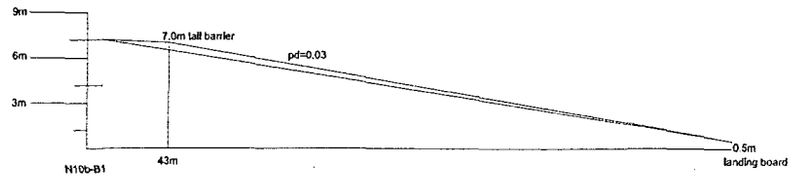

9m
6m
3m
pd=1.2
8.8m tall barrier
0.5m
LPG containers loading into truck
N10b-A4
46m

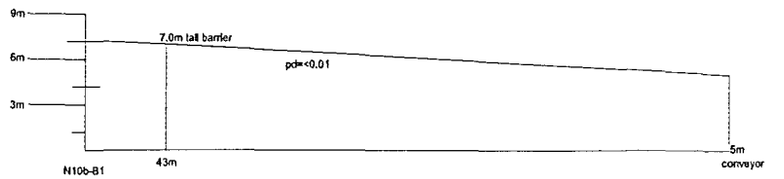
N10b-B1

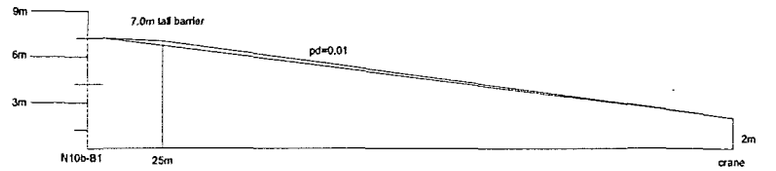

9m
6m
3m
7.0m tall barrier
pd=0.32
0.5m
N10b-B1
20m
kaito

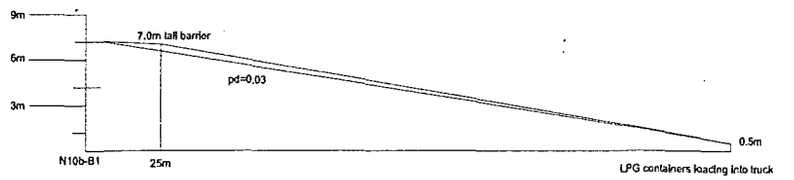

9m
6m
3m
7.0m tall barrier
pd=0.03
1.0m
N10b-B1
48m
lorry / sand barge / LPG container vessel


9m
6m
3m
7.0m tall barrier
pd=0.04
0.5m
N10b-B1
55m
tug boat

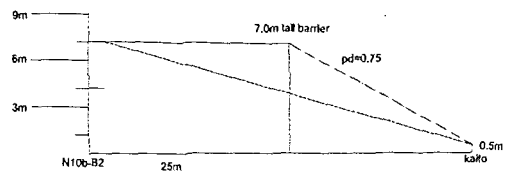

9m
6m
3m
7.0m tall barrier
pd=0.03
0.5m
N10b-B1
43m
landing board

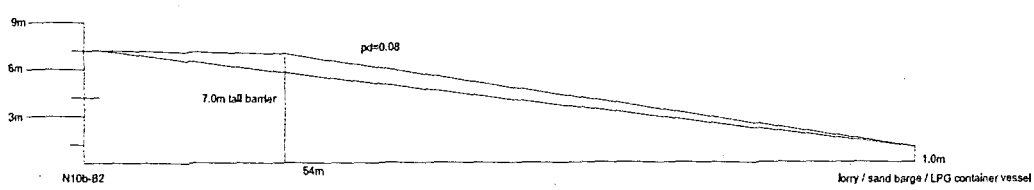

9m
6m
3m
7.0m tall barrier
pd=<0.01
5m
N10b-B1
43m
conveyor

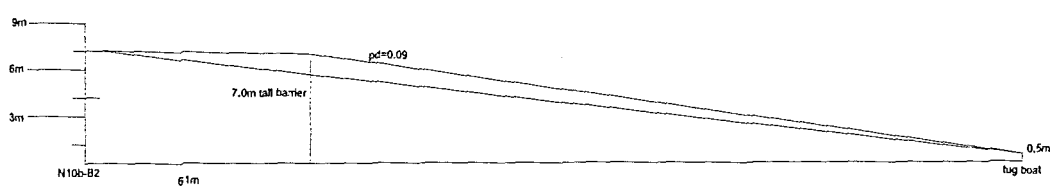

9m
6m
3m
7.0m tall barrier
pd=0.01
2m
N10b-B1
25m
crane

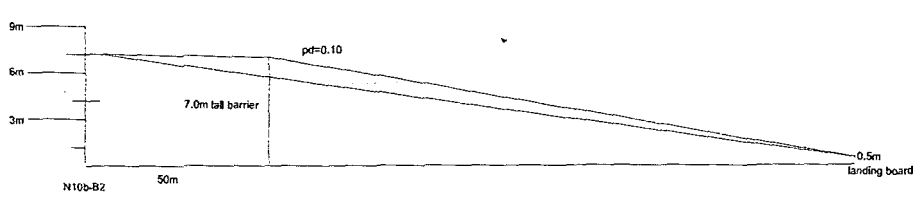

9m
6m
3m
7.0m tall barrier
pd=0.03
0.5m
N10b-B1
25m
LPG containers loading into truck

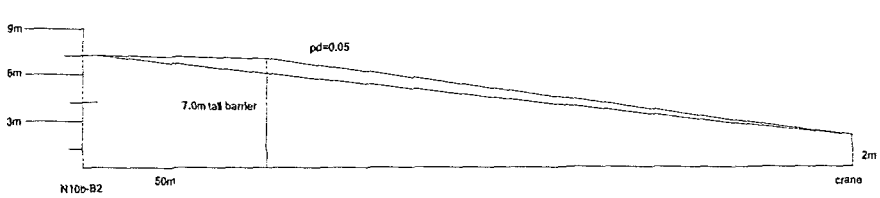
N10b-B2

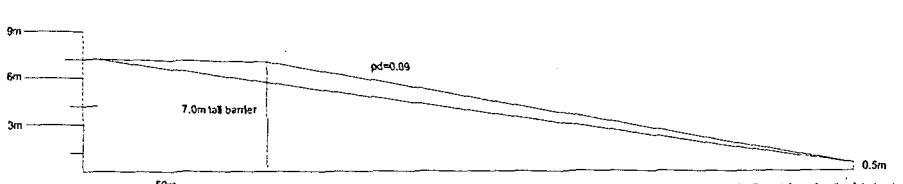

9m
6m
3m
7.0m tall barrier
pd=0.75
0.5m
kaito
N10b-B2
25m


9m
6m
3m
pd=0.08
7.0m tall barrier
1.0m
N10b-B2
54m
lorry / sand barge / LPG container vessel

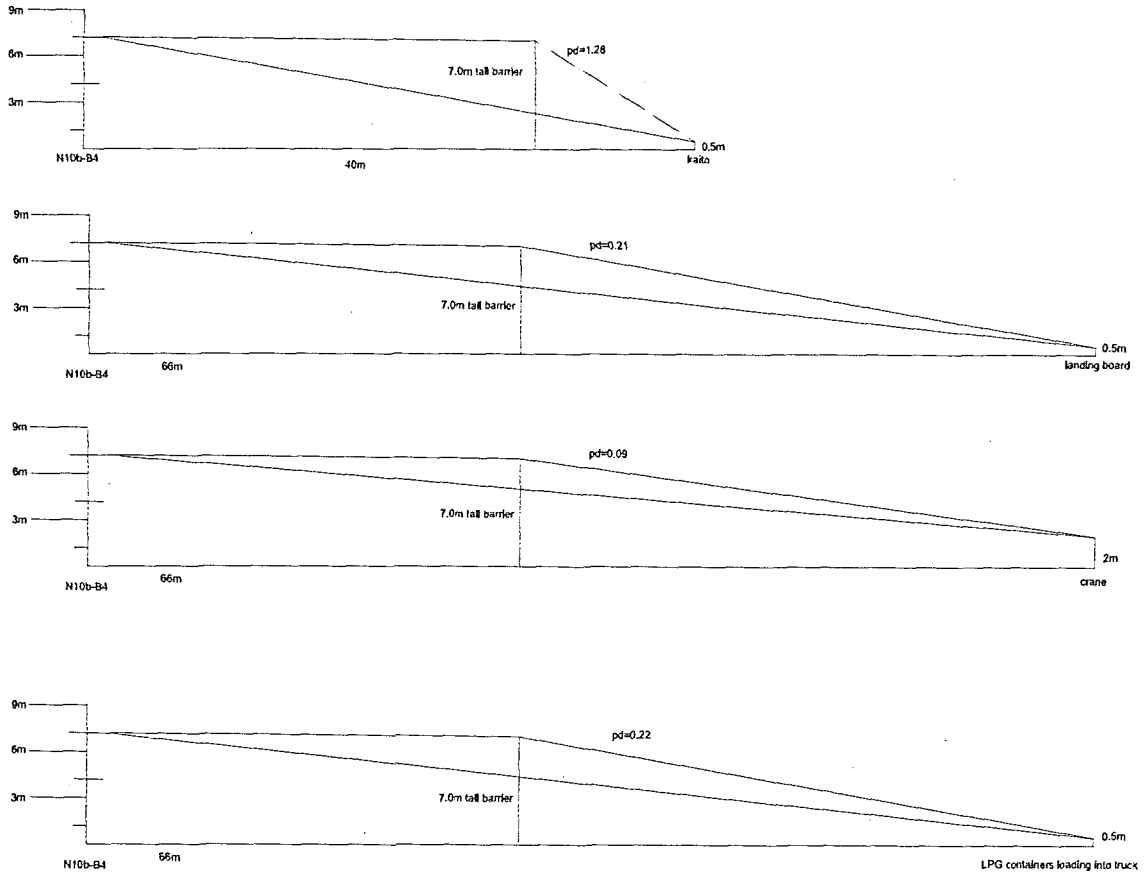

9m
6m
3m
pd=0.09
7.0m tall barrier
0.5m
N10b-B2
61m
tug boat


9m
6m
3m
pd=0.10
7.0m tall barrier
0.5m
landing board
N10b-B2
50m


9m
6m
3m
pd=0.05
7.0m tall barrier
2m
crane
N10b-B2
50m


9m
6m
3m
pd=0.09
7.0m tall barrier
0.5m
LPG containers loading into truck
N10b-B2
50m

N10b-B4


9m
6m
3m
7.0m tall barrier
pd=1.28
0.5m
N10b-B4
40m
kaito
9m
6m
3m
pd=0.21
7.0m tall barrier
0.5m
N10b-B4
66m
landing board
9m
6m
3m
pd=0.09
7.0m tall barrier
2m
N10b-B4
66m
crane
9m
6m
3m
pd=0.22
7.0m tall barrier
0.5m
N10b-B4
66m
LPG containers loading into truck

Appendix 5.6

Firework Display
Noise Measurement
Location

#F1
(at the Existing
Lookout Point)

Parkvale Drive

Discovery Bay Plaza

Tai Pak Wan

Nim Shue Wan

Area 10b

#F2
(at the Existing
Breakwater)

Nim Shue Wan

N

LEGEND

FIREWORKS NOISE MEASUREMENT
(7PM - 9PM ON 23rd APRIL, 2014)

0 25 50 75 100 125
METRES

I:\acoustic\env\project\235928\13 Drawing Deliverables\report\02-EAS\Area 10b\Appendix 5.5 - Firework Display Noise Measurement Locations.dgn

Appendix 5.7

Firework Display Noise Result Summary

Project : Discovery Bay EAS
Job No.: 235928
Title: Firework Display Noise Assessment
Subtitle: Firework Display Noise Measurement Results

Noise Level	**Location F1**	**Location F2**
Measured Noise Level, Leq (15 min) , dB(A) [3]	52	53
Background Noise Level (Before firework display), Leq (15 min) , dB(A) [1]	50	50
Background Noise Level (After firework display), Leq (15 min) , dB(A) [2]	48	50
Average Background Noise Level, dB(A) [3]	49	50
Facade correction [4]	3	
Corrected Noise Level, Leq (15 min) , dB(A)	**52**	**53**
Noise Criterion [5]	**55**	
Exceedance, dB(A)	**-**	**-**

Note:
[1] Background noise level was measured 15 minutes before the firework display.
[2] Background noise level was measured 15 minutes after the firework display.
[3] Logarithmic average of [1] and [2]
[4] Facade correction has been considered in noise calculation.
[5] The firework display noise criteria is referenced to Environmental Impact Assessment - Construction of an International Theme Park in Penny's Bay of North Lantau together with its Essential Associated Infrastructures (AEIAR – 0323/2000) and Hong Kong International Theme Parks Limited - Air Quality and Noise Monitoring During Fireworks Dress Rehearsal: Monitoring Report.

Appendix 6.1

Legislation and Standards for Water Quality Assessment

Legislation and Standards for Water Quality Assessment

The relevant legislations, standards and guidelines applicable to present study for the assessment of water quality impacts include:

- Water Pollution Control Ordinance (WPCO) CAP 358;
- Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems Inland and Coastal Waters (TM-DSS);
- Hong Kong Planning Standards and Guidelines (HKPSG); and
- ProPECC PN 1/94 "Construction Site Drainage"

Water Pollution Control Ordinance, CAP 358

The Project is located in the Southern Water Control Zone (WCZ) under the Water Pollution Control Ordinance (WPCO) (CAP 358) and the corresponding WQOs are summarised in below table.

Table A6.1: Water quality objectives for Southern Water Control Zones

Parameters	Objectives	Sub-Zone
Aesthetic Appearance	Waste discharges shall cause no objectionable odours or discolouration of the water.	Whole zone
	Tarry residues, floating wood, articles made of glass, plastic, rubber or of any other substance should be absent.	
	Mineral oil should not be visible on the surface. Surfactants should not give rise to a lasting foam.	
	There should be no recognisable sewage-derived debris.	
	Floating, submerged and semi-submerged objects of a size likely to interfere with the free movement of vessels, or cause damage to vessels, should be absent.	
	Waste discharges shall not cause the water to contain substances which settle to form objectionable deposits.	
Bacteria	*Escherichia coli* < 610/100 mL, geometric mean in one calendar year.	Secondary Contact, Recreation Subzones and Fish Culture Subzones
	Escherichia coli < 180/100 mL, geometric mean from March to October inclusive in one calendar year. Samples at least 3 times in a calendar month at intervals of between 3 and 14 days.	Bathing Beach Subzones
Dissolved Oxygen	> 4 mg/L at depth-averaged for 90% of the samples > 2 mg/L within 2m of the seabed for 90% of the	Marine waters excepting Fish Culture

Parameters	Objectives	Sub-Zone
	samples	Subzones
	> 5 mg/L at depth averaged for 90% of the samples > 2 mg/L within 2 metres of the seabed for 90% of the sample.	Fish Culture Subzones
	> 4 mg/L	Inland waters of the Zone
pH	In the range of 6.5 – 8.5 Change due to waste discharge < 0.2	Marine waters excepting Bathing Beach Subzones; Mui Wo (A), Mui Wo (B), Miu Wo (C), Mui Wo (E) and Mui Wo (F) Subzones.
	In the range of 6.0 – 9.0 Change due to waste discharge < 0.2	Mui Wo (D) Sub-zone and other inland waters.
	In the range of 6.0 – 9.0 for 90% of samples Change due to waste discharge < 0.5	Bathing Beach Subzones.
Temperature	Change due to waste discharge < 2.0 degC	Whole zone
Salinity	Change due to waste discharges < 10% of ambient levels	Whole zone
Suspended solids	Change due to waste discharge < 30% of ambient levels	Marine waters
	< 20 mg/L, annual median	Mui Wo (A), Mui Wo (B), Mui Wo (C), Mui Wo (E) and Mui Wo (F) Subzones.
	< 25 mg/L, annual median	Mui Wo (D) Subzone and other inland waters.
Unionized Ammonia (UIA)	< 0.021 mg/L, annual arithmetic mean	Whole zone
Nutrient	Shall not cause excessive or nuisance algal growth Total inorganic nitrogen (TIN) < 0.1 mg/L, annual mean of depth averaged	Marine waters
5-Day Biochemical Oxygen Demand (BOD_5)	< 5 mg/L	Inland waters of the Zone
Chemical Oxygen Demand (COD)	< 30mg/L	Inland waters of the Zone
Dangerous Substances	Waste discharges shall not cause the concentrations of dangerous substances in marine waters to attain such levels as to produce significant toxic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chains and to toxicant interactions with each other.	Whole zone

Parameters	Objectives	Sub-Zone
	Waste discharges of dangerous substances shall not put a risk to any beneficial uses of the aquatic environment.	Whole zone

Technical Memorandum for Effluents Discharge into Drainage and Sewerage Systems, Inland & Coastal Waters

Apart from the WQOs, Annex 1 of CAP358AK also specifies the limits to control the physical, chemical and microbial parameters for effluent discharges into drainage and sewage system at both inland and coastal waters under the TM-DSS. The discharge limits vary with the effluent flowrates and the sewage from the Project (treated after sewage treatment works) should comply with the standards for effluent discharged into marine water. The effluent discharge standards are presented in tables below.

Table A6.2: Standards for effluents discharged into the marine waters of Southern WCZ (in mg/L unless otherwise indicated)

Flow rate (m^3/day)	**≤ 10**	**>10 and ≤200**	**>200 and ≤400**	**>400 and ≤600**	**>600 and ≤800**	**>800 and ≤1000**	**>1000 and ≤1500**	**>1500 and ≤2000**	**>2000 and ≤3000**	**>3000 and ≤4000**	**>4000 and ≤5000**	**>5000 and ≤6000**
pH (pH units)	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10
Temperature (degC)	45	45	45	45	45	45	45	45	45	45	45	45
Colour (lovibond units) (25mm cell length)	4	1	1	1	1	1	1	1	1	1	1	1
Suspended solids	500	500	500	300	200	200	100	100	50	50	40	30
BOD	500	500	500	300	200	200	100	100	50	50	40	30
COD	1000	1000	1000	700	500	400	300	200	150	100	80	80
Oil & Grease	50	50	50	30	25	20	20	20	20	20	20	20
Iron	20	15	13	10	7	6	4	3	2	1.5	1.2	1
Boron	6	5	4	3.5	2.5	2	1.5	1	0.7	0.5	0.4	0.3
Barium	6	5	4	3.5	2.5	2	1.5	1	0.7	0.5	0.4	0.3
Mercury	0.1	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.1	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Other toxic metals individually	2	1.5	1.2	0.8	0.6	0.5	0.32	0.24	0.16	0.12	0.1	0.1
Total toxic metals	4	3	2.4	1.6	1.2	1	0.64	0.48	0.32	0.24	0.2	0.14
Cyanide	1	0.5	0.5	0.5	0.4	0.3	0.2	0.15	0.1	0.08	0.06	0.04
Phenols	0.5	0.5	0.5	0.3	0.25	0.2	0.13	0.1	0.1	0.1	0.1	0.1

Flow rate (m^3/day)	≤ 10	>10 and ≤200	>200 and ≤400	>400 and ≤600	>600 and ≤800	>800 and ≤1000	>1000 and ≤1500	>1500 and ≤2000	>2000 and ≤3000	>3000 and ≤4000	>4000 and ≤5000	>5000 and ≤6000
Sulphide	5	5	5	5	5	5	2.5	2.5	1.5	1	1	0.5
Total residual chlorine	1	1	1	1	1	1	1	1	1	1	1	1
Total nitrogen	100	100	80	80	80	80	50	50	50	50	50	50
Total phosphorus	10	10	8	8	8	8	5	5	5	5	5	5
Surfactants (total)	30	20	20	20	15	15	15	15	15	15	15	15
E. coli (count/100ml)	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000

Hong Kong Planning Standards and Guidelines

Chapter 9 of the Hong Kong Planning Standards and Guidelines (HKPSG) outlines the environmental requirements that need to be considered in land use planning. The recommended guidelines, standards and guidance cover the selection of suitable locations for the developments and sensitive uses, provision of environmental facilities, and design, layout, phasing and operational controls to minimise adverse environmental impacts. It also lists out environmental factors that influence land use planning and recommends buffer distances for land uses.

ProPECC PN 1/94 "Construction Site Drainage"

The Practice Note for Professional Persons (ProPECC Note PN1/94) on Construction Site Drainage provides guidelines for the handling and disposal of construction discharges. It is applicable to this study for the control of site runoff and wastewater generated during the construction phase. The types of discharges from construction sites outlined in the ProPECC Note PN1/94 include:

- Surface runoff;
- Groundwater;
- Boring and drilling water;
- Wastewater from concrete batching plant;
- Wheel washing water;
- Bentonite slurries;
- Water for testing and sterilization of water retaining structures and water pipes;
- Wastewater from building construction and site facilities; and
- Acid cleaning, etching and pickling wastewater.

Appendix 6.2

Standard Practice for Site Drainage

Standard Practice for Site Drainage

Site Runoff

In accordance with the Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94), best management practices should be implemented as far as practicable as below:

- At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities.
- The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a silt/sediment trap. The silt/sediment traps should be incorporated in the permanent drainage channels to enhance deposition rates.
- The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94. The detailed design of the sand/silt traps should be undertaken by the contractor prior to the commencement of construction.
- The design of temporary on-site drainage should prevent runoff going through site surface, construction machinery and equipment in order to avoid or minimize polluted runoff. Sedimentation tanks with sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8 m3 capacities, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity shall be flexible and able to handle multiple inputs from a variety of sources and suited to applications where the influent is pumped.
- Construction works should be programmed to minimize surface excavation works during the rainy seasons (April to September). All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or other means.
- All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.
- All open stockpiles of construction materials (for example, aggregates, sand and fill material) should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.
- Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or

debris being washed into the drainage system and storm runoff being directed into foul sewers.

- Precautions to be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarized in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events.
- All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.
- Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain.
- Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts.
- All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby.
- Regular environmental audit on the construction site should be carried out in order to prevent any malpractices. Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the water bodies, marsh and ponds.

By adopting the best management practices, it is anticipated that the impacts of general site operation will be reduced to acceptable levels before discharges. The details of best management practices will be highly dependent to actual site condition and Contractor shall apply for a discharge license under WPCO.

Sewage from Workforce

Mitigation measures to manage the sewage from workforce include the following:

- Portable chemical toilets and sewage holding tanks should be provided for handling the construction sewage generated by the workforce.
- A licensed contractor should be employed to provide appropriate and adequate portable toilets to cater 0.15m3/day/employed population and be responsible for appropriate disposal and maintenance.

- Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction phase of the Project.
- Regular environmental audit on the construction site should be conducted in order to provide an effective control of any malpractices and achieve continual improvement of environmental performance on site.

Appendix 6.3

Preliminary Water Quality Assessment

1 Introduction

1.1.1.1 This technical note is prepared for supporting the Section 12A Application No. Y/I-DB/3 of rezoning the permissible use from "Other Specified Use" ("OU") and "Government, Institution and Community" for various supporting service uses to "OU" (Residential and various supporting service uses) R(C)13 at Area 10b. It summarises the results of preliminary water quality impact assessment for the proposed sewage treatment works (STW) in Area 10b to the water sensitive receivers during operational phase.

1.1.1.2 The proposed STW will be established to receive and treat the sewage generated from Area 10b which will accommodate a total of about 2,813 additional population. The Average Dry Weather Flow (ADWF) of the proposed STW is approximately 1,100 m^3/day. Nitrogen removal and disinfection will be implemented into the proposed STW. As discussed in Study on Sewerage accompanying the Planning Statement of Area 10b, the treated effluent from the proposed STW would be conveyed to a booster pump system, and finally discharged via a submarine outfall. Mitigation measures will be proposed as necessary to achieve compliance of Water Quality Objectives (WQOs).

2 Baseline Condition

2.1 Marine Water Quality

2.1.1.1 The WQOs include various parameters, which describe the physical, chemical and biological properties of the marine environment. **Table 2.1** summarises the key baseline conditions of SS (suspended solids), *E. coli*, UIA (Un-ionized Ammonia Nitrogen) and TIN (Total Inorganic Nitrogen) at EPD's marine monitoring location SM10 from year 2005 to 2014. The annual average of the baseline condition at SM10 from year 2005 to 2014 is presented in **Appendix A**. It should be noted that the baseline TIN level (0.35 mg/L) already exceeds the WQO of 0.1 mg/L in Southern Water Control Zone (WCZ), due to high TIN level in the background of Pearl River estuary[1].

Table 2.1 Baseline condition of EPD's marine monitoring station SM10 from year 2005 to 2014

SS (mg/L)	*E. coli* (counts/100ml)	UIA (mg/L)	TIN (mg/L)
6.92	8	0.0042	0.35

Notes:

[1] EPD Marine Water Quality in Hong Kong in 2014.

[1] Unless otherwise specified, data presented are depth averaged and are the annual arithmetic mean except for *E. coli* which is in geometric mean.

[2] Underlined indicates occurrence of non-compliance with that parameter of WQO.

3 Water Sensitive Receivers

3.1.1.1 Water sensitive receivers (WSRs) have been identified and are shown in **Figure 3.1**. The treated effluent from the STW in Area 10b would be conveyed to the booster pump system, and eventually discharged to the marine outfall near Nim Shue Wan.

3.1.1.2 The distances between the discharge point of the marine outfall and WSRs are listed in **Table 3.1**. The nearest WSR is Hai Tei Wan Marina (WSR 05) at 320m.

Table 3.1 Description of water sensitive receivers within 2500 meters

WSR	Name	Description	Distance from the discharge location (m)
WSR01	Discovery Bay Reservoir	Primary reservoir for flushing, located upstream of the potential development areas	-[1]
WSR02	Discovery Bay Reservoir Spillway and Tributaries	Spillway from Discovery Bay Reservoir and the tributaries, drainage runs along Discovery Valley Road and downstream to Tsoi Yuen Wan	-[1]
WSR03	Nim Shue Wan Stream	Natural stream downstream from the existing golf course to Nim Shue Wan	-[1]
WSR04	Tai Pak Wan	Non-gazetted beach downstream to Discovery Bay Reservoir Spillway	2500
WSR05	Hai Tei Wan Marina	Marina at Hai Tei Wan next to Discovery Bay Road	320
WSR06	Nim Shue Wan	Nim Shue Wan Beach	650
WSR07	Tai Pak Tsui Peninsula Coastal Protection Area (CPA)	Protected natural shoreline at north of Tai Pak Tsui Peninsula	1600

Note:
[1] Inland WSR.

4 Assessment Methodology

4.1 Effluent Discharge Standards

4.1.1.1 **Table 4.1** shows the effluent discharge standards of the proposed STW.

Table 4.1 Effluent discharge standards of the proposed STW

Parameters	Discharge standard provided by sub-contractor (Flow rate estimated as 690 m^3/day)
pH	6-10
Temperature	< 30°C
Colour	< 1 lovibond units
Suspended Solids (SS)	30 mg/L
5-Day Biochemical Oxygen Demand (BOD_5)	20 mg/L
Chemical Oxygen Demand (COD)	< 80 mg/L
Oil & Grease	< 10 mg/L
Total phosphorus	2 mg/L
Ammonia Nitrogen	8 mg/L
Nitrate + nitrite nitrogen	12 mg/L
Surfactants	< 15 mg/L
E. coli	10 count/100ml

Note:
[1] Mercury, Cadmium, Cyanide, Phenols, Sulphide, Sulphate, Chloride, Fluoride, Iron, Boron, Barium and other toxic metals are not the major pollutants in the domestic sewage and are excluded in the comparison.

4.2 WQOs in Southern WCZ

4.2.1.1 **Table 4.2** shows the criteria of SS, *E. coli*, UIA and TIN under WQOs in Southern Water Control Zone. As discussed in **Section 2**, the baseline TIN level has already exceeded the WQO criterion of 0.1 mg/L.

Table 4.2 WQOs Criteria in Southern WCZ

SS [2] (mg/L)	*E. coli* (counts/100ml)	UIA (mg/L)	TIN (mg/L)
8.99	180/610[1]	0.021	0.1

Note:
[1] The criteria for *E. coli* are 610 counts/100ml for Secondary Contact Recreational Subzones, and 180 counts/100ml for bathing beaches in wet season.
[2] SS criteria is established based on WQO that water discharge shall not cause the natural ambient level to be raised by 30% for marine water WCZ.

4.3 Design of Proposed Marine Outfall

4.3.1.1 **Table 4.3** shows the tentative details of proposed marine outfall. These assumptions would be further refined and developed during the detailed design stage.

Table 4.3 Tentative design details for the diffuser in the proposed marine outfall

Parameters	Description
No. of discharge ports in the diffuser	8
Design discharge speed at the port	1 m/s
Length of diffuser base	10m
Configuration of discharge ports	Each discharge ports are distributed evenly on the diffuser line. The ports are pointing horizontally with alternating directions.
Location of the diffuser/discharge outfall	Approximately 300m offshore[1]
Depth of the discharge port	4.5m from water surface (at sea bottom)

Note:
[1] The outfall location is also tentatively set at a location with a water depth of approximately 4.5m. The location would be further refined during the detailed design stage.

4.4 Modelling Scenario

4.4.1.1 The effluent dispersion scenarios are simulated by a near-field model, CORMIX. The key inputs to the CORMIX include outfall configuration, ambient current speed, vertical density profile and effluent flow rate.

4.4.1.2 An 8 port submarine diffuser is considered at this stage. Hence, the discharge will be in alternating directions with both co-flow and counter-flow conditions. Module CORMIX 2 is adopted for simulation.

4.4.1.3 Ambient velocities at 0.013 m/s (10 percentile), 0.042 m/s (50 percentile) and 0.076 m/s (90 percentile) have been estimated from the approved Delft 3D modelling results from HATS Stage 2A EIA (AEIAR-121/2008), which are presented in **Appendix B**.

4.4.1.4 CORMIX is applicable for uni-directional ambient flow simulation. To cater for the different tidal conditions, the following scenarios have been modelled under CORMIX:

- The 90 percentile of ambient velocity of 0.076 m/s. Under this scenario, the effluent discharge flow is in the same direction as the ambient flow. The pollutant plume is then flowing towards the WSR by the maximum ambient flow.
- The 50 percentile of ambient velocity of 0.042 m/s. Under this scenario, the effluent discharge flow is in the same direction as the ambient flow. The pollutant plume is then flowing towards the WSR by the average ambient flow.
- The 10 percentile of ambient velocity of 0.013 m/s. Under this scenario, the ambient velocity is near stagnant. The dispersion of the plume is dominated by diffusion.

4.4.1.5 **Table 4.4** presents the modelling parameters of the worst case scenario for ambient in co-flow situation.

4.4.1.6 Sensitivity test on different values for angle between ambient flow and diffuser line has been conducted. It is found that the dilution factor does not change significantly. Given high dilution factors (300-760) can be achieved as shown in **Table 5.2**, typical scenario with ambient flow at 90 deg of diffuser line has been adopted.

Table 4.4 Modelling scenario and corresponding parameters for the model

Parameter		**Scenario**	
Season		Dry	Wet
Effluent Discharge Parameters	Total Discharge Flow Rate	1 m/s[1]·1100m³/day	
	Concentration of Effluent at Peak Flow	NH_3-N: 8 mg/L (UIA[2]: 0.424 mg/L) SS: 30 mg/L *E. coli*: 10 counts/100ml TIN[3]: 12 + 8 mg/L	
	Effluent Density	1000 kg/m	
	Discharge height above bottom	0 m (sea bottom)	
Ambient Conditions	Ambient Velocity	Ambient flow of 10, 50 and 90 percentile at 0.013, 0.042 and 0.076 m/s respectively (See **Appendix B**) with 90 deg of diffuser line	
	Ambient Density [5]	Surface 1,022 kg/m³; Bottom 1,022 kg/m³	Surface 1,017 kg/m³; Bottom 1,017.7 kg/m³
	Water Depth	4.5 m [6]	
	Wind speed	2 m/s [4]	

Note:

[1] Reference to the designed effluent velocity of the proposed marine outfall discharging to sea.

[2] UIA is estimated by multiplying a percentage factor to NH3-N. This factor depends on temperature and pH. The average temp and pH from EPD water quality monitoring stations in Southern WCZ are 23.8°C and 8.0 respectively. According to the "Aqueous Ammonia Equilibrium- Tabulation of Percent Unionized Ammonia" from USEPA, the conversion factor is 5.3%.

[3] TIN concentration is the sum of the concentration of NH_3-N, NO_2-N and NO_3-N (see **Table 4.1**).

[4] CORMIX's recommended value for conservative design condition.

[5] Ambient density is estimated from the EPD water quality monitoring station SM10 from year 2005-2014.

[6] Water depth at Discovery Bay are obtained from nautical chart in Hong Kong, published by the Hydrographic Office, Marine Department of HKSAR Government (**Appendix C**).

4.5 Comparison with the Proposed and Existing STW in Southern WCZ

4.5.1.1 It can be seen from **Table 4.5** that the proposed STW has adopted the same treatment technology as the South Lantau STW (SLSTW). Although the flow rate for the proposed STW is much lower than that in the SLSTW, the concentration of E. coli has been purposefully reduced to 10 counts/100ml which is significantly lower than that of 1,000 counts/100ml in the SLSTW. In fact, the proposed discharge limit of 10 counts/100mL is even lower than the WQO and hence any risk of human contact has been proactively addressed. In terms of TIN, it can also be noted that the discharge from the proposed STW would reach a concentration of 20mg/L which is also lower than the 30 mg/L as adopted in the SLSTW. It can therefore be seen that the discharge limit in the proposed STW for Area 10b is by all aspects much better than that adopted in the SLSTW which is also discharging into the sea area off South Lantau.

Table 4.5 Comparison of Effluent Discharge Standards against South Lantau EIA

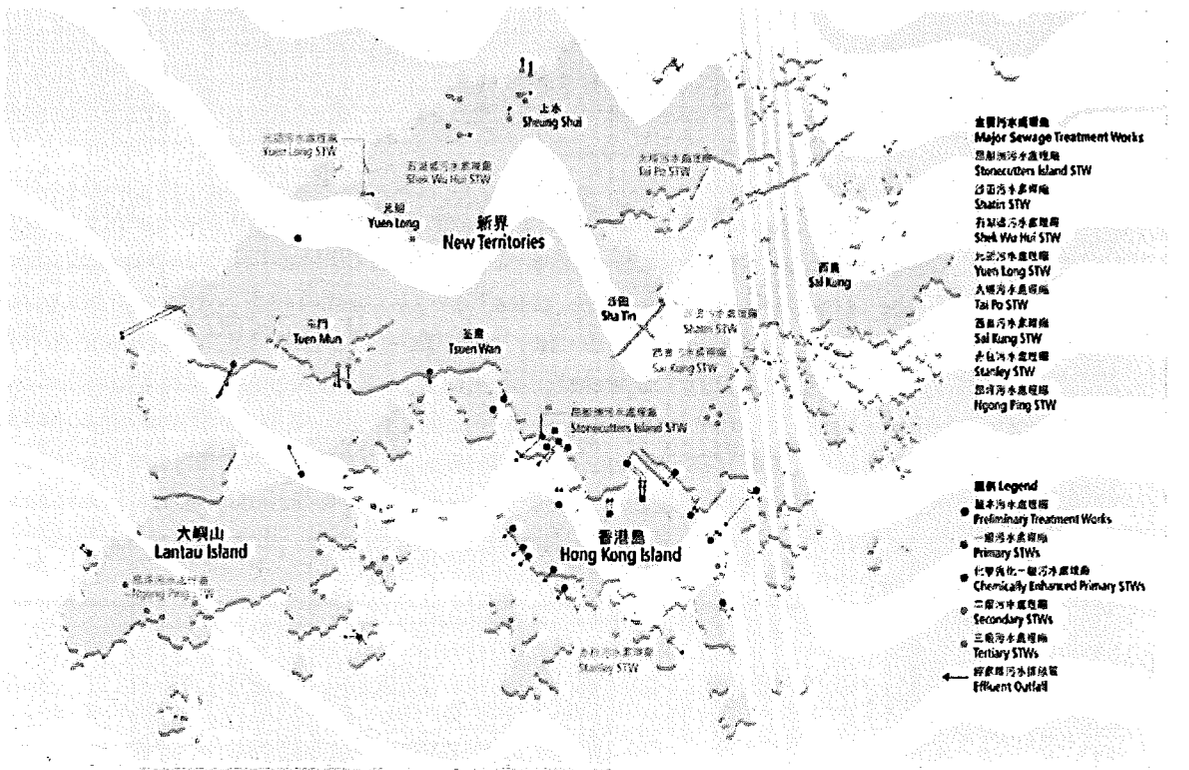
Parameters	Present Study (for Area 10b)	South Lantau EIA[1]
Treatment technology	MBR	MBR
Flow Rate: m^3/day	1,100	5,800
NH3-N: mg/L	8	Not provided in EIA
TIN : mg/L	20	30
TP: mg/L	2	Not provided in EIA
SS: mg/L	30	30
E. coli: counts/100ml	10	1,000

[1] Application No.: EIA-247/2016

4.5.1.2 Apart from the planned STW, the MBR technology is also comparable to the existing sewage treatment technology adopted on South Lantau and its surrounding outlying islands. The MBR technology is composed of activated sludge treatment and microfiltration/ultrafiltration which can be classified as secondary treatment level. As shown in Figure 1, the majority of the existing STWs on South Lantau and its surrounding

outlying islands are implementing secondary treatment level. Therefore, the adopted MBR is also consistent with the existing sewage treatment technology in South Lantau.

Figure 1 Sewage Treatment Technology in Hong Kong



[1] DSD Sustainability Report 2015-16

5 Evaluation of Impacts

5.1.1.1 **Table 5.1** shows the dilution factors for SS and UIA required to meet the WQOs in marine waters. Since the *E. coli* level of treated effluent has already met the WQO criteria, it is not included in the assessment. The calculation of dilution factor is based on **Equation 5.1**. The WQO criteria can be complied if the predicted dilution factor at the WSRs is higher than the required dilution factor presented in **Table 5.1**.

Table 5.1 Dilution factors for SS and UIA to meet the WQO criteria

	SS (mg/L)	UIA (mg/L)	Remark
Criteria/Target Limit of Conc. ($C_{criteria}$)	8.99	0.021	See **Table 4.2**
Baseline Conc. ($C_{baseline}$)	6.92	0.004	See **Table 2.1**
Effluent Discharge Conc. ($C_{effluent}$)	30	0.424	See **Table 4.3**
Dilution Factor to Meet the Criteria	11	25	Calculation based on **Equation 5.1**

Note:

As a sample calculation, the required dilution factor for the SS criterion would be (30.00 – 6.92)/(8.99 – 6.92) ≈ 11.

$$DF = \frac{C_{effluent} - C_{baseline}}{C_{criteria} - C_{baseline}}$$ **Equation 5.1**

where

$C_{effluent}$ is the effluent concentration at the discharge point.
$C_{baseline}$ is the baseline concentration at the WSR.
$C_{criteria}$ is the criteria/ target limit of concentration.

5.1.1.2 **Table 5.2** shows the dilution factor and predicted vertical thickness of sewage plume for the simulated scenario at 320 m of the closest WSR (WSR 05 Hai Tei Wan Marina). For dry season, the simulated scenarios are classified as submerged positively buoyant multiport diffuser discharge in uniform density layer (flow class MU1V, MU1H and MU8 according to CORMIX Manual). For wet season, the simulated scenarios are classified as deeply submerged test for plume trapping in a linearly stratified layer (flow class MS8 and MS5 according to CORMIX Manual). The details of CORMIX outputs are presented in **Appendix D**. Based on the modelling result, the lowest predicted dilution factor can be achieved is 306. The predicted vertical thickness of sewage plume is about 0.6-1m near the surface.

Table 5.2 Predicted dilution factors and plume vertical thickness at the WSR05 (i.e. 320 m from discharge point)

Season	Ambient flow (m/s)	Dilution Factor	Plume Vertical Thickness (m)
Dry	0.013	480	0.59
	0.042	756	0.98
	0.076	650	0.77
Wet	0.013	306	0.47
	0.042	623	0.57
	0.076	700	0.63

5.1.1.3 Since the predicted dilution factor at the nearest WSR is higher than the required dilution presented in **Table 5.1**, it is anticipated that SS and UIA level would comply with the WQO criteria at all marine based WSRs. The summary of compliance for different water quality parameters is presented in **Table 5.3**. **As regards the sedimentation, since the plume according to the model is above the seabed there would be no direct deposit of suspended solid to the bottom. Even if it is assumed that the plume can hit the seabed and other conditions remain unchanged, the increase in the concentration of suspended solid would be <0.1 mg/L (=30/306) which is within the natural fluctuation of the annual concentration of suspended solid. It is thus anticipated that the sedimentation due to the treated effluent would be insignificant.**

Table 5.3 Summary of compliance for different water quality parameters inside the sewage plume for WSR 05

Season	Ambient flow (m/s)	SS (mg/L)			*E.coli* (mg/L)			UIA (mg/L)			TIN (mg/L)		
		Predicted Value	Criteria	Compliance	Predicted Value	Criteria	Compliance	Predicted Value	Criteria	Compliance	Predicted Value	Criteria	Compliance
Dry	0.013	6.97	8.99	Yes	8	610	Yes	0.005	0.021	Yes	0.391	0.1	No [1]
	0.042	6.95	8.99	Yes	8	610	Yes	0.005	0.021	Yes	0.376	0.1	No [1]
	0.076	6.96	8.99	Yes	8	610	Yes	0.005	0.021	Yes	0.380	0.1	No [1]
Wet	0.013	7.00	8.99	Yes	8	610	Yes	0.006	0.021	Yes	0.414	0.1	No [1]
	0.042	6.96	8.99	Yes	8	610	Yes	0.005	0.021	Yes	0.382	0.1	No [1]
	0.076	6.95	8.99	Yes	8	610	Yes	0.005	0.021	Yes	0.378	0.1	No [1]

Note:
[1] Baseline TIN level already exceeds the WQO criterion.

5.1.1.4 Using **Equation 5.1** and the effluent standards in **Section 4.1**, the predicted levels of total inorganic nitrogen (TIN) inside the sewage plume with predicted dilution factors are presented in **Table 5.4**.

Table 5.4 Predicted nitrogen levels at the WSR05 (i.e. 320 m from discharge point)

Season	Ambient flow (m/s)	TIN, inside the sewage plume (mg/L)	Depth averaged TIN (mg/L)
Dry	0.013	0.391	0.355
	0.042	0.376	0.356
	0.076	0.380	0.355
Wet	0.013	0.414	0.357
	0.042	0.382	0.354
	0.076	0.378	0.354

Note:
As a sample calculation for the first scenario, the depth averaged TIN = 0.391 x (0.59/4.5) +0.35 x (1-0.59/4.5) = 0.355 mg/L.

5.1.1.5 The predicted value of TIN inside the sewage plume exceeds the depth averaged baseline value of 0.35 mg/L at the nearest WSR 05 (Hai Tei Wan Marina). However, since the predicted sewage plume thickness is thin (0.6-1m out of 4.5m water depth), the treated effluent slightly increases the depth averaged TIN by about 1-2% from the baseline value and thus is considered to be not significant.

5.1.1.6 According to **Section 3.1.1.2**, the nearest WSR is the Hai Tei Wan Marina at approximately 320m from the discharge point. The predicted increase in TIN (in depth-averaged as per WQO) between the with and without the proposed STW scenarios is about 0.007 mg/L. Taking into account of the baseline condition of 0.35mg/L, the percentage of increase is only 2 %. **Table 5.5** summarized the comparison at the Hai Tei Wan Marina. Compared with the relevant WSRs considered in the South Lantau EIA in which the increase in depth-averaged TIN is up to 33% (e.g. Tong Fuk Beach SR11: 33% in dry season and 12.5% in wet season), the increase in depth-averaged TIN due to the project is not significant.

Table 5.5 Predicted depth-averaged TIN level in the worst case scenario

WSR	TIN (mg/L)		
	Without Project	With Project	% Increase
Hai Tei Wan Marina [1]	0.35	0.357	2

[1] Water Depth = approx. 4.5 m

5.1.1.7 Besides, an analysis on the TIN concentration within the effluent plume in addition to the depth-averaged one is also carried out. Compared with the baseline TIN condition of 0.35 mg/L, the preliminary water quality assessment showed that the increase of TIN within the plume at the nearest WSR (Hai Tei Wan Marina) is up to 0.064 mg/L or 18.3% during wet season when the ambient flow is 0.013 m/s. This figure, compared with the aforementioned 33% increase in depth-averaged TIN from the South Lantau EIA is more or less in the same order.

5.1.1.8 Based on the analysis on the depth-averaged TIN and TIN within the effluent plume, it can thus be seen that the proposed treatment level of the proposed STW in terms of TIN has ensured that the elevation of TIN at WSRs is very low as compared to other approved EIA Report.

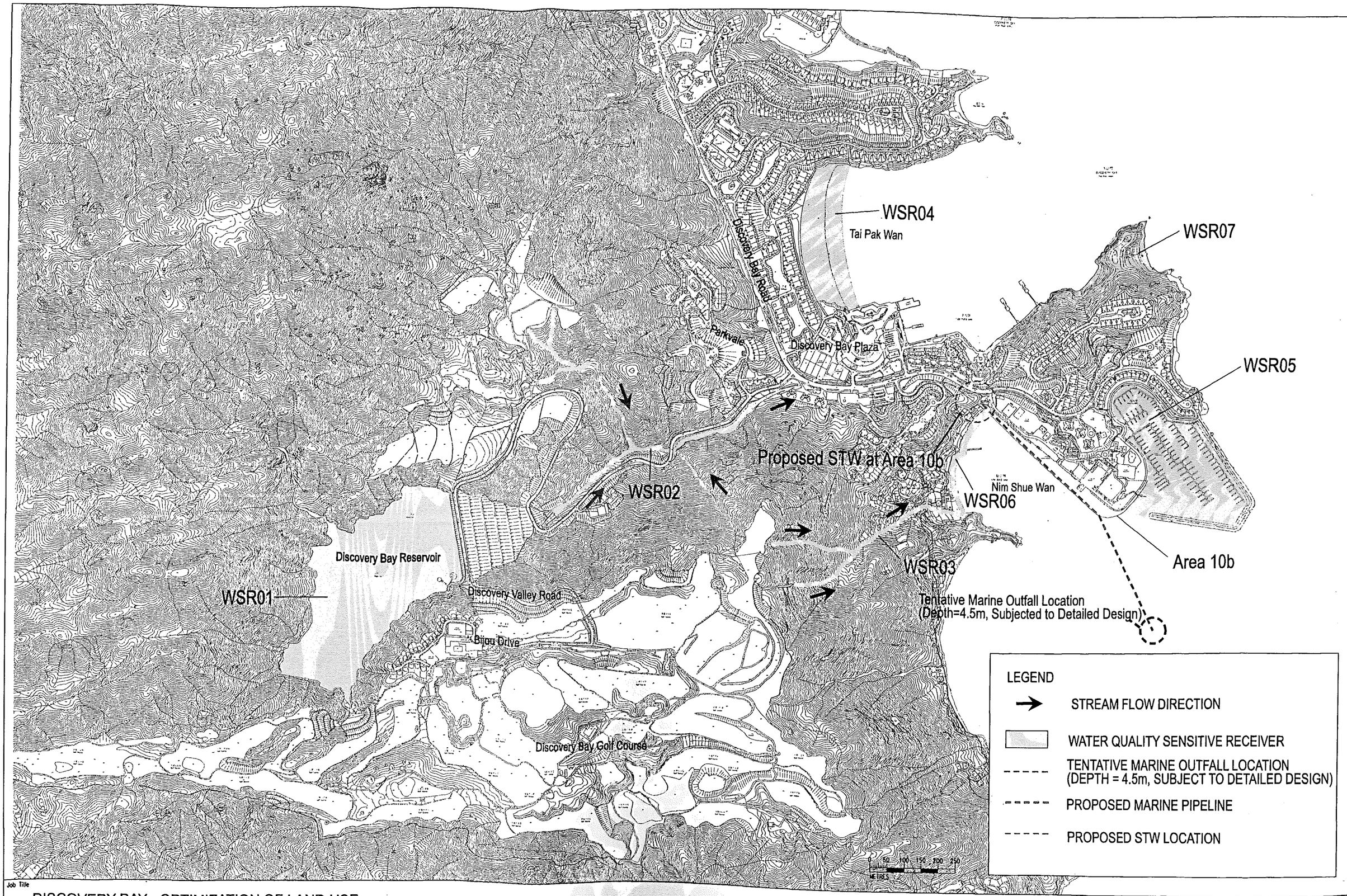
5.1.1.9 In addition, the flow in the CORMIX is assumed to be always in the same direction towards the WSR. In reality, the flow direction will change during ebb and flood tides. So the effluent plume will have half of the time to flow in one direction reaching the WSR, and the other half of the time to flow in the other direction away from the WSR. So indeed the TIN concentration at the WSR would be further reduced. Results from this Technical Note is hence based on a conservative side.

6 Conclusion

6.1.1.1 The preliminary water quality impact assessment of the proposed sewage treatment works in Area 10b to the water sensitive receivers during operational phase has be conducted. The modelling result indicates that the water quality in the vicinity of marine-based WSRs would be in compliance with WQOs in SS, *E. coli* and UIA. Exceedance of TIN under WQO is observed. However the contribution is due to high TIN level in background from Pearl River estuary. The predicted depth averaged TIN would slightly increase of the baseline value by 1-2% and is considered as not significant.

6.1.1.2 Notwithstanding the above discussion, the Project Proponent of Area 10b still commits to review the effectiveness of any suitable technology available at the time of detailed design that could deliver discharge limits that are as good as that proposed now. In particular, it is noted that some of the existing STWs beyond South Lantau can achieve an even lower total nitrogen concentration, say 10 mg/L in Peng Chau STW. The possibility to reduce the total nitrogen level to similar level will be further explored during the detailed design stage.

Figures



Job Title

DISCOVERY BAY - OPTIMIZATION OF LAND USE

Date	Scale	Drawing Title
Sept 22	1:10000	Water Quality Sensitive Receivers
Drawn: GL	Job No.: 235928	

FIGURE 3.1

ARUP

$FILE$

Appendix A

EPD Marine Water Quality
Monitoring Data

Figure A1 Locations of the Environmental Protection Department's marine monitoring measurement sites, captured from the EPD's marine water reports 2014

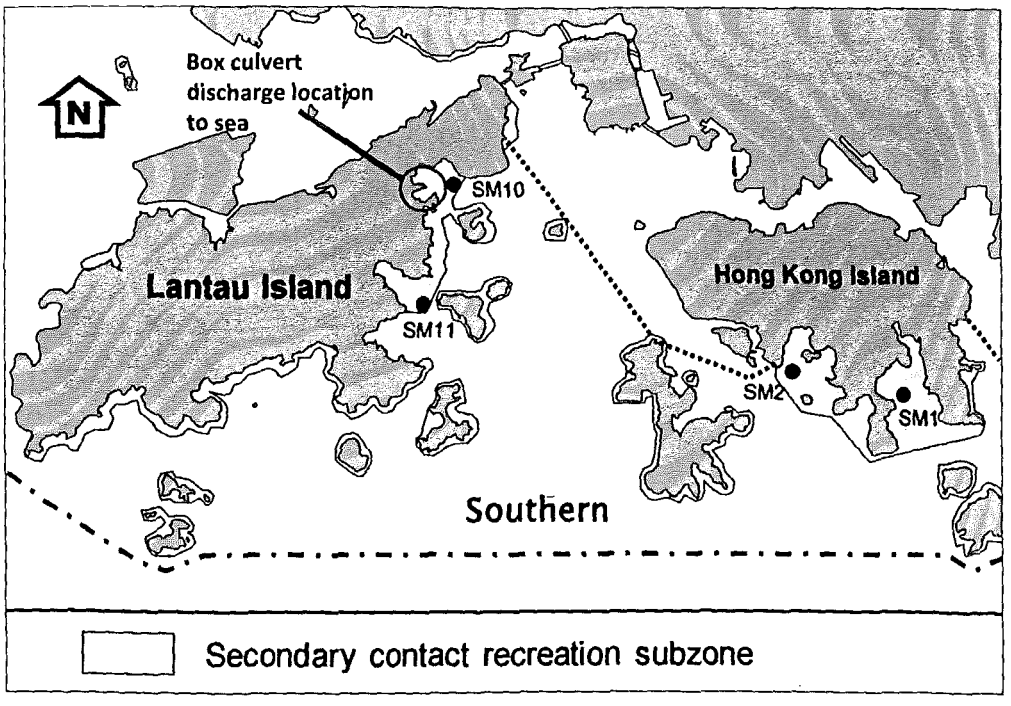


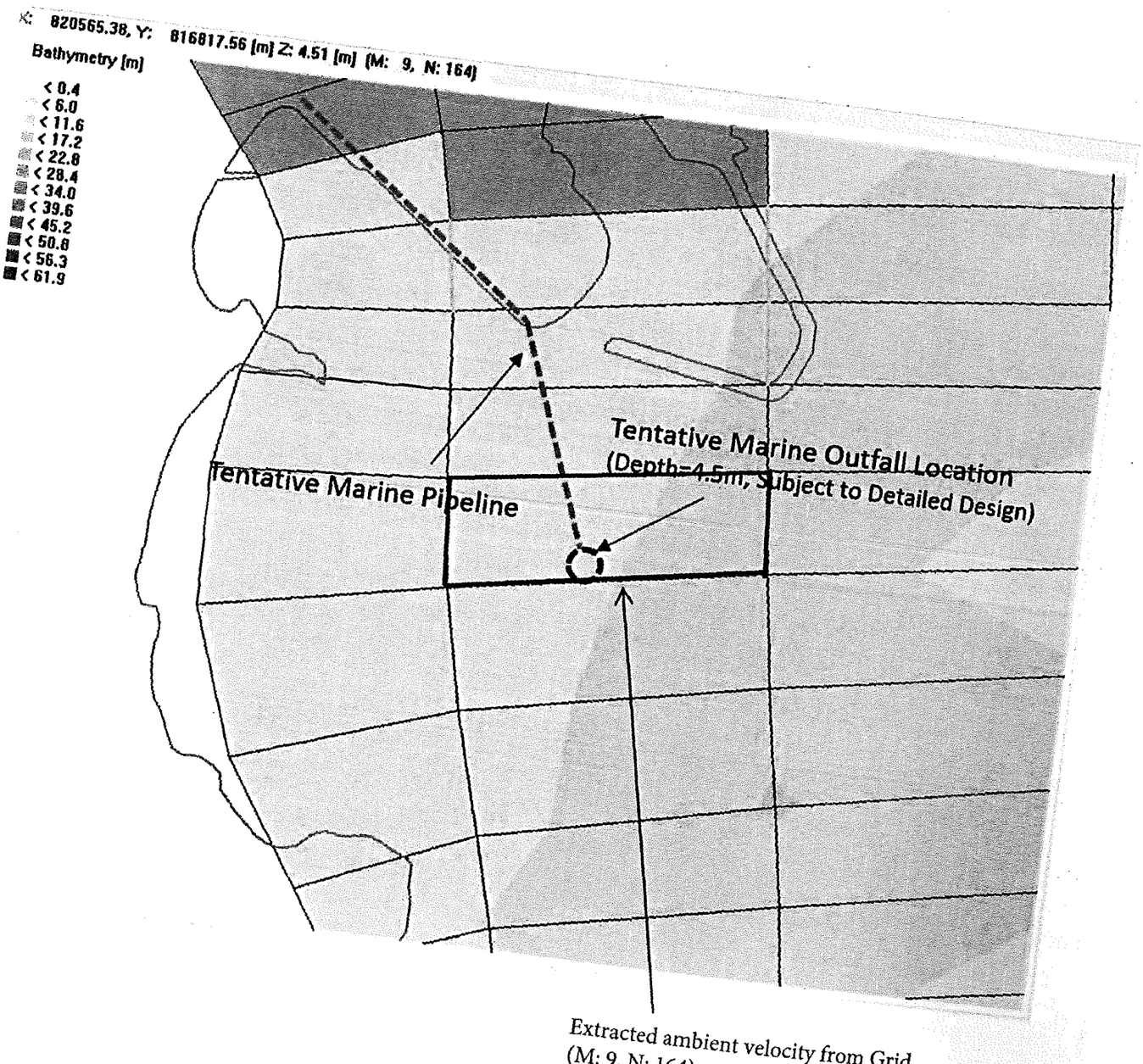
Table A1 Annual average of the water quality parameters at EPD's marine monitoring site SM10

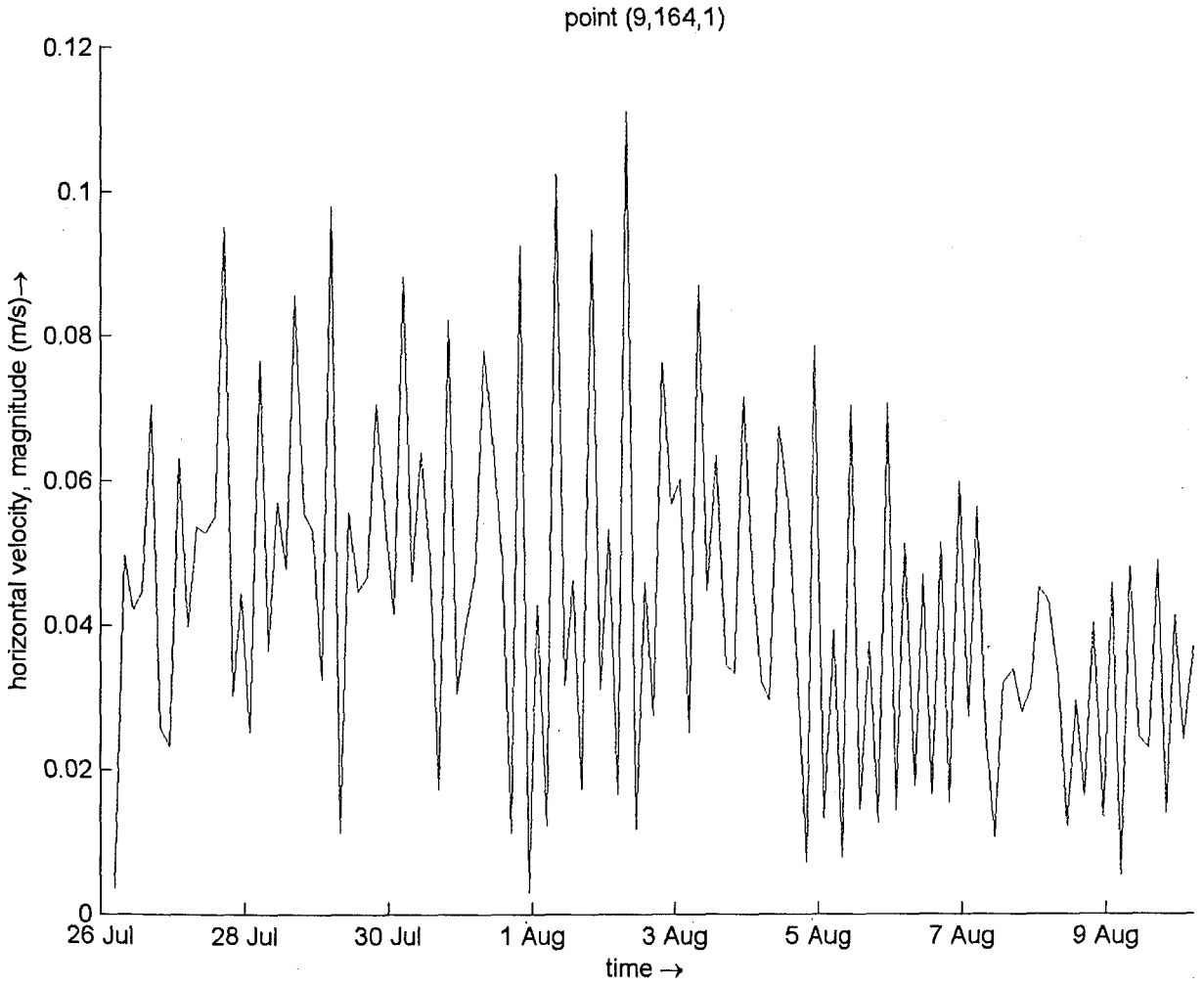
Year	Total Inorganic Nitrogen (mg/L)	*E. coli* [1] (cfu/100mL)	Suspended Solids (mg/L)	Unionised Ammonia (mg/L)	Total Phosphorus (mg/L)
2005	0.35	9.44	7.10	0.005	0.038
2006	0.32	19.04	9.06	0.006	0.044
2007	0.32	11.28	8.15	0.006	0.046
2008	0.37	14.59	7.33	0.005	0.041
2009	0.28	10.51	8.28	0.003	0.037
2010	0.33	5.00	5.46	0.003	0.035
2011	0.36	2.37	7.12	0.003	0.039
2012	0.42	2.82	7.20	0.003	0.038
2013	0.35	2.78	3.92	0.003	0.039
2014	0.30	4.30	4.68	0.004	0.045

Note:
[1] According to WQO, the criterion for *E. coli* should be calculated as annual geometric mean of its concentration, instead of the annual arithmetic mean.

Appendix B

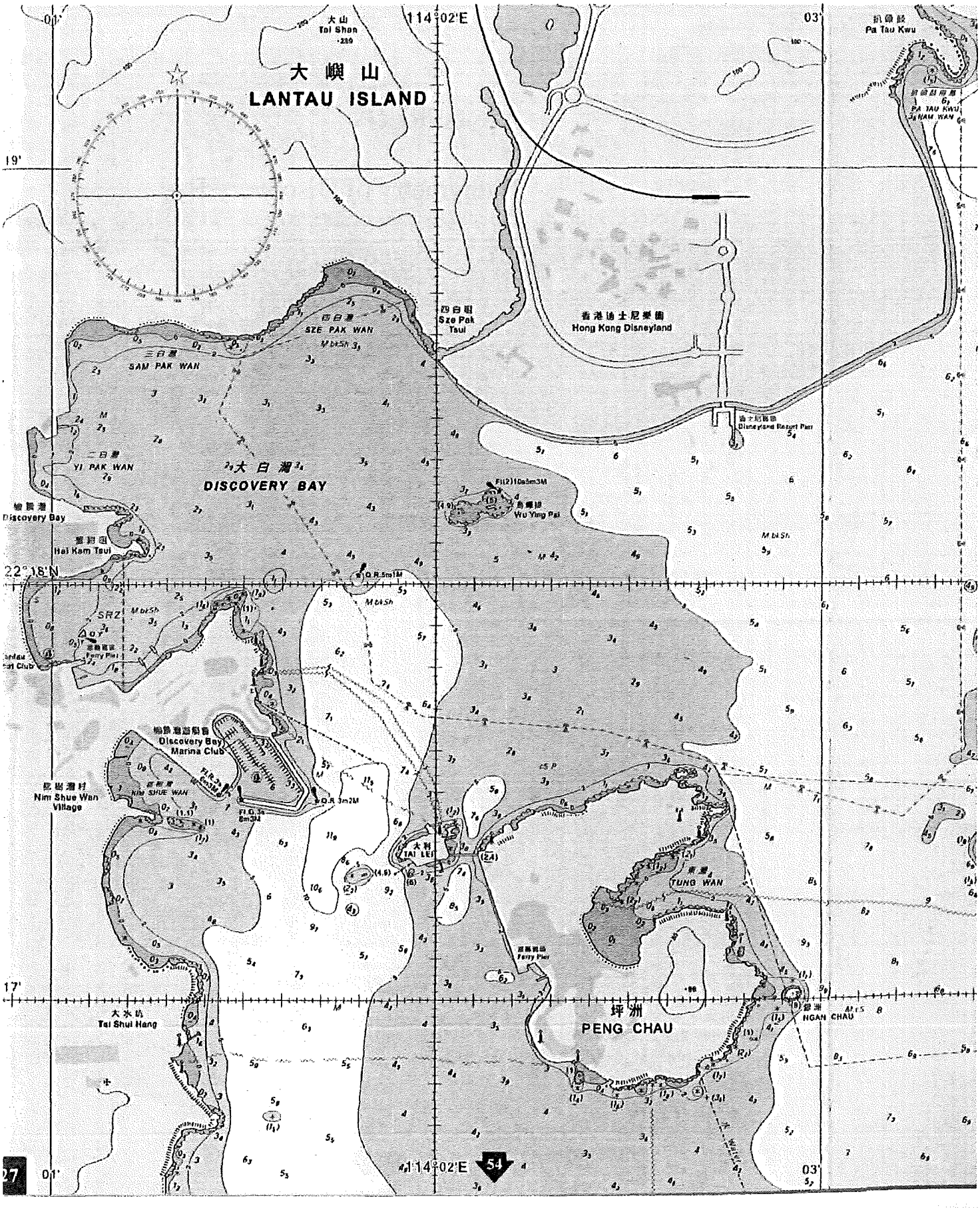
Delft 3D Modelling Result


X: 820565.38, Y: 816817.56 [m] Z: 4.51 [m] (M: 9, N: 164)
Bathymetry [m]
< 0.4
< 6.0
< 11.6
< 17.2
< 22.8
< 28.4
< 34.0
< 39.6
< 45.2
< 50.8
< 56.3
< 61.9
Tentative Marine Outfall Location
(Depth=4.5m, Subject to Detailed Design)
Tentative Marine Pipeline
Extracted ambient velocity from Grid
(M: 9, N: 164)


point (9,164,1)
0.12
0.1
0.08
0.06
0.04
0.02
0
horizontal velocity, magnitude (m/s)→
26 Jul
28 Jul
30 Jul
1 Aug
3 Aug
5 Aug
7 Aug
9 Aug
time →

Appendix C

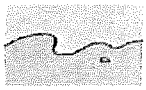
Bathymetry of Discovery Bay

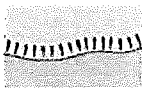

大嶼山
LANTAU ISLAND
大山
Tai Shan
114°02'E
03'
01'
19'
22°18'N
17'
大白灣
DISCOVERY BAY
SAM PAK WAN
三白灣
SZE PAK WAN
四白咀
Sze Pak Tsui
YI PAK WAN
二白灣
香港迪士尼樂園
Hong Kong Disneyland
迪士尼酒店
Disneyland Resort Pier
烏蠅洲
Wu Ying Pai
Discovery Bay
海景道
Hai Kam Tsui
SRZ
Ferry Pier
Discovery Bay Marina Club
NIM SHUE WAN
Nim Shue Wan Village
TAI LEI
大利
TUNG WAN
東灣
坪洲
PENG CHAU
NGAN CHAU
銀洲
PA TAU KWU
Pa Tau Kwu
大水坑
Tai Shui Hang
54
27

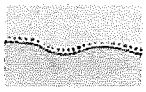
圖例

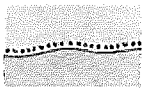
地貌 TOPOGRAPHY

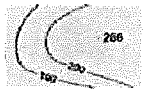
自然地貌 Natural Features


海岸線(已測量)
Coastline, surveyed


陡岸
Steep coast


沙質岸
Sandy shore


石質岸
Stony shore



等高線(附數值)及高程點
Contour lines with values and spot height


河流、溪澗
River, Stream

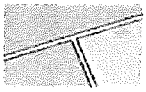

水庫、塘
Reservoir, Pond


鹽田
Salt pans

沼林
Mangrove

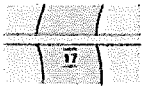

沼澤
Marsh

人工地貌 Cultural Features

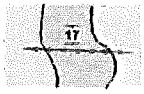

市區
Urban area


道路
Road


機場
Airport, Airfield



最高天文潮至橋底的垂直淨空
Vertical clearance above the Highest Astronomical Tide



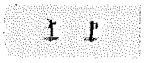
架空索道，附垂直淨空
Overhead transporter, Aerial cableway with vertical clearance

陸地標記 Landmarks


廟宇
Temple

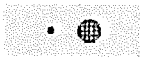

塔
Tower


煙囪，紀念碑
Chimney, Monument

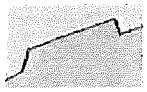

風力發電機，旗杆
Wind turbine, Flagstaff

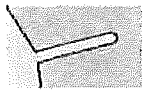

無線電桅，無線電塔
Radio mast, Radio tower

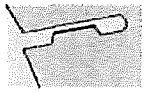

碟形天線
Dish aerial


貯存庫
Tanks

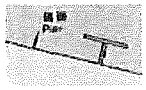
港口 Ports


海堤
Seawall

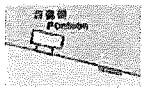

防波堤
Breakwater


突堤(附泊位設施)
Mole (with berthing facilities)


順岸碼頭
Quay, Wharf



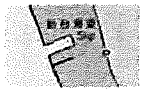
突堤式碼頭
Pier, Jetty

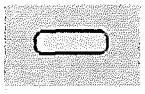


浮碼頭，登岸梯級
Pontoon, Landing steps


泊位編號
Designation of berth


繫船柱
Dolphin


船台滑道
Slipway

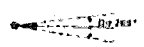

浮塢
Floating dock

輔航設備 NAVIGATION AIDS

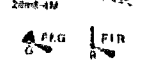
燈標、立標 Lights, Beacons


主燈標
Major light


導燈
Leading lights


定向燈
Direction light

扇形燈
Sector light

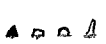


設燈標誌
Lighted marks


一般立標
Beacon in general


電纜著陸點的立標
Cable landing beacon

浮標 Buoys


浮標形狀(錐形，罐形，球形，柱形)
Shapes of buoys (conical, can, spherical, pillar)

繫泊浮標
Mooring buoy

方位浮標(北，東，南，西)
Cardinal buoys (North, East, South, West)

孤立危險物浮標
Isolated danger buoy

安全水域浮標
Safe water buoys

特殊浮標
Special buoys

霧號、雷達 Fog Signal, Radar

燈立標上的霧角
(響號一次，周期15秒)
Lighted beacon, with horn giving a single blast every 15 seconds

雷達應答器
Radar transponder beacon

自動識別系統發射機
Automatic Identification System transmitter

一般信號站
Signal station in general

航道走向
Direction of buoyage

LEGEND

海道測量及服務 HYDROGRAPHY & SERVICES

深度 Depths

- 實際位置的水深 Soundings in true position
- 乾出高度 Drying heights
- 疏浚航道或區域(附維護深度) Dredged channel or area with maintained depth
- 等深線 Depth contours
- 礁石灘 Rocky area, which covers and uncovers

底質 Nature of the Seabed

S	沙	*Sand*
M	泥	*Mud*
Cy	黏土	*Clay*
Si	淤泥	*Silt*
St	石	*Stones*
G	沙礫	*Gravel*
P	小卵石	*Pebbles*
Cb	鵝卵石	*Cobbles*
R	礁石	*Rock*
Co	珊瑚	*Coral*
Sh	貝殼	*Shells*
S/M	雙層底質，例如上沙下泥	*Two layers, e.g. Sand over Mud*
fS M Sh	混合底質，先註主要成份，例如含泥含泥沙，貝殼，	*The main constituent is given first for mixtures, e.g. fine sand with mud and shells*

礁石 Rocks

- 危險線 Danger line
- 乾出礁(高度在海圖基準以上) Rock which covers and uncovers, height above Chart Datum
- 過潮礁(在海圖基準面) Rock awash at the level of Chart Datum
- 危險暗礁(深度不明) Dangerous underwater rock of uncertain depth
- 危險暗礁(已知深度) Dangerous underwater rock of known depth
- 非危險礁礁(已知深度) Non-dangerous rock, depth known
- 浪花 Breakers

沉船，障礙物 Wrecks, Obstructions

- 部份船體露出海圖基準面的沉船 Wreck showing any portion of hull at level of chart datum
- 僅桅杆露出海圖基準面的沉船 Wreck of which the mast(s) only are visible at Chart Datum
- 已知最小深度的沉船 Wreck, least depth known by sounding only
- 最小深度不明的沉船，對航行有潛在危險 Wreck, least depth unknown, considered to be potentially dangerous to some surface vessels
- 礁石地，對航行無危險，但應避免拋錨、拖網等。 Foul ground, not dangerous to surface navigation but to be avoided by vessels anchoring, trawling etc.
- 已知最小深度的障礙物 Obstruction, least depth known by sounding only
- 魚礁(附最小深度) Fish haven with minimum depth
- 海產養殖場 Marine farm

近岸設施 Offshore Installations

- 海底電纜 Submarine cable
- 海底電纜區 Submarine cable area
- 海底輸電纜 Submarine power cable
- 海底輸電纜區 Submarine power cable area
- 停用海底電纜 Disused submarine cable
- 供應管道 Supply pipeline
- 排放管道 Outfall and Intake
- 停用管道 Disused pipeline/outfall

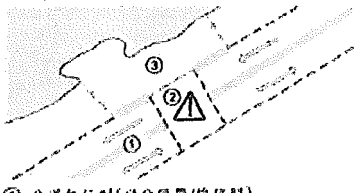
服務 Services

- 領港員登船站 Pilot boarding place
- 遊艇會 Marina
- 指定供給燃料區 Designated bunkering area

航路 Tracks, Routes

- 導航線(實線為應遵循的航路) Leading line (firm line is the track to be followed)
- 沒有固定導航標誌的建議航路 Recommended tracks not based on a system of fixed marks
- 規定航向 Established direction of traffic flow
- 無線電報告點 Radio reporting points

航路分隔措施(例制)： Examples of Routeing Measures :



① 分道航行制(以分隔帶/線區開) Traffic Separation Scheme, traffic separated by separation zone/line

② 警戒區 Precautionary area

③ 沿岸航行區 Inshore traffic zone

區域，界線 Areas, Limits

- 限制區 Restricted area
- 禁區界線(不准擅進) Limit of area into which entry is prohibited
- 錨地 Anchorage area
- 禁止拋錨區 Anchoring prohibited area
- 禁止捕魚區 Fishing prohibited area
- 鳥類保育區 Bird sanctuary
- 海岸保護區 Marine Reserve
- SRZ 航速限制區 Speed Restricted Zone
- 海港界線 Harbour limit
- 香港特別行政區區界 Boundary of the Hong Kong Special Administrative Region

Appendix D

CORMIX model output

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                        CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                              CORMIX Version 5.0GT
                          HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\dry_u010.prd
 Time stamp:         Thu Oct 20 10:30:15 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =       4.50  HD    =       4.50
 UA    =      0.013  F     =      0.019 USTAR =0.6338E-03
 UW    =      2.000  UWSTAR=0.2198E-02
 Uniform density environment
 STRCND=  U          RHOAM = 1022.0000

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =    305.00  YB1   =    300.00  YB2   =    310.00
 LD    =     10.00   NOPEN =    8       SPAC  =      1.43
 D0    =     0.045   A0    =     0.002  H0    =      0.00  SUB0  =      4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =     90.00   THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.998   Q0    =     0.013        =0.1270E-01
 RHO0  = 1000.0000   DRHO0 =0.2200E+02  GP0   =0.2111E+00
 C0    =0.1000E+01   CUNITS=  mg/l
 IPOLL =  1          KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02   m0    =0.1268E-02  j0    =0.2681E-03  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001   lM    =      0.31  lm    =      7.50
 lmp   =  99999.00   lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01   M0    =0.1268E-01  J0    =0.2681E-02
 Associated 3-d length scales (meters)
 LQ    =      0.04   LM    =      0.73  Lm    =      8.66  Lb    =   1220.30
                                        Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     60.90   FRD0  =     10.24  R     =     76.78  PL    =     73.
 (slot)              (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8909E-04  M0    =0.8909E-03
 lQ=B  =     0.018   lM    =      0.02  lm    =      0.53  lmp   =  99999.00
 LQ    =     0.030   LM    =      0.10  Lm    =      2.30  Lmp   =  99999.00
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.070   D0    =      0.170 A0    =     0.023  THETA =     90.00
 FR0   =      1.13   FRD0  =      0.37  R     =      5.40
 (slot)              (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU1V   2
 2  Applicable layer depth HS =     4.50  2
 22222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01   CUNITS=  mg/l
 NTOX  =  0
```

NSTD = 1 CSTD =0.4700E-02
REGMZ = 0
XINT = 2000.00 XMAX = 2000.00

X-Y-Z COORDINATE SYSTEM:
ORIGIN is located at the bottom and the diffuser mid-point:
305.00 m from the LEFT bank/shore.
X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 50 display intervals per module

BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

X	Y	Z	S	C	BV	BH
0.00	0.00	0.00	1.0	0.100E+01	0.08	0.08

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

Jet/plume transition motion in weak crossflow.

Zone of flow establishment: THETAE= 85.61 SIGMAE= 0.00
LE = 0.13 XE = 0.01 YE = 0.00 ZE = 0.13

Profile definitions:
BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane normal to trajectory
after merging: top-hat half-width in horizontal plane parallel to diffuser line
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
Individual jet/plumes before merging:						
0.01	0.00	0.13	1.0	0.100E+01	0.08	0.08
0.01	0.00	0.13	1.0	0.100E+01	0.08	0.08
0.08	0.00	0.33	1.7	0.596E+00	0.07	0.07
0.20	0.00	0.51	3.1	0.325E+00	0.09	0.09
0.33	0.00	0.68	4.8	0.209E+00	0.12	0.12
0.47	0.00	0.84	6.7	0.149E+00	0.15	0.15
0.62	0.00	0.99	8.8	0.113E+00	0.18	0.18
0.79	0.00	1.12	11.0	0.906E-01	0.20	0.20
0.97	0.00	1.24	13.3	0.752E-01	0.23	0.23
1.16	0.00	1.34	15.5	0.643E-01	0.25	0.25
1.36	0.00	1.43	17.8	0.561E-01	0.27	0.27
1.55	0.00	1.51	20.1	0.498E-01	0.29	0.29
1.76	0.00	1.59	22.3	0.448E-01	0.32	0.32
1.96	0.00	1.65	24.6	0.407E-01	0.34	0.34
2.17	0.00	1.71	26.9	0.372E-01	0.36	0.36
2.37	0.00	1.76	29.1	0.344E-01	0.38	0.38
2.58	0.00	1.81	31.4	0.319E-01	0.40	0.40
2.79	0.00	1.86	33.6	0.298E-01	0.42	0.42
3.00	0.00	1.90	35.9	0.279E-01	0.43	0.43
3.21	0.00	1.94	38.2	0.262E-01	0.45	0.45
3.42	0.00	1.98	40.5	0.247E-01	0.47	0.47
3.63	0.00	2.02	42.8	0.233E-01	0.49	0.49
3.84	0.00	2.06	45.2	0.221E-01	0.51	0.51
4.06	0.00	2.10	47.7	0.210E-01	0.52	0.52
4.27	0.00	2.14	50.2	0.199E-01	0.54	0.54
4.48	0.00	2.18	52.7	0.190E-01	0.56	0.56
4.69	0.00	2.22	55.2	0.181E-01	0.58	0.58
4.90	0.00	2.26	57.8	0.173E-01	0.59	0.59
5.11	0.00	2.30	60.4	0.165E-01	0.61	0.61
5.32	0.00	2.34	63.1	0.158E-01	0.63	0.63
5.53	0.00	2.38	65.8	0.152E-01	0.65	0.65

5.74	0.00	2.42	68.6	0.146E-01	0.66	0.66
5.95	0.00	2.46	71.3	0.140E-01	0.68	0.68
6.16	0.00	2.50	74.2	0.135E-01	0.70	0.70
6.38	0.00	2.53	77.0	0.130E-01	0.71	0.71

Merging of individual jet/plumes to form plane jet/plume:

6.40	0.00	2.54	100.9	0.991E-02	0.90	5.90
6.80	0.00	2.60	104.7	0.955E-02	0.93	5.93
7.01	0.00	2.64	106.7	0.938E-02	0.94	5.94
7.22	0.00	2.67	108.6	0.921E-02	0.96	5.96
7.43	0.00	2.70	110.6	0.904E-02	0.98	5.98
7.65	0.00	2.73	112.6	0.888E-02	0.99	5.99
7.86	0.00	2.77	114.5	0.873E-02	1.01	6.01
8.07	0.00	2.80	116.5	0.858E-02	1.03	6.03
8.28	0.00	2.83	118.5	0.844E-02	1.04	6.04
8.49	0.00	2.87	120.4	0.830E-02	1.06	6.06
8.71	0.00	2.90	122.4	0.817E-02	1.08	6.08
8.92	0.00	2.93	124.4	0.804E-02	1.09	6.09
9.13	0.00	2.97	126.4	0.791E-02	1.11	6.11
9.34	0.00	3.00	128.4	0.779E-02	1.13	6.13
9.55	0.00	3.04	130.4	0.767E-02	1.14	6.14
9.76	0.00	3.07	132.4	0.755E-02	1.16	6.16
9.98	0.00	3.10	134.4	0.744E-02	1.18	6.18

Cumulative travel time = 90.1355 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 9.11 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	319.35 m
X-position of upstream stagnation point	=	-309.37 m
Thickness in intrusion region	=	0.02 m
Half-width at downstream end	=	447.20 m
Thickness at downstream end	=	0.47 m

In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times the local water depth.
This may be caused by a very small ambient velocity, perhaps in combination with large discharge buoyancy.
If the ambient conditions are strongly transient (e.g. tidal), then the CORMIX steady-state predictions of upstream intrusion are probably unrealistic.
The plume predictions prior to boundary impingement and wedge formation will be acceptable, however.

Control volume inflow:

X	Y	Z	S	C	BV	BH
9.98	0.00	3.10	134.4	0.744E-02	1.18	6.18

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
-309.37	0.00	4.50	9999.9	0.000E+00	0.00	0.00	4.50	4.50

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

-298.51	0.00	4.50	581.5	0.172E-02	0.01	63.24	4.50	4.49
-245.30	0.00	4.50	241.3	0.414E-02	0.01	153.62	4.50	4.49
-192.09	0.00	4.50	181.9	0.550E-02	0.02	207.84	4.50	4.48
-138.89	0.00	4.50	155.8	0.642E-02	0.02	250.59	4.50	4.48
-85.68	0.00	4.50	142.3	0.703E-02	0.02	287.04	4.50	4.48
-32.47	0.00	4.50	135.8	0.736E-02	0.02	319.36	4.50	4.48
20.74	0.00	4.50	137.1	0.729E-02	0.03	424.24	4.50	4.47
73.95	0.00	4.50	217.5	0.460E-02	0.15	430.55	4.50	4.35
127.16	0.00	4.50	332.9	0.300E-02	0.32	436.43	4.50	4.18
180.37	0.00	4.50	402.9	0.248E-02	0.43	441.96	4.50	4.07
233.58	0.00	4.50	432.1	0.231E-02	0.47	447.20	4.50	4.03

Cumulative travel time = 17290.1152 sec

END OF MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

** End of NEAR-FIELD REGION (NFR) **

In this design case, the diffuser is located CLOSE TO BANK/SHORE.
Some boundary interaction occurs at end of near-field.
  This may be related to a design case with a VERY LOW AMBIENT VELOCITY.
  The dilution values in one or more of the preceding zones may be too high.
Carefully evaluate results in near-field and check degree of interaction.

Consider locating outfall further away from bank or shore.
In the next prediction module, the plume centerline will be set
  to follow the bank/shore.

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Plume is ATTACHED to LEFT bank/shore.
  Plume width is now determined from LEFT bank/shore.

Profile definitions:
  BV = top-hat thickness, measured vertically
  BH = top-hat half-width, measured horizontally in y-direction
  ZU = upper plume boundary (Z-coordinate)
  ZL = lower plume boundary (Z-coordinate)
  S = hydrodynamic average (bulk) dilution
  C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
233.58	305.00	4.50	432.1	0.231E-02	0.56	752.20	4.50	3.94
268.90	305.00	4.50	455.5	0.220E-02	0.57	775.13	4.50	3.93
304.23	305.00	4.50	480.0	0.208E-02	0.59	797.69	4.50	3.91
339.56	305.00	4.50	505.8	0.198E-02	0.60	819.91	4.50	3.90
374.89	305.00	4.50	532.9	0.188E-02	0.62	841.84	4.50	3.88
410.22	305.00	4.50	561.3	0.178E-02	0.64	863.48	4.50	3.86
445.55	305.00	4.50	590.9	0.169E-02	0.65	884.86	4.50	3.85
480.87	305.00	4.50	621.9	0.161E-02	0.67	906.00	4.50	3.83
516.20	305.00	4.50	654.3	0.153E-02	0.69	926.92	4.50	3.81
551.53	305.00	4.50	688.0	0.145E-02	0.71	947.64	4.50	3.79
586.86	305.00	4.50	723.2	0.138E-02	0.73	968.16	4.50	3.77
622.19	305.00	4.50	759.7	0.132E-02	0.75	988.50	4.50	3.75
657.52	305.00	4.50	797.7	0.125E-02	0.77	1008.67	4.50	3.73
692.85	305.00	4.50	837.2	0.119E-02	0.80	1028.69	4.50	3.70
728.17	305.00	4.50	878.1	0.114E-02	0.82	1048.55	4.50	3.68
763.50	305.00	4.50	920.5	0.109E-02	0.84	1068.27	4.50	3.66
798.83	305.00	4.50	964.4	0.104E-02	0.87	1087.85	4.50	3.63
834.16	305.00	4.50	1009.9	0.990E-03	0.89	1107.31	4.50	3.61
869.49	305.00	4.50	1057.0	0.946E-03	0.92	1126.64	4.50	3.58
904.82	305.00	4.50	1105.6	0.905E-03	0.94	1145.86	4.50	3.56
940.15	305.00	4.50	1155.8	0.865E-03	0.97	1164.96	4.50	3.53
975.47	305.00	4.50	1207.6	0.828E-03	1.00	1183.96	4.50	3.50
1010.80	305.00	4.50	1261.1	0.793E-03	1.02	1202.85	4.50	3.48
1046.13	305.00	4.50	1316.2	0.760E-03	1.05	1221.65	4.50	3.45
1081.46	305.00	4.50	1372.9	0.728E-03	1.08	1240.35	4.50	3.42
1116.79	305.00	4.50	1431.4	0.699E-03	1.11	1258.95	4.50	3.39

1152.12	305.00	4.50	1491.6	0.670E-03	1.14	1277.47	4.50	3.36
1187.44	305.00	4.50	1553.4	0.644E-03	1.17	1295.90	4.50	3.33
1222.77	305.00	4.50	1617.1	0.618E-03	1.20	1314.25	4.50	3.30
1258.10	305.00	4.50	1682.4	0.594E-03	1.23	1332.52	4.50	3.27
1293.43	305.00	4.50	1749.6	0.572E-03	1.27	1350.71	4.50	3.23
1328.76	305.00	4.50	1818.5	0.550E-03	1.30	1368.82	4.50	3.20
1364.09	305.00	4.50	1889.3	0.529E-03	1.33	1386.85	4.50	3.17
1399.42	305.00	4.50	1961.9	0.510E-03	1.36	1404.82	4.50	3.14
1434.74	305.00	4.50	2036.3	0.491E-03	1.40	1422.71	4.50	3.10
1470.07	305.00	4.50	2112.6	0.473E-03	1.43	1440.54	4.50	3.07
1505.40	305.00	4.50	2190.7	0.456E-03	1.47	1458.29	4.50	3.03
1540.73	305.00	4.50	2270.8	0.440E-03	1.50	1475.98	4.50	3.00
1576.06	305.00	4.50	2352.8	0.425E-03	1.54	1493.61	4.50	2.96
1611.39	305.00	4.50	2436.6	0.410E-03	1.58	1511.17	4.50	2.92
1646.71	305.00	4.50	2522.5	0.396E-03	1.61	1528.67	4.50	2.89
1682.04	305.00	4.50	2610.2	0.383E-03	1.65	1546.11	4.50	2.85
1717.37	305.00	4.50	2700.0	0.370E-03	1.69	1563.49	4.50	2.81
1752.70	305.00	4.50	2791.7	0.358E-03	1.73	1580.82	4.50	2.77
1788.03	305.00	4.50	2885.4	0.347E-03	1.76	1598.08	4.50	2.74
1823.36	305.00	4.50	2981.2	0.335E-03	1.80	1615.29	4.50	2.70
1858.69	305.00	4.50	3079.0	0.325E-03	1.84	1632.44	4.50	2.66
1894.01	305.00	4.50	3178.8	0.315E-03	1.88	1649.54	4.50	2.62
1929.34	305.00	4.50	3280.7	0.305E-03	1.92	1666.58	4.50	2.58
1964.67	305.00	4.50	3384.7	0.295E-03	1.96	1683.58	4.50	2.54
2000.00	305.00	4.50	3490.8	0.286E-03	2.01	1700.52	4.50	2.49

Cumulative travel time = 153168.9375 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD241: BUOYANT AMBIENT SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                        CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                              CORMIX Version 5.0GT
                          HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\dry_u050.prd
 Time stamp:         Thu Oct 20 10:31:02 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =       4.50  HD    =       4.50
 UA    =      0.042  F     =      0.019 USTAR =0.2048E-02
 UW    =      2.000  UWSTAR=0.2198E-02
 Uniform density environment
 STRCND=  U          RHOAM = 1022.0000

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =    305.00  YB1   =    300.00  YB2   =    310.00
 LD    =     10.00   NOPEN =    8       SPAC  =      1.43
 D0    =     0.045   A0    =     0.002 H0    =      0.00  SUB0  =      4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =     90.00   THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.998   Q0    =     0.013       =0.1270E-01
 RHO0  = 1000.0000   DRHO0 =0.2200E+02  GP0   =0.2111E+00
 C0    =0.1000E+01   CUNITS=  mg/l
 IPOLL =  1          KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02   m0    =0.1268E-02  j0    =0.2681E-03  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001   lM    =      0.31  lm    =      0.72
 lmp   =  99999.00   lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01   M0    =0.1268E-01  J0    =0.2681E-02
 Associated 3-d length scales (meters)
 LQ    =      0.04   LM    =      0.73  Lm    =      2.68  Lb    =     36.19
                                        Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     60.90   FRD0  =     10.24  R     =     23.77  PL    =     73.
 (slot)              (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8909E-04  M0    =0.8909E-03
 lQ=B  =     0.018   lM    =      0.02  lm    =      0.05  lmp   =  99999.00
 LQ    =     0.030   LM    =      0.10  Lm    =      0.71  Lmp   =  99999.00
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.070   D0    =     0.170  A0    =     0.023  THETA =     90.00
 FR0   =      1.13   FRD0  =      0.37  R     =      1.67
 (slot)              (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU1H   2
 2  Applicable layer depth HS =     4.50  2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01   CUNITS=  mg/l
 NTOX  =  0
```

NSTD = 1 CSTD =0.4700E-02
REGMZ = 0
XINT = 2000.00 XMAX = 2000.00

X-Y-Z COORDINATE SYSTEM:
ORIGIN is located at the bottom and the diffuser mid-point:
305.00 m from the LEFT bank/shore.
X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 50 display intervals per module

BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

X	Y	Z	S	C	BV	BH
0.00	0.00	0.00	1.0	0.100E+01	0.08	0.08

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

Jet/plume transition motion in strong crossflow.

Zone of flow establishment: THETAE= 76.07 SIGMAE= 0.00
LE = 0.00 XE = 0.00 YE = 0.00 ZE = 0.00

Profile definitions:
BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane normal to trajectory
after merging: top-hat half-width in horizontal plane parallel to diffuser line
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
Individual jet/plumes before merging:						
0.00	0.00	0.00	1.0	0.100E+01	0.08	0.08
0.66	0.00	0.24	3.6	0.279E+00	0.11	0.11
1.33	0.00	0.43	7.6	0.132E+00	0.16	0.16
2.03	0.00	0.55	12.1	0.825E-01	0.22	0.22
2.72	0.00	0.65	17.0	0.590E-01	0.27	0.27
3.42	0.00	0.73	22.0	0.455E-01	0.31	0.31
4.12	0.00	0.79	27.1	0.369E-01	0.35	0.35
4.82	0.00	0.84	32.3	0.310E-01	0.39	0.39
5.52	0.00	0.88	37.5	0.266E-01	0.43	0.43
6.23	0.00	0.92	43.0	0.233E-01	0.47	0.47
6.93	0.00	0.96	48.6	0.206E-01	0.50	0.50
7.63	0.00	1.00	54.3	0.184E-01	0.54	0.54
8.33	0.00	1.04	60.2	0.166E-01	0.57	0.57
9.03	0.00	1.08	66.3	0.151E-01	0.61	0.61
9.74	0.00	1.11	72.5	0.138E-01	0.64	0.64
10.44	0.00	1.15	78.8	0.127E-01	0.67	0.67
11.14	0.00	1.19	85.3	0.117E-01	0.70	0.70
Merging of individual jet/plumes to form plane jet/plume:						
11.49	0.00	1.20	109.5	0.913E-02	0.90	5.90
12.54	0.00	1.25	116.0	0.862E-02	0.95	5.95
13.24	0.00	1.29	120.3	0.831E-02	0.98	5.98
13.95	0.00	1.32	124.6	0.803E-02	1.02	6.02
14.65	0.00	1.35	128.9	0.776E-02	1.05	6.05
15.35	0.00	1.38	133.2	0.751E-02	1.09	6.09
16.05	0.00	1.42	137.5	0.727E-02	1.13	6.13
16.75	0.00	1.45	141.9	0.705E-02	1.16	6.16
17.46	0.00	1.48	146.2	0.684E-02	1.20	6.20
18.16	0.00	1.52	150.6	0.664E-02	1.23	6.23
18.86	0.00	1.55	154.9	0.645E-02	1.27	6.27
19.56	0.00	1.59	159.3	0.628E-02	1.30	6.30
20.27	0.00	1.62	163.7	0.611E-02	1.34	6.34

20.97	0.00	1.66	168.1	0.595E-02	1.37	6.37
21.67	0.00	1.69	172.5	0.580E-02	1.41	6.41
22.37	0.00	1.73	176.9	0.565E-02	1.45	6.45
23.08	0.00	1.76	181.3	0.552E-02	1.48	6.48
23.78	0.00	1.80	185.7	0.538E-02	1.52	6.52
24.48	0.00	1.83	190.2	0.526E-02	1.55	6.55
25.18	0.00	1.87	194.6	0.514E-02	1.59	6.59
25.89	0.00	1.90	199.1	0.502E-02	1.63	6.63
26.59	0.00	1.94	203.6	0.491E-02	1.66	6.66
27.29	0.00	1.98	208.1	0.481E-02	1.70	6.70
27.99	0.00	2.01	212.6	0.470E-02	1.73	6.73

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

28.70	0.00	2.05	217.1	0.461E-02	1.77	6.77
29.40	0.00	2.09	221.6	0.451E-02	1.81	6.81
30.10	0.00	2.12	226.1	0.442E-02	1.84	6.84
30.80	0.00	2.16	230.6	0.434E-02	1.88	6.88
31.51	0.00	2.20	235.2	0.425E-02	1.92	6.92
32.21	0.00	2.23	239.8	0.417E-02	1.95	6.95
32.91	0.00	2.27	244.3	0.409E-02	1.99	6.99
33.61	0.00	2.31	248.9	0.402E-02	2.03	7.03
34.31	0.00	2.35	253.5	0.394E-02	2.06	7.06
35.02	0.00	2.39	258.1	0.387E-02	2.10	7.10

Cumulative travel time = 414.8818 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

Control volume inflow:

X	Y	Z	S	C	BV	BH
35.02	0.00	2.39	258.1	0.387E-02	2.10	7.10

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
32.92	0.00	4.50	258.1	0.387E-02	0.00	0.00	4.50	4.50
34.18	0.00	4.50	258.1	0.387E-02	3.36	6.32	4.50	1.14
35.44	0.00	4.50	264.5	0.378E-02	3.94	14.09	4.50	0.56
36.70	0.00	4.50	334.9	0.299E-02	4.27	14.11	4.50	0.23
37.96	0.00	4.50	397.7	0.251E-02	4.44	14.12	4.50	0.06
39.22	0.00	4.50	420.6	0.238E-02	4.50	14.13	4.50	0.00

Cumulative travel time = 514.8773 sec

END OF MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
39.22	0.00	4.50	420.6	0.238E-02	4.50	14.13	4.50	0.00
64.10	0.00	4.50	508.6	0.197E-02	2.55	30.10	4.50	1.95
88.99	0.00	4.50	555.2	0.180E-02	1.98	42.47	4.50	2.52
113.88	0.00	4.50	588.9	0.170E-02	1.67	53.21	4.50	2.83
138.77	0.00	4.50	616.2	0.162E-02	1.48	62.91	4.50	3.02
163.65	0.00	4.50	639.8	0.156E-02	1.35	71.89	4.50	3.15
188.54	0.00	4.50	661.2	0.151E-02	1.24	80.31	4.50	3.26
213.43	0.00	4.50	681.2	0.147E-02	1.17	88.28	4.50	3.33
238.32	0.00	4.50	700.4	0.143E-02	1.10	95.88	4.50	3.40
263.20	0.00	4.50	719.0	0.139E-02	1.05	103.16	4.50	3.45
288.09	0.00	4.50	737.4	0.136E-02	1.01	110.17	4.50	3.49
312.98	0.00	4.50	755.9	0.132E-02	0.98	116.94	4.50	3.52
337.87	0.00	4.50	774.4	0.129E-02	0.95	123.50	4.50	3.55
362.75	0.00	4.50	793.3	0.126E-02	0.92	129.87	4.50	3.58
387.64	0.00	4.50	812.5	0.123E-02	0.90	136.07	4.50	3.60
412.53	0.00	4.50	832.3	0.120E-02	0.89	142.11	4.50	3.61
437.42	0.00	4.50	852.5	0.117E-02	0.87	148.01	4.50	3.63
462.31	0.00	4.50	873.5	0.114E-02	0.86	153.78	4.50	3.64
487.19	0.00	4.50	895.0	0.112E-02	0.85	159.42	4.50	3.65
512.08	0.00	4.50	917.4	0.109E-02	0.84	164.96	4.50	3.66
536.97	0.00	4.50	940.4	0.106E-02	0.83	170.39	4.50	3.67
561.86	0.00	4.50	964.3	0.104E-02	0.83	175.72	4.50	3.67
586.74	0.00	4.50	989.1	0.101E-02	0.83	180.96	4.50	3.67
611.63	0.00	4.50	1014.7	0.985E-03	0.82	186.12	4.50	3.68
636.52	0.00	4.50	1041.3	0.960E-03	0.82	191.19	4.50	3.68
661.41	0.00	4.50	1068.8	0.936E-03	0.82	196.20	4.50	3.68
686.29	0.00	4.50	1097.2	0.911E-03	0.82	201.13	4.50	3.68
711.18	0.00	4.50	1126.7	0.888E-03	0.83	205.99	4.50	3.67
736.07	0.00	4.50	1157.2	0.864E-03	0.83	210.79	4.50	3.67
760.96	0.00	4.50	1188.7	0.841E-03	0.83	215.52	4.50	3.67
785.84	0.00	4.50	1221.3	0.819E-03	0.84	220.21	4.50	3.66
810.73	0.00	4.50	1254.9	0.797E-03	0.84	224.83	4.50	3.66
835.62	0.00	4.50	1289.6	0.775E-03	0.85	229.41	4.50	3.65
860.51	0.00	4.50	1325.5	0.754E-03	0.86	233.93	4.50	3.64
885.39	0.00	4.50	1362.5	0.734E-03	0.86	238.41	4.50	3.64
910.28	0.00	4.50	1400.6	0.714E-03	0.87	242.84	4.50	3.63
935.17	0.00	4.50	1439.9	0.694E-03	0.88	247.23	4.50	3.62
960.06	0.00	4.50	1480.4	0.675E-03	0.89	251.58	4.50	3.61
984.94	0.00	4.50	1522.1	0.657E-03	0.90	255.89	4.50	3.60
1009.83	0.00	4.50	1565.0	0.639E-03	0.91	260.16	4.50	3.59
1034.72	0.00	4.50	1609.1	0.621E-03	0.92	264.40	4.50	3.58
1059.61	0.00	4.50	1654.4	0.604E-03	0.93	268.60	4.50	3.57
1084.49	0.00	4.50	1701.0	0.588E-03	0.94	272.77	4.50	3.56
1109.38	0.00	4.50	1748.9	0.572E-03	0.95	276.90	4.50	3.55
1134.27	0.00	4.50	1798.0	0.556E-03	0.97	281.00	4.50	3.53
1159.16	0.00	4.50	1848.4	0.541E-03	0.98	285.07	4.50	3.52
1184.04	0.00	4.50	1900.1	0.526E-03	0.99	289.12	4.50	3.51
1208.93	0.00	4.50	1953.1	0.512E-03	1.01	293.13	4.50	3.49
1233.82	0.00	4.50	2007.5	0.498E-03	1.02	297.12	4.50	3.48
1258.71	0.00	4.50	2063.2	0.485E-03	1.04	301.08	4.50	3.46
1283.59	0.00	4.50	2120.2	0.472E-03	1.05	305.02	4.50	3.45

Cumulative travel time = 30142.9121 sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
1283.59	305.00	4.50	2120.2	0.472E-03	1.05	610.00	4.50	3.45
1297.92	305.00	4.50	2151.4	0.465E-03	1.06	612.09	4.50	3.44
1312.25	305.00	4.50	2182.8	0.458E-03	1.07	614.19	4.50	3.43
1326.58	305.00	4.50	2214.4	0.452E-03	1.09	616.28	4.50	3.41
1340.91	305.00	4.50	2246.2	0.445E-03	1.10	618.37	4.50	3.40
1355.23	305.00	4.50	2278.3	0.439E-03	1.11	620.46	4.50	3.39
1369.56	305.00	4.50	2310.6	0.433E-03	1.12	622.55	4.50	3.38

1383.89	305.00	4.50	2343.1	0.427E-03	1.13	624.63	4.50	3.37
1398.22	305.00	4.50	2375.8	0.421E-03	1.15	626.72	4.50	3.35
1412.55	305.00	4.50	2408.7	0.415E-03	1.16	628.80	4.50	3.34
1426.88	305.00	4.50	2441.9	0.410E-03	1.17	630.88	4.50	3.33
1441.20	305.00	4.50	2475.3	0.404E-03	1.18	632.96	4.50	3.32
1455.53	305.00	4.50	2508.9	0.399E-03	1.19	635.04	4.50	3.31
1469.86	305.00	4.50	2542.8	0.393E-03	1.21	637.12	4.50	3.29
1484.19	305.00	4.50	2576.9	0.388E-03	1.22	639.20	4.50	3.28
1498.52	305.00	4.50	2611.2	0.383E-03	1.23	641.27	4.50	3.27
1512.84	305.00	4.50	2645.7	0.378E-03	1.24	643.34	4.50	3.26
1527.17	305.00	4.50	2680.5	0.373E-03	1.26	645.41	4.50	3.24
1541.50	305.00	4.50	2715.5	0.368E-03	1.27	647.48	4.50	3.23
1555.83	305.00	4.50	2750.7	0.364E-03	1.28	649.55	4.50	3.22
1570.16	305.00	4.50	2786.1	0.359E-03	1.29	651.62	4.50	3.21
1584.48	305.00	4.50	2821.8	0.354E-03	1.31	653.68	4.50	3.19
1598.81	305.00	4.50	2857.8	0.350E-03	1.32	655.75	4.50	3.18
1613.14	305.00	4.50	2893.9	0.346E-03	1.33	657.81	4.50	3.17
1627.47	305.00	4.50	2930.3	0.341E-03	1.34	659.87	4.50	3.16
1641.80	305.00	4.50	2966.9	0.337E-03	1.36	661.92	4.50	3.14
1656.13	305.00	4.50	3003.7	0.333E-03	1.37	663.98	4.50	3.13
1670.45	305.00	4.50	3040.8	0.329E-03	1.38	666.04	4.50	3.12
1684.78	305.00	4.50	3078.1	0.325E-03	1.39	668.09	4.50	3.11
1699.11	305.00	4.50	3115.7	0.321E-03	1.41	670.14	4.50	3.09
1713.44	305.00	4.50	3153.5	0.317E-03	1.42	672.19	4.50	3.08
1727.77	305.00	4.50	3191.5	0.313E-03	1.43	674.24	4.50	3.07
1742.09	305.00	4.50	3229.8	0.310E-03	1.44	676.29	4.50	3.06
1756.42	305.00	4.50	3268.3	0.306E-03	1.46	678.33	4.50	3.04
1770.75	305.00	4.50	3307.0	0.302E-03	1.47	680.37	4.50	3.03
1785.08	305.00	4.50	3346.0	0.299E-03	1.48	682.42	4.50	3.02
1799.41	305.00	4.50	3385.2	0.295E-03	1.50	684.46	4.50	3.00
1813.73	305.00	4.50	3424.6	0.292E-03	1.51	686.49	4.50	2.99
1828.06	305.00	4.50	3464.3	0.289E-03	1.52	688.53	4.50	2.98
1842.39	305.00	4.50	3504.2	0.285E-03	1.53	690.57	4.50	2.97
1856.72	305.00	4.50	3544.4	0.282E-03	1.55	692.60	4.50	2.95
1871.05	305.00	4.50	3584.8	0.279E-03	1.56	694.63	4.50	2.94
1885.38	305.00	4.50	3625.4	0.276E-03	1.57	696.66	4.50	2.93
1899.70	305.00	4.50	3666.3	0.273E-03	1.59	698.69	4.50	2.91
1914.03	305.00	4.50	3707.5	0.270E-03	1.60	700.71	4.50	2.90
1928.36	305.00	4.50	3748.8	0.267E-03	1.61	702.74	4.50	2.89
1942.69	305.00	4.50	3790.5	0.264E-03	1.63	704.76	4.50	2.87
1957.02	305.00	4.50	3832.3	0.261E-03	1.64	706.78	4.50	2.86
1971.34	305.00	4.50	3874.4	0.258E-03	1.65	708.80	4.50	2.85
1985.67	305.00	4.50	3916.8	0.255E-03	1.67	710.82	4.50	2.83
2000.00	305.00	4.50	3959.4	0.253E-03	1.68	712.84	4.50	2.82

Cumulative travel time = 47200.1914 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD241: BUOYANT AMBIENT SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File

22222222222222222222222222222222222222222222222222222222222222222222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                       CORMIX Version 5.0GT
                    HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\dry_u090.prd
 Time stamp:         Thu Oct 20 10:31:30 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =       4.50  HD    =       4.50
 UA    =      0.076  F     =      0.019 USTAR =0.3705E-02
 UW    =      2.000  UWSTAR=0.2198E-02
 Uniform density environment
 STRCND=  U          RHOAM = 1022.0000

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =    305.00  YB1   =    300.00  YB2   =    310.00
 LD    =     10.00   NOPEN =    8       SPAC  =      1.43
 D0    =     0.045   A0    =     0.002  H0    =      0.00  SUB0  =      4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =     90.00   THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.998   Q0    =     0.013        =0.1270E-01
 RHO0  = 1000.0000   DRHO0 =0.2200E+02  GP0   =0.2111E+00
 C0    =0.1000E+01   CUNITS=  mg/l
 IPOLL =  1          KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02   m0    =0.1268E-02  j0    =0.2681E-03  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001   lM    =      0.31  lm    =      0.22
 lmp   =  99999.00   lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01   M0    =0.1268E-01  J0    =0.2681E-02
 Associated 3-d length scales (meters)
 LQ    =      0.04   LM    =      0.73  Lm    =      1.48  Lb    =      6.11
                                        Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     60.90   FRD0  =     10.24  R     =     13.13  PL    =     73.
 (slot)              (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8909E-04  M0    =0.8909E-03
 lQ=B  =     0.018   lM    =      0.02  lm    =      0.02  lmp   =  99999.00
 LQ    =     0.030   LM    =      0.10  Lm    =      0.39  Lmp   =  99999.00
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.070   D0    =     0.170  A0    =     0.023  THETA =     90.00
 FR0   =      1.13   FRD0  =      0.37  R     =      0.92
 (slot)              (riser group)

FLOW CLASSIFICATION
 2222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU8    2
 2  Applicable layer depth HS =     4.50  2
 2222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01   CUNITS=  mg/l
 NTOX  =  0
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NSTD = 1 CSTD =0.4700E-02
REGMZ = 0
XINT = 2000.00 XMAX = 2000.00

X-Y-Z COORDINATE SYSTEM:
ORIGIN is located at the bottom and the diffuser mid-point:
305.00 m from the LEFT bank/shore.
X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 50 display intervals per module

BEGIN MOD201: DIFFUSER DISCHARGE MODULE

Due to complex near-field motions: EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

Profile definitions:
BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
BH = top-hat half-width, in horizontal plane normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
0.00	0.00	0.00	1.0	0.100E+01	0.01	5.00

END OF MOD201: DIFFUSER DISCHARGE MODULE

BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

INITIAL LOCAL VERTICAL INSTABILITY REGION:
Bulk dilution (S = 292.49) occurs in a limited region (horizontal extent = 0.30 m) surrounding the discharge location.

Control volume inflow:

X	Y	Z	S	C	BV	BH
0.00	0.00	0.00	1.0	0.100E+01	0.01	5.00

Control volume outflow:

X	Y	Z	S	C	BV	BH
0.30	0.00	2.25	292.5	0.342E-02	4.50	16.25

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	0.57 m
X-position of upstream stagnation point	=	-0.27 m
Thickness in intrusion region	=	1.22 m
Half-width at downstream end	=	7.48 m
Thickness at downstream end	=	3.54 m

Control volume inflow:

X	Y	Z	S	C	BV	BH
0.30	0.00	2.25	292.5	0.342E-02	4.50	16.25

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 due to mixing in this control volume.
The actual extent of the zone at whose boundary the water quality standard or the CCC is exceeded will be smaller than the control volume outflow values predicted below.

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)

ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
-0.27	0.00	4.50	9999.9	0.000E+00	0.00	0.00	4.50	4.50
-0.19	0.00	4.50	603.4	0.166E-02	0.59	6.31	4.50	3.91
0.24	0.00	4.50	294.7	0.339E-02	1.21	15.34	4.50	3.29
0.66	0.00	4.50	293.4	0.341E-02	1.30	12.17	4.50	3.20
1.08	0.00	4.50	296.4	0.337E-02	1.59	11.33	4.50	2.91
1.50	0.00	4.50	300.8	0.332E-02	2.01	10.62	4.50	2.49
1.93	0.00	4.50	305.4	0.327E-02	2.45	9.98	4.50	2.05
2.35	0.00	4.50	309.5	0.323E-02	2.84	9.41	4.50	1.66
2.77	0.00	4.50	312.6	0.320E-02	3.14	8.88	4.50	1.36
3.19	0.00	4.50	314.7	0.318E-02	3.33	8.38	4.50	1.17
3.62	0.00	4.50	315.8	0.317E-02	3.44	7.92	4.50	1.06
4.04	0.00	4.50	316.9	0.316E-02	3.54	7.48	4.50	0.96

Cumulative travel time = 49.1919 sec

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
4.04	0.00	4.50	316.9	0.316E-02	3.54	7.48	4.50	0.96
43.96	0.00	4.50	410.2	0.244E-02	1.65	20.71	4.50	2.85
83.88	0.00	4.50	455.3	0.220E-02	1.25	30.42	4.50	3.25
123.80	0.00	4.50	490.1	0.204E-02	1.06	38.73	4.50	3.44
163.71	0.00	4.50	521.7	0.192E-02	0.94	46.20	4.50	3.56
203.63	0.00	4.50	553.0	0.181E-02	0.87	53.08	4.50	3.63
243.55	0.00	4.50	585.6	0.171E-02	0.82	59.51	4.50	3.68
283.47	0.00	4.50	620.3	0.161E-02	0.79	65.59	4.50	3.71
323.39	0.00	4.50	657.8	0.152E-02	0.77	71.38	4.50	3.73
363.31	0.00	4.50	698.5	0.143E-02	0.76	76.94	4.50	3.74
403.23	0.00	4.50	742.9	0.135E-02	0.75	82.28	4.50	3.75
443.15	0.00	4.50	791.3	0.126E-02	0.76	87.45	4.50	3.74
483.07	0.00	4.50	843.8	0.119E-02	0.76	92.45	4.50	3.74
522.99	0.00	4.50	900.7	0.111E-02	0.77	97.32	4.50	3.73
562.91	0.00	4.50	962.3	0.104E-02	0.79	102.06	4.50	3.71
602.83	0.00	4.50	1028.7	0.972E-03	0.81	106.69	4.50	3.69
642.75	0.00	4.50	1100.0	0.909E-03	0.83	111.22	4.50	3.67
682.66	0.00	4.50	1176.4	0.850E-03	0.85	115.66	4.50	3.65
722.58	0.00	4.50	1258.1	0.795E-03	0.88	120.01	4.50	3.62
762.50	0.00	4.50	1345.2	0.743E-03	0.90	124.28	4.50	3.60
802.42	0.00	4.50	1437.7	0.696E-03	0.93	128.48	4.50	3.57
842.34	0.00	4.50	1535.9	0.651E-03	0.97	132.61	4.50	3.53
882.26	0.00	4.50	1639.8	0.610E-03	1.00	136.68	4.50	3.50
922.18	0.00	4.50	1749.5	0.572E-03	1.04	140.69	4.50	3.46
962.10	0.00	4.50	1865.2	0.536E-03	1.08	144.65	4.50	3.42
1002.02	0.00	4.50	1986.9	0.503E-03	1.12	148.55	4.50	3.38
1041.94	0.00	4.50	2114.7	0.473E-03	1.16	152.41	4.50	3.34
1081.86	0.00	4.50	2248.8	0.445E-03	1.20	156.21	4.50	3.30
1121.78	0.00	4.50	2389.2	0.419E-03	1.25	159.98	4.50	3.25
1161.70	0.00	4.50	2536.0	0.394E-03	1.29	163.70	4.50	3.21
1201.62	0.00	4.50	2689.3	0.372E-03	1.34	167.38	4.50	3.16
1241.53	0.00	4.50	2849.1	0.351E-03	1.39	171.03	4.50	3.11
1281.45	0.00	4.50	3015.7	0.332E-03	1.44	174.64	4.50	3.06

1321.37	0.00	4.50	3189.0	0.314E-03	1.50	178.21	4.50	3.00
1361.29	0.00	4.50	3369.1	0.297E-03	1.55	181.75	4.50	2.95
1401.21	0.00	4.50	3556.1	0.281E-03	1.60	185.26	4.50	2.90
1441.13	0.00	4.50	3750.0	0.267E-03	1.66	188.73	4.50	2.84
1481.05	0.00	4.50	3951.0	0.253E-03	1.72	192.18	4.50	2.78
1520.97	0.00	4.50	4159.2	0.240E-03	1.78	195.60	4.50	2.72
1560.89	0.00	4.50	4374.5	0.229E-03	1.84	198.99	4.50	2.66
1600.81	0.00	4.50	4597.1	0.218E-03	1.90	202.35	4.50	2.60
1640.73	0.00	4.50	4827.0	0.207E-03	1.96	205.69	4.50	2.54
1680.65	0.00	4.50	5064.3	0.197E-03	2.02	209.00	4.50	2.48
1720.57	0.00	4.50	5309.0	0.188E-03	2.09	212.29	4.50	2.41
1760.49	0.00	4.50	5561.3	0.180E-03	2.16	215.56	4.50	2.34
1800.40	0.00	4.50	5821.1	0.172E-03	2.22	218.80	4.50	2.28
1840.32	0.00	4.50	6088.6	0.164E-03	2.29	222.02	4.50	2.21
1880.24	0.00	4.50	6363.9	0.157E-03	2.36	225.22	4.50	2.14
1920.16	0.00	4.50	6646.9	0.150E-03	2.43	228.39	4.50	2.07
1960.08	0.00	4.50	6937.7	0.144E-03	2.50	231.55	4.50	2.00
2000.00	0.00	4.50	7236.4	0.138E-03	2.58	234.68	4.50	1.92

Cumulative travel time = 26311.8594 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD241: BUOYANT AMBIENT SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File

22222222222222222222222222222222222222222222222222222222222222222222222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                        CORMIX Version 5.0GT
                    HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\wet_u010.prd
 Time stamp:         Thu Oct 20 10:31:43 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =       4.50  HD    =       4.50
 UA    =      0.013  F     =      0.019 USTAR =0.6338E-03
 UW    =      2.000  UWSTAR=0.2198E-02
 Density stratified environment
 STRCND=  A          RHOAM = 1017.3500
 RHOAS = 1017.0000   RHOAB = 1017.7000  RHOAH0= 1017.7000  E     =0.1499E-02

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =    305.00  YB1   =    300.00  YB2   =    310.00
 LD    =     10.00   NOPEN =    8       SPAC  =      1.43
 D0    =     0.045   A0    =     0.002  H0    =      0.00  SUB0  =      4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =     90.00   THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.998   Q0    =     0.013        =0.1270E-01
 RHO0  = 1000.0000   DRHO0 =0.1770E+02  GP0   =0.1706E+00
 C0    =0.1000E+01   CUNITS=  mg/l
 IPOLL =  1          KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02   m0    =0.1268E-02  j0    =0.2166E-03  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001   lM    =      0.35  lm    =      7.50
 lmp   =      0.95   lbp   =      1.55  la    =      0.34

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01   M0    =0.1268E-01  J0    =0.2166E-02
 Associated 3-d length scales (meters)
 LQ    =      0.04   LM    =      0.81  Lm    =      8.66  Lb    =    985.93
                                        Lmp   =      1.71  Lbp   =      2.47

NON-DIMENSIONAL PARAMETERS
 FR0   =     67.76   FRD0  =     11.39  R     =     76.78  PL    =     68.
 (slot)              (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8181E-04  M0    =0.8181E-03
 lQ=B  =     0.020   lM    =      0.02  lm    =      0.48  lmp   =      0.38
 LQ    =     0.029   LM    =      0.10  Lm    =      2.20  Lmp   =      0.86
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.064   D0    =     0.177  A0    =     0.025  THETA =     90.00
 FR0   =      1.11   FRD0  =      0.37  R     =      4.95
 (slot)              (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)       =    MS8    2
 2  Applicable layer depth HS =     4.50   2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01   CUNITS=  mg/l
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 NTOX   =  0
 NSTD   =  1          CSTD  =0.4700E-02
 REGMZ  =  0
 XINT   =   2000.00   XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

      X        Y        Z        S        C        BV       BH
   0.00     0.00     0.00      1.0 0.100E+01    0.09     0.09

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

 Plume-like motion in linear stratification with weak crossflow.

 Zone of flow establishment:              THETAE=     85.22  SIGMAE=      0.00
  LE    =      0.12  XE    =      0.00  YE    =      0.00  ZE    =      0.12

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane
                        normal to trajectory
        after merging:  top-hat half-width in horizontal plane
                        parallel to diffuser line
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

      X        Y        Z        S        C        BV       BH
 Individual jet/plumes before merging:
   0.00     0.00     0.12      1.0 0.100E+01    0.09     0.09
   0.00     0.00     0.12      1.0 0.100E+01    0.09     0.09
   0.12     0.00     0.35      1.9 0.532E+00    0.07     0.07
   0.28     0.00     0.56      3.6 0.280E+00    0.11     0.11
   0.46     0.00     0.75      5.6 0.178E+00    0.14     0.14
   0.65     0.00     0.93      7.9 0.127E+00    0.17     0.17
   0.87     0.00     1.07     10.3 0.971E-01    0.20     0.20
   1.10     0.00     1.20     12.7 0.786E-01    0.23     0.23
   1.34     0.00     1.31     15.2 0.659E-01    0.26     0.26
   1.58     0.00     1.40     17.6 0.568E-01    0.29     0.29
   1.83     0.00     1.48     20.0 0.499E-01    0.32     0.32
   2.08     0.00     1.55     22.4 0.446E-01    0.34     0.34
   2.34     0.00     1.61     24.8 0.403E-01    0.37     0.37
   2.60     0.00     1.66     27.2 0.367E-01    0.39     0.39
   2.86     0.00     1.71     29.6 0.338E-01    0.41     0.41
   3.11     0.00     1.75     32.0 0.313E-01    0.44     0.44
   3.37     0.00     1.80     34.4 0.291E-01    0.46     0.46
   3.63     0.00     1.84     36.8 0.272E-01    0.48     0.48
   3.89     0.00     1.88     39.3 0.254E-01    0.51     0.51
   4.15     0.00     1.92     41.8 0.239E-01    0.53     0.53
   4.41     0.00     1.96     44.4 0.225E-01    0.55     0.55
   4.67     0.00     1.99     47.0 0.213E-01    0.58     0.58
   4.93     0.00     2.03     49.6 0.202E-01    0.60     0.60
   5.19     0.00     2.07     52.2 0.192E-01    0.62     0.62
   5.45     0.00     2.10     54.9 0.182E-01    0.64     0.64
   5.71     0.00     2.14     57.6 0.174E-01    0.66     0.66
   5.97     0.00     2.17     60.3 0.166E-01    0.69     0.69
   6.23     0.00     2.20     63.0 0.159E-01    0.71     0.71
 Merging of individual jet/plumes to form plane jet/plume:
   6.28     0.00     2.21     82.5 0.121E-01    0.90     5.90
```

6.75	0.00	2.26	85.8	0.117E-01	0.94	5.94
7.01	0.00	2.28	87.6	0.114E-01	0.97	5.97
7.27	0.00	2.31	89.4	0.112E-01	1.00	6.00
7.53	0.00	2.33	91.1	0.110E-01	1.02	6.02
7.80	0.00	2.36	92.8	0.108E-01	1.05	6.05
8.06	0.00	2.38	94.5	0.106E-01	1.08	6.08
8.32	0.00	2.40	96.2	0.104E-01	1.11	6.11
8.58	0.00	2.43	97.8	0.102E-01	1.13	6.13
8.84	0.00	2.45	99.5	0.101E-01	1.16	6.16
9.10	0.00	2.47	101.1	0.990E-02	1.19	6.19
9.36	0.00	2.49	102.6	0.974E-02	1.22	6.22
9.62	0.00	2.51	104.2	0.960E-02	1.25	6.25
9.89	0.00	2.52	105.7	0.946E-02	1.28	6.28
10.15	0.00	2.54	107.2	0.932E-02	1.31	6.31
10.41	0.00	2.56	108.7	0.920E-02	1.34	6.34
10.67	0.00	2.57	110.2	0.908E-02	1.37	6.37
10.93	0.00	2.59	111.6	0.896E-02	1.39	6.39
11.20	0.00	2.60	113.0	0.885E-02	1.42	6.42
11.46	0.00	2.61	114.4	0.874E-02	1.45	6.45
11.72	0.00	2.62	115.7	0.864E-02	1.48	6.48
11.98	0.00	2.63	117.0	0.855E-02	1.51	6.51
12.24	0.00	2.64	118.2	0.846E-02	1.53	6.53
12.50	0.00	2.64	119.4	0.838E-02	1.56	6.56

Terminal level in stratified ambient has been reached.
Cumulative travel time = 157.1202 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD236: TERMINAL LAYER IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 1.24 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

UPSTREAM INTRUSION PROPERTIES:

Maximum elevation of jet/plume rise	=	4.07 m
Layer thickness in impingement region	=	0.81 m
Upstream intrusion length	=	5.64 m
X-position of upstream stagnation point	=	6.86 m
Thickness in intrusion region	=	0.81 m
Half-width at downstream end	=	44.78 m
Thickness at downstream end	=	1.62 m

Control volume inflow:

X	Y	Z	S	C	BV	BH
12.50	0.00	2.64	119.4	0.838E-02	1.56	6.56

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
6.86	0.00	2.64	9999.9	0.000E+00	0.00	0.00	2.64	2.64

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

7.42	0.00	2.64	302.9	0.330E-02	0.32	6.33	2.80	2.48
10.17	0.00	2.64	133.8	0.747E-02	0.72	15.38	3.00	2.28
12.92	0.00	2.64	119.4	0.837E-02	0.81	31.56	3.05	2.24
15.66	0.00	2.64	121.6	0.822E-02	0.87	33.92	3.08	2.21
18.41	0.00	2.64	126.5	0.790E-02	1.00	35.94	3.14	2.14
21.16	0.00	2.64	132.6	0.754E-02	1.17	37.72	3.23	2.06

23.90	0.00	2.64	138.3	0.723E-02	1.33	39.34	3.31	1.98
26.65	0.00	2.64	142.7	0.701E-02	1.46	40.83	3.37	1.91
29.40	0.00	2.64	145.7	0.687E-02	1.54	42.23	3.41	1.87
32.15	0.00	2.64	147.3	0.679E-02	1.58	43.54	3.43	1.85
34.89	0.00	2.64	148.7	0.673E-02	1.62	44.78	3.45	1.83

Cumulative travel time = 1879.2767 sec

END OF MOD236: TERMINAL LAYER IMPINGEMENT/UPSTREAM SPREADING

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD242: BUOYANT TERMINAL LAYER SPREADING

Profile definitions:
- BV = top-hat thickness, measured vertically
- BH = top-hat half-width, measured horizontally in y-direction
- ZU = upper plume boundary (Z-coordinate)
- ZL = lower plume boundary (Z-coordinate)
- S = hydrodynamic average (bulk) dilution
- C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
34.89	0.00	2.64	148.7	0.673E-02	1.62	44.78	3.45	1.83
39.53	0.00	2.64	159.6	0.627E-02	1.32	59.27	3.30	1.98
44.16	0.00	2.64	167.3	0.598E-02	1.15	71.33	3.22	2.07
48.80	0.00	2.64	173.4	0.577E-02	1.03	81.90	3.16	2.13
53.43	0.00	2.64	178.4	0.560E-02	0.95	91.43	3.12	2.17
58.06	0.00	2.64	182.8	0.547E-02	0.89	100.18	3.09	2.20
62.70	0.00	2.64	186.7	0.536E-02	0.84	108.31	3.06	2.22
67.33	0.00	2.64	190.1	0.526E-02	0.80	115.93	3.04	2.24
71.97	0.00	2.64	193.4	0.517E-02	0.77	123.13	3.03	2.26
76.60	0.00	2.64	196.3	0.509E-02	0.74	129.96	3.01	2.27
81.24	0.00	2.64	199.2	0.502E-02	0.71	136.49	3.00	2.29
85.87	0.00	2.64	201.8	0.495E-02	0.69	142.74	2.99	2.30
90.50	0.00	2.64	204.4	0.489E-02	0.67	148.75	2.98	2.31
95.14	0.00	2.64	206.8	0.483E-02	0.65	154.55	2.97	2.32
99.77	0.00	2.64	209.2	0.478E-02	0.64	160.15	2.96	2.32
104.41	0.00	2.64	211.5	0.473E-02	0.62	165.58	2.95	2.33
109.04	0.00	2.64	213.8	0.468E-02	0.61	170.85	2.95	2.34
113.68	0.00	2.64	216.0	0.463E-02	0.60	175.97	2.94	2.34
118.31	0.00	2.64	218.2	0.458E-02	0.59	180.96	2.94	2.35
122.94	0.00	2.64	220.4	0.454E-02	0.58	185.83	2.93	2.35
127.58	0.00	2.64	222.6	0.449E-02	0.57	190.59	2.93	2.36
132.21	0.00	2.64	224.7	0.445E-02	0.56	195.24	2.92	2.36
136.85	0.00	2.64	226.8	0.441E-02	0.55	199.80	2.92	2.37
141.48	0.00	2.64	229.0	0.437E-02	0.55	204.26	2.92	2.37
146.12	0.00	2.64	231.1	0.433E-02	0.54	208.64	2.91	2.37
150.75	0.00	2.64	233.2	0.429E-02	0.53	212.95	2.91	2.38
155.38	0.00	2.64	235.3	0.425E-02	0.53	217.18	2.91	2.38
160.02	0.00	2.64	237.5	0.421E-02	0.52	221.34	2.90	2.38
164.65	0.00	2.64	239.6	0.417E-02	0.52	225.44	2.90	2.38
169.29	0.00	2.64	241.8	0.414E-02	0.51	229.48	2.90	2.39
173.92	0.00	2.64	243.9	0.410E-02	0.51	233.46	2.90	2.39
178.56	0.00	2.64	246.1	0.406E-02	0.51	237.39	2.90	2.39
183.19	0.00	2.64	248.3	0.403E-02	0.50	241.27	2.89	2.39
187.82	0.00	2.64	250.5	0.399E-02	0.50	245.10	2.89	2.39
192.46	0.00	2.64	252.8	0.396E-02	0.50	248.89	2.89	2.39
197.09	0.00	2.64	255.0	0.392E-02	0.49	252.63	2.89	2.40
201.73	0.00	2.64	257.3	0.389E-02	0.49	256.34	2.89	2.40
206.36	0.00	2.64	259.5	0.385E-02	0.49	260.01	2.89	2.40
211.00	0.00	2.64	261.8	0.382E-02	0.49	263.64	2.89	2.40
215.63	0.00	2.64	264.1	0.379E-02	0.48	267.24	2.88	2.40
220.26	0.00	2.64	266.5	0.375E-02	0.48	270.80	2.88	2.40
224.90	0.00	2.64	268.8	0.372E-02	0.48	274.34	2.88	2.40
229.53	0.00	2.64	271.2	0.369E-02	0.48	277.85	2.88	2.40
234.17	0.00	2.64	273.6	0.366E-02	0.48	281.33	2.88	2.40
238.80	0.00	2.64	276.0	0.362E-02	0.47	284.78	2.88	2.41

243.44	0.00	2.64	278.4	0.359E-02	0.47	288.21	2.88	2.41
248.07	0.00	2.64	280.9	0.356E-02	0.47	291.62	2.88	2.41
252.70	0.00	2.64	283.4	0.353E-02	0.47	295.00	2.88	2.41
257.34	0.00	2.64	285.9	0.350E-02	0.47	298.36	2.88	2.41
261.97	0.00	2.64	288.4	0.347E-02	0.47	301.70	2.88	2.41
266.61	0.00	2.64	290.9	0.344E-02	0.47	305.03	2.88	2.41

Cumulative travel time = 19703.4395 sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
266.61	305.00	2.64	290.9	0.344E-02	0.47	610.00	2.88	2.41
301.27	305.00	2.64	306.2	0.327E-02	0.47	630.24	2.88	2.41
335.94	305.00	2.64	321.6	0.311E-02	0.48	650.74	2.88	2.40
370.61	305.00	2.64	337.0	0.297E-02	0.49	671.46	2.89	2.40
405.28	305.00	2.64	352.5	0.284E-02	0.50	692.38	2.89	2.39
439.95	305.00	2.64	368.1	0.272E-02	0.50	713.46	2.89	2.39
474.61	305.00	2.64	383.8	0.261E-02	0.51	734.69	2.90	2.39
509.28	305.00	2.64	399.6	0.250E-02	0.52	756.05	2.90	2.38
543.95	305.00	2.64	415.6	0.241E-02	0.52	777.53	2.90	2.38
578.62	305.00	2.64	431.6	0.232E-02	0.53	799.11	2.91	2.38
613.29	305.00	2.64	447.8	0.223E-02	0.53	820.78	2.91	2.38
647.95	305.00	2.64	464.1	0.215E-02	0.54	842.54	2.91	2.37
682.62	305.00	2.64	480.6	0.208E-02	0.54	864.37	2.91	2.37
717.29	305.00	2.64	497.2	0.201E-02	0.55	886.27	2.92	2.37
751.96	305.00	2.64	513.9	0.195E-02	0.55	908.24	2.92	2.37
786.62	305.00	2.64	530.7	0.188E-02	0.56	930.26	2.92	2.36
821.29	305.00	2.64	547.7	0.183E-02	0.56	952.34	2.92	2.36
855.96	305.00	2.64	564.8	0.177E-02	0.57	974.47	2.93	2.36
890.63	305.00	2.64	582.1	0.172E-02	0.57	996.65	2.93	2.36
925.30	305.00	2.64	599.5	0.167E-02	0.57	1018.87	2.93	2.36
959.96	305.00	2.64	617.0	0.162E-02	0.58	1041.14	2.93	2.35
994.63	305.00	2.64	634.7	0.158E-02	0.58	1063.44	2.93	2.35
1029.30	305.00	2.64	652.4	0.153E-02	0.59	1085.77	2.94	2.35
1063.97	305.00	2.64	670.4	0.149E-02	0.59	1108.15	2.94	2.35
1098.64	305.00	2.64	688.4	0.145E-02	0.59	1130.55	2.94	2.35
1133.30	305.00	2.64	706.6	0.142E-02	0.60	1152.99	2.94	2.34
1167.97	305.00	2.64	724.9	0.138E-02	0.60	1175.45	2.94	2.34
1202.64	305.00	2.64	743.3	0.135E-02	0.61	1197.95	2.95	2.34
1237.31	305.00	2.64	761.8	0.131E-02	0.61	1220.47	2.95	2.34
1271.97	305.00	2.64	780.5	0.128E-02	0.61	1243.02	2.95	2.34
1306.64	305.00	2.64	799.3	0.125E-02	0.62	1265.59	2.95	2.33
1341.31	305.00	2.64	818.2	0.122E-02	0.62	1288.19	2.95	2.33
1375.98	305.00	2.64	837.2	0.119E-02	0.62	1310.80	2.95	2.33
1410.65	305.00	2.64	856.4	0.117E-02	0.63	1333.45	2.96	2.33
1445.31	305.00	2.64	875.6	0.114E-02	0.63	1356.11	2.96	2.33
1479.98	305.00	2.64	895.0	0.112E-02	0.63	1378.79	2.96	2.33
1514.65	305.00	2.64	914.5	0.109E-02	0.64	1401.49	2.96	2.32
1549.32	305.00	2.64	934.1	0.107E-02	0.64	1424.22	2.96	2.32
1583.99	305.00	2.64	953.9	0.105E-02	0.64	1446.96	2.96	2.32
1618.65	305.00	2.64	973.7	0.103E-02	0.65	1469.71	2.97	2.32
1653.32	305.00	2.64	993.6	0.101E-02	0.65	1492.49	2.97	2.32
1687.99	305.00	2.64	1013.7	0.986E-03	0.65	1515.28	2.97	2.32
1722.66	305.00	2.64	1033.9	0.967E-03	0.66	1538.09	2.97	2.31
1757.32	305.00	2.64	1054.2	0.949E-03	0.66	1560.92	2.97	2.31
1791.99	305.00	2.64	1074.5	0.931E-03	0.66	1583.76	2.97	2.31
1826.66	305.00	2.64	1095.0	0.913E-03	0.67	1606.61	2.98	2.31
1861.33	305.00	2.64	1115.6	0.896E-03	0.67	1629.49	2.98	2.31
1896.00	305.00	2.64	1136.3	0.880E-03	0.67	1652.37	2.98	2.31
1930.66	305.00	2.64	1157.1	0.864E-03	0.67	1675.27	2.98	2.31
1965.33	305.00	2.64	1178.0	0.849E-03	0.68	1698.18	2.98	2.30
2000.00	305.00	2.64	1199.0	0.834E-03	0.68	1721.11	2.98	2.30

Cumulative travel time = 153041.3594 sec

Simulation limit based on maximum specified distance = 2000.00 m.

This is the REGION OF INTEREST limitation.

END OF MOD242: BUOYANT TERMINAL LAYER SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File

2222222222222222222222222222222222222222222222222222222222222222222222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                        CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                              CORMIX Version 5.0GT
                          HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\wet_u050.prd
 Time stamp:         Thu Oct 20 10:32:29 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =      4.50  HD    =      4.50
 UA    =     0.042  F     =     0.019 USTAR =0.2048E-02
 UW    =     2.000  UWSTAR=0.2198E-02
 Density stratified environment
 STRCND=  A          RHOAM = 1017.3500
 RHOAS = 1017.0000  RHOAB = 1017.7000  RHOAH0= 1017.7000  E     =0.1499E-02

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =    305.00  YB1   =    300.00  YB2   =    310.00
 LD    =    10.00    NOPEN =    8       SPAC  =      1.43
 D0    =    0.045    A0    =     0.002 H0    =      0.00  SUB0  =      4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =     90.00   THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =    0.998    Q0    =     0.013       =0.1270E-01
 RHO0  = 1000.0000   DRHO0 =0.1770E+02  GP0   =0.1706E+00
 C0    =0.1000E+01   CUNITS=  mg/l
 IPOLL =  1          KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02  m0    =0.1268E-02  j0    =0.2166E-03  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001  lM    =      0.35  lm    =      0.72
 lmp   =      0.95  lbp   =      1.55  la    =      1.08

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01  M0    =0.1268E-01  J0    =0.2166E-02
 Associated 3-d length scales (meters)
 LQ    =      0.04  LM    =      0.81  Lm    =      2.68  Lb    =     29.24
                                       Lmp   =      1.71  Lbp   =      2.47

NON-DIMENSIONAL PARAMETERS
 FR0   =     67.76  FRD0  =     11.39  R     =     23.77  PL    =     68.
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8181E-04  M0    =0.8181E-03
 lQ=B  =     0.020  lM    =      0.02  lm    =      0.05  lmp   =      0.38
 LQ    =     0.029  LM    =      0.10  Lm    =      0.68  Lmp   =      0.86
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.064  D0    =     0.177  A0    =     0.025  THETA =     90.00
 FR0   =      1.11  FRD0  =      0.37  R     =      1.53
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)       =    MS5    2
 2  Applicable layer depth HS =     4.50  2
 22222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01  CUNITS=  mg/l
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 NTOX   =  0
 NSTD   =  1          CSTD  =0.4700E-02
 REGMZ  =  0
 XINT   =   2000.00   XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

       X         Y         Z         S         C         BV        BH
    0.00      0.00      0.00      1.0 0.100E+01    0.09      0.09

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

 Plume-like motion in linear stratification with strong crossflow.

 Zone of flow establishment:              THETAE=     74.89  SIGMAE=       0.00
  LE    =       0.00  XE    =       0.00  YE    =      0.00  ZE    =       0.00

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane
                        normal to trajectory
        after merging:  top-hat half-width in horizontal plane
                        parallel to diffuser line
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X         Y         Z         S         C         BV        BH
 Individual jet/plumes before merging:
    0.00      0.00      0.00      1.0 0.100E+01    0.09      0.09
    0.62      0.00      0.21      3.2 0.316E+00    0.10      0.10
    1.26      0.00      0.38      6.5 0.154E+00    0.16      0.16
    1.91      0.00      0.50     10.3 0.972E-01    0.20      0.20
    2.56      0.00      0.58     14.3 0.699E-01    0.25      0.25
    3.21      0.00      0.65     18.5 0.541E-01    0.29      0.29
    3.87      0.00      0.71     22.7 0.440E-01    0.33      0.33
    4.53      0.00      0.76     27.0 0.370E-01    0.37      0.37
    5.18      0.00      0.80     31.3 0.319E-01    0.40      0.40
    5.84      0.00      0.83     35.7 0.280E-01    0.44      0.44
    6.50      0.00      0.86     40.2 0.249E-01    0.47      0.47
    7.16      0.00      0.90     44.7 0.224E-01    0.50      0.50
    7.82      0.00      0.93     49.4 0.203E-01    0.53      0.53
    8.47      0.00      0.96     54.1 0.185E-01    0.56      0.56
    9.13      0.00      0.99     58.9 0.170E-01    0.59      0.59
    9.79      0.00      1.02     63.7 0.157E-01    0.61      0.61
   10.45      0.00      1.04     68.6 0.146E-01    0.64      0.64
   11.11      0.00      1.07     73.6 0.136E-01    0.67      0.67
   11.76      0.00      1.10     78.6 0.127E-01    0.69      0.69
 Merging of individual jet/plumes to form plane jet/plume:
   12.29      0.00      1.12    101.6 0.984E-02    0.90      5.90
   13.08      0.00      1.15    105.4 0.949E-02    0.93      5.93
   13.74      0.00      1.17    108.6 0.921E-02    0.96      5.96
   14.40      0.00      1.19    111.6 0.896E-02    0.99      5.99
   15.05      0.00      1.21    114.7 0.872E-02    1.02      6.02
   15.71      0.00      1.23    117.7 0.849E-02    1.05      6.05
   16.37      0.00      1.26    120.7 0.828E-02    1.08      6.08
   17.03      0.00      1.28    123.7 0.808E-02    1.11      6.11
   17.69      0.00      1.30    126.6 0.790E-02    1.14      6.14
   18.35      0.00      1.32    129.5 0.772E-02    1.17      6.17
```

19.00	0.00	1.34	132.3	0.756E-02	1.20	6.20
19.66	0.00	1.35	135.1	0.740E-02	1.23	6.23
20.32	0.00	1.37	137.9	0.725E-02	1.26	6.26
20.98	0.00	1.39	140.6	0.711E-02	1.29	6.29
21.64	0.00	1.41	143.3	0.698E-02	1.32	6.32
22.30	0.00	1.42	145.9	0.686E-02	1.35	6.35
22.96	0.00	1.44	148.4	0.674E-02	1.37	6.37
23.62	0.00	1.45	150.9	0.662E-02	1.40	6.40
24.28	0.00	1.47	153.4	0.652E-02	1.43	6.43
24.93	0.00	1.48	155.8	0.642E-02	1.45	6.45
25.59	0.00	1.50	158.2	0.632E-02	1.48	6.48
26.25	0.00	1.51	160.5	0.623E-02	1.51	6.51
26.91	0.00	1.52	162.7	0.615E-02	1.53	6.53
27.57	0.00	1.53	164.9	0.606E-02	1.56	6.56
28.23	0.00	1.54	167.1	0.599E-02	1.58	6.58
28.89	0.00	1.55	169.1	0.591E-02	1.61	6.61
29.55	0.00	1.56	171.1	0.584E-02	1.63	6.63
30.21	0.00	1.57	173.1	0.578E-02	1.65	6.65
30.86	0.00	1.57	175.0	0.571E-02	1.67	6.67
31.52	0.00	1.58	176.8	0.565E-02	1.70	6.70
32.18	0.00	1.58	178.6	0.560E-02	1.72	6.72
32.84	0.00	1.58	180.3	0.555E-02	1.74	6.74

Terminal level in stratified ambient has been reached.
Cumulative travel time = 442.4950 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

Control volume inflow:

X	Y	Z	S	C	BV	BH
32.84	0.00	1.58	180.3	0.555E-02	1.74	6.74

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
31.11	0.00	1.58	180.3	0.555E-02	0.00	0.00	1.58	1.58
32.15	0.00	1.58	180.3	0.555E-02	3.36	4.34	3.26	0.00
33.19	0.00	1.58	184.6	0.542E-02	3.94	9.69	3.55	0.00

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

34.23	0.00	1.58	231.7	0.432E-02	4.27	9.70	3.72	0.00
35.27	0.00	1.58	273.7	0.365E-02	4.44	9.70	3.81	0.00
36.31	0.00	1.58	289.1	0.346E-02	4.50	9.71	3.83	0.00

Cumulative travel time = 525.1552 sec

END OF MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD242: BUOYANT TERMINAL LAYER SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution

C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
36.31	0.00	1.58	289.1	0.346E-02	4.50	9.71	3.83	0.00
52.59	0.00	1.58	401.9	0.249E-02	1.68	36.17	2.42	0.74
68.87	0.00	1.58	440.6	0.227E-02	1.28	51.99	2.23	0.94
85.15	0.00	1.58	465.9	0.215E-02	1.09	64.64	2.13	1.04
101.43	0.00	1.58	485.2	0.206E-02	0.97	75.52	2.07	1.10
117.71	0.00	1.58	501.2	0.200E-02	0.89	85.22	2.03	1.14
133.99	0.00	1.58	514.9	0.194E-02	0.83	94.07	2.00	1.17
150.27	0.00	1.58	527.2	0.190E-02	0.78	102.25	1.97	1.19
166.55	0.00	1.58	538.5	0.186E-02	0.74	109.90	1.95	1.21
182.83	0.00	1.58	549.0	0.182E-02	0.71	117.12	1.94	1.23
199.11	0.00	1.58	559.0	0.179E-02	0.68	123.96	1.93	1.24
215.38	0.00	1.58	568.7	0.176E-02	0.66	130.49	1.91	1.26
231.66	0.00	1.58	578.0	0.173E-02	0.64	136.75	1.90	1.27
247.94	0.00	1.58	587.2	0.170E-02	0.62	142.78	1.90	1.27
264.22	0.00	1.58	596.3	0.168E-02	0.61	148.59	1.89	1.28
280.50	0.00	1.58	605.2	0.165E-02	0.59	154.22	1.88	1.29
296.78	0.00	1.58	614.2	0.163E-02	0.58	159.69	1.88	1.29
313.06	0.00	1.58	623.2	0.160E-02	0.57	165.00	1.87	1.30
329.34	0.00	1.58	632.2	0.158E-02	0.56	170.18	1.87	1.30
345.62	0.00	1.58	641.2	0.156E-02	0.55	175.25	1.86	1.31
361.90	0.00	1.58	650.4	0.154E-02	0.55	180.20	1.86	1.31
378.18	0.00	1.58	659.6	0.152E-02	0.54	185.05	1.85	1.32
394.46	0.00	1.58	669.0	0.149E-02	0.53	189.82	1.85	1.32
410.74	0.00	1.58	678.4	0.147E-02	0.53	194.50	1.85	1.32
427.02	0.00	1.58	688.0	0.145E-02	0.52	199.10	1.85	1.32
443.29	0.00	1.58	697.7	0.143E-02	0.52	203.64	1.84	1.33
459.57	0.00	1.58	707.5	0.141E-02	0.51	208.11	1.84	1.33
475.85	0.00	1.58	717.5	0.139E-02	0.51	212.53	1.84	1.33
492.13	0.00	1.58	727.6	0.137E-02	0.51	216.89	1.84	1.33
508.41	0.00	1.58	737.9	0.136E-02	0.50	221.20	1.84	1.33
524.69	0.00	1.58	748.3	0.134E-02	0.50	225.46	1.84	1.33
540.97	0.00	1.58	758.8	0.132E-02	0.50	229.69	1.83	1.33
557.25	0.00	1.58	769.5	0.130E-02	0.50	233.87	1.83	1.34
573.53	0.00	1.58	780.3	0.128E-02	0.50	238.02	1.83	1.34
589.81	0.00	1.58	791.2	0.126E-02	0.49	242.14	1.83	1.34
606.09	0.00	1.58	802.3	0.125E-02	0.49	246.22	1.83	1.34
622.37	0.00	1.58	813.5	0.123E-02	0.49	250.28	1.83	1.34
638.65	0.00	1.58	824.8	0.121E-02	0.49	254.31	1.83	1.34
654.92	0.00	1.58	836.3	0.120E-02	0.49	258.31	1.83	1.34
671.20	0.00	1.58	847.9	0.118E-02	0.49	262.29	1.83	1.34
687.48	0.00	1.58	859.6	0.116E-02	0.49	266.26	1.83	1.34
703.76	0.00	1.58	871.5	0.115E-02	0.49	270.20	1.83	1.34
720.04	0.00	1.58	883.5	0.113E-02	0.49	274.12	1.83	1.34
736.32	0.00	1.58	895.6	0.112E-02	0.49	278.03	1.83	1.34
752.60	0.00	1.58	907.8	0.110E-02	0.49	281.92	1.83	1.34
768.88	0.00	1.58	920.1	0.109E-02	0.49	285.80	1.83	1.34
785.16	0.00	1.58	932.6	0.107E-02	0.49	289.66	1.83	1.34
801.44	0.00	1.58	945.1	0.106E-02	0.49	293.51	1.83	1.34
817.72	0.00	1.58	957.8	0.104E-02	0.49	297.35	1.83	1.34
834.00	0.00	1.58	970.6	0.103E-02	0.49	301.18	1.83	1.34
850.28	0.00	1.58	983.4	0.102E-02	0.49	305.00	1.83	1.34

Cumulative travel time = 19905.2246 sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
850.28	305.00	1.58	983.4	0.102E-02	0.49	610.01	1.83	1.34
873.27	305.00	1.58	998.9	0.100E-02	0.49	614.41	1.83	1.34
896.26	305.00	1.58	1014.3	0.986E-03	0.50	618.85	1.83	1.34
919.26	305.00	1.58	1029.7	0.971E-03	0.50	623.33	1.83	1.33
942.25	305.00	1.58	1044.9	0.957E-03	0.50	627.85	1.84	1.33

965.25	305.00	1.58	1060.1	0.943E-03	0.51	632.39	1.84	1.33
988.24	305.00	1.58	1075.2	0.930E-03	0.51	636.97	1.84	1.33
1011.24	305.00	1.58	1090.3	0.917E-03	0.51	641.58	1.84	1.33
1034.23	305.00	1.58	1105.3	0.905E-03	0.52	646.22	1.84	1.33
1057.23	305.00	1.58	1120.2	0.893E-03	0.52	650.89	1.84	1.32
1080.22	305.00	1.58	1135.1	0.881E-03	0.52	655.59	1.85	1.32
1103.22	305.00	1.58	1150.0	0.870E-03	0.53	660.31	1.85	1.32
1126.21	305.00	1.58	1164.9	0.858E-03	0.53	665.05	1.85	1.32
1149.20	305.00	1.58	1179.7	0.848E-03	0.53	669.82	1.85	1.32
1172.20	305.00	1.58	1194.5	0.837E-03	0.54	674.62	1.85	1.32
1195.19	305.00	1.58	1209.3	0.827E-03	0.54	679.43	1.85	1.32
1218.19	305.00	1.58	1224.1	0.817E-03	0.54	684.27	1.86	1.31
1241.18	305.00	1.58	1238.8	0.807E-03	0.54	689.13	1.86	1.31
1264.18	305.00	1.58	1253.5	0.798E-03	0.55	694.00	1.86	1.31
1287.17	305.00	1.58	1268.3	0.788E-03	0.55	698.90	1.86	1.31
1310.17	305.00	1.58	1283.0	0.779E-03	0.55	703.81	1.86	1.31
1333.16	305.00	1.58	1297.7	0.771E-03	0.55	708.75	1.86	1.31
1356.15	305.00	1.58	1312.4	0.762E-03	0.56	713.70	1.86	1.31
1379.15	305.00	1.58	1327.1	0.754E-03	0.56	718.66	1.86	1.31
1402.14	305.00	1.58	1341.8	0.745E-03	0.56	723.64	1.86	1.30
1425.14	305.00	1.58	1356.5	0.737E-03	0.56	728.64	1.87	1.30
1448.13	305.00	1.58	1371.2	0.729E-03	0.57	733.66	1.87	1.30
1471.13	305.00	1.58	1385.9	0.722E-03	0.57	738.68	1.87	1.30
1494.12	305.00	1.58	1400.7	0.714E-03	0.57	743.72	1.87	1.30
1517.12	305.00	1.58	1415.4	0.707E-03	0.57	748.78	1.87	1.30
1540.11	305.00	1.58	1430.1	0.699E-03	0.57	753.85	1.87	1.30
1563.11	305.00	1.58	1444.9	0.692E-03	0.58	758.93	1.87	1.30
1586.10	305.00	1.58	1459.7	0.685E-03	0.58	764.02	1.87	1.30
1609.09	305.00	1.58	1474.4	0.678E-03	0.58	769.12	1.87	1.29
1632.09	305.00	1.58	1489.2	0.671E-03	0.58	774.24	1.88	1.29
1655.08	305.00	1.58	1504.0	0.665E-03	0.58	779.37	1.88	1.29
1678.08	305.00	1.58	1518.8	0.658E-03	0.59	784.51	1.88	1.29
1701.07	305.00	1.58	1533.7	0.652E-03	0.59	789.66	1.88	1.29
1724.07	305.00	1.58	1548.5	0.646E-03	0.59	794.81	1.88	1.29
1747.06	305.00	1.58	1563.4	0.640E-03	0.59	799.98	1.88	1.29
1770.06	305.00	1.58	1578.2	0.634E-03	0.59	805.16	1.88	1.29
1793.05	305.00	1.58	1593.1	0.628E-03	0.59	810.35	1.88	1.29
1816.04	305.00	1.58	1608.1	0.622E-03	0.60	815.55	1.88	1.29
1839.04	305.00	1.58	1623.0	0.616E-03	0.60	820.75	1.88	1.29
1862.03	305.00	1.58	1637.9	0.611E-03	0.60	825.97	1.88	1.28
1885.03	305.00	1.58	1652.9	0.605E-03	0.60	831.19	1.89	1.28
1908.02	305.00	1.58	1667.9	0.600E-03	0.60	836.42	1.89	1.28
1931.02	305.00	1.58	1682.9	0.594E-03	0.60	841.66	1.89	1.28
1954.01	305.00	1.58	1698.0	0.589E-03	0.61	846.90	1.89	1.28
1977.01	305.00	1.58	1713.0	0.584E-03	0.61	852.16	1.89	1.28
2000.00	305.00	1.58	1728.1	0.579E-03	0.61	857.42	1.89	1.28

Cumulative travel time = 47279.6055 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD242: BUOYANT TERMINAL LAYER SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File

2222222222222222222222222222222222222222222222222222222222222222222222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                        CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                              CORMIX Version 5.0GT
                          HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\wet_u090.prd
 Time stamp:         Thu Oct 20 10:33:02 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =       4.50  HD    =       4.50
 UA    =      0.076  F     =      0.019 USTAR =0.3705E-02
 UW    =      2.000  UWSTAR=0.2198E-02
 Density stratified environment
 STRCND=  A          RHOAM = 1017.3500
 RHOAS = 1017.0000  RHOAB = 1017.7000  RHOAH0= 1017.7000  E     =0.1499E-02

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =    305.00  YB1   =    300.00  YB2   =    310.00
 LD    =     10.00   NOPEN =    8       SPAC  =      1.43
 D0    =     0.045   A0    =     0.002  H0    =      0.00  SUB0  =      4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =     90.00   THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.998   Q0    =     0.013        =0.1270E-01
 RHO0  = 1000.0000  DRHO0 =0.1770E+02  GP0   =0.1706E+00
 C0    =0.1000E+01  CUNITS=  mg/l
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02  m0    =0.1268E-02  j0    =0.2166E-03  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001  lM    =      0.35  lm    =      0.22
 lmp   =      0.95  lbp   =      1.55  la    =      1.96

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01  M0    =0.1268E-01  J0    =0.2166E-02
 Associated 3-d length scales (meters)
 LQ    =      0.04  LM    =      0.81  Lm    =      1.48  Lb    =      4.93
                                       Lmp   =      1.71  Lbp   =      2.47

NON-DIMENSIONAL PARAMETERS
 FR0   =     67.76  FRD0  =     11.39  R     =     13.13  PL    =     68.
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:   m0    =0.8181E-04  M0    =0.8181E-03
 lQ=B  =     0.020  lM    =      0.02  lm    =      0.01  lmp   =      0.38
 LQ    =     0.029  LM    =      0.10  Lm    =      0.38  Lmp   =      0.86
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.064  D0    =     0.177  A0    =     0.025  THETA =     90.00
 FR0   =      1.11  FRD0  =      0.37  R     =      0.85
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MS5    2
 2  Applicable layer depth HS =     4.50  2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01  CUNITS=  mg/l
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 NTOX   =  0
 NSTD   =  1          CSTD   =0.4700E-02
 REGMZ  =  0
 XINT   =   2000.00   XMAX   =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

      X        Y        Z        S        C        BV       BH
   0.00     0.00     0.00      1.0 0.100E+01    0.09     0.09

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

 Plume-like motion in linear stratification with strong crossflow.

 Zone of flow establishment:              THETAE=     63.95  SIGMAE=       0.00
  LE    =       0.00  XE    =       0.00  YE    =       0.00  ZE    =       0.00

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane
                        normal to trajectory
        after merging:  top-hat half-width in horizontal plane
                        parallel to diffuser line
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

      X        Y        Z        S        C        BV       BH
 Individual jet/plumes before merging:
    0.00     0.00     0.00      1.1 0.931E+00    0.09     0.09
    1.17     0.00     0.20      4.5 0.221E+00    0.12     0.12
    2.34     0.00     0.33      9.7 0.103E+00    0.18     0.18
    3.52     0.00     0.43     15.3 0.654E-01    0.23     0.23
    4.71     0.00     0.49     21.0 0.476E-01    0.28     0.28
    5.89     0.00     0.55     26.8 0.374E-01    0.32     0.32
    7.07     0.00     0.59     32.5 0.308E-01    0.35     0.35
    8.26     0.00     0.63     38.1 0.262E-01    0.38     0.38
    9.44     0.00     0.66     43.7 0.229E-01    0.41     0.41
   10.63     0.00     0.69     49.3 0.203E-01    0.44     0.44
   11.81     0.00     0.72     54.9 0.182E-01    0.47     0.47
   12.99     0.00     0.74     60.6 0.165E-01    0.49     0.49
   14.18     0.00     0.77     66.3 0.151E-01    0.52     0.52
   15.36     0.00     0.80     72.0 0.139E-01    0.54     0.54
   16.55     0.00     0.82     77.8 0.129E-01    0.56     0.56
   17.73     0.00     0.84     83.6 0.120E-01    0.59     0.59
   18.92     0.00     0.87     89.4 0.112E-01    0.61     0.61
   20.10     0.00     0.89     95.2 0.105E-01    0.63     0.63
   21.29     0.00     0.91    101.0 0.990E-02    0.65     0.65
   22.47     0.00     0.94    106.8 0.937E-02    0.67     0.67
   23.66     0.00     0.96    112.6 0.888E-02    0.69     0.69
   24.84     0.00     0.98    118.3 0.845E-02    0.71     0.71
 Merging of individual jet/plumes to form plane jet/plume:
   25.41     0.00     0.99    145.6 0.687E-02    0.90     5.90
   27.21     0.00     1.01    150.9 0.663E-02    0.93     5.93
   28.40     0.00     1.03    154.4 0.648E-02    0.95     5.95
   29.58     0.00     1.05    157.8 0.634E-02    0.97     5.97
   30.77     0.00     1.06    161.2 0.620E-02    1.00     6.00
   31.95     0.00     1.08    164.5 0.608E-02    1.02     6.02
   33.14     0.00     1.09    167.7 0.596E-02    1.04     6.04
```

34.32	0.00	1.11	170.9	0.585E-02	1.06	6.06
35.51	0.00	1.12	174.0	0.575E-02	1.08	6.08
36.69	0.00	1.13	177.1	0.565E-02	1.10	6.10
37.88	0.00	1.15	180.1	0.555E-02	1.12	6.12
39.06	0.00	1.16	183.1	0.546E-02	1.14	6.14
40.25	0.00	1.17	185.9	0.538E-02	1.16	6.16
41.43	0.00	1.19	188.7	0.530E-02	1.18	6.18
42.62	0.00	1.20	191.5	0.522E-02	1.20	6.20
43.80	0.00	1.21	194.2	0.515E-02	1.21	6.21
44.99	0.00	1.22	196.8	0.508E-02	1.23	6.23
46.17	0.00	1.23	199.3	0.502E-02	1.25	6.25
47.36	0.00	1.24	201.8	0.496E-02	1.26	6.26
48.54	0.00	1.24	204.2	0.490E-02	1.28	6.28
49.73	0.00	1.25	206.5	0.484E-02	1.30	6.30
50.92	0.00	1.26	208.8	0.479E-02	1.31	6.31
52.10	0.00	1.27	210.9	0.474E-02	1.33	6.33

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

53.28	0.00	1.27	213.0	0.469E-02	1.34	6.34
54.47	0.00	1.28	215.1	0.465E-02	1.35	6.35
55.66	0.00	1.28	217.0	0.461E-02	1.37	6.37
56.84	0.00	1.28	218.9	0.457E-02	1.38	6.38
58.03	0.00	1.29	220.7	0.453E-02	1.39	6.39
59.21	0.00	1.29	222.4	0.450E-02	1.40	6.40

Terminal level in stratified ambient has been reached.
Cumulative travel time = 625.3839 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

Control volume inflow:

X	Y	Z	S	C	BV	BH
59.21	0.00	1.29	222.4	0.450E-02	1.40	6.40

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
57.81	0.00	1.29	222.4	0.450E-02	0.00	0.00	1.29	1.29
58.65	0.00	1.29	222.4	0.450E-02	2.78	3.49	2.68	0.00
59.49	0.00	1.29	227.4	0.440E-02	3.26	7.80	2.92	0.00
60.33	0.00	1.29	281.9	0.355E-02	3.54	7.80	3.06	0.00
61.18	0.00	1.29	330.6	0.303E-02	3.68	7.81	3.13	0.00
62.02	0.00	1.29	348.3	0.287E-02	3.73	7.81	3.15	0.00

Cumulative travel time = 662.3197 sec

END OF MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD242: BUOYANT TERMINAL LAYER SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution

C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
62.02	0.00	1.29	348.3	0.287E-02	3.73	7.81	3.15	0.00
91.70	0.00	1.29	486.9	0.205E-02	1.37	29.65	1.98	0.60
121.39	0.00	1.29	535.0	0.187E-02	1.05	42.68	1.81	0.77
151.08	0.00	1.29	567.8	0.176E-02	0.89	53.11	1.74	0.84
180.76	0.00	1.29	594.6	0.168E-02	0.80	62.11	1.69	0.89
210.45	0.00	1.29	618.5	0.162E-02	0.74	70.19	1.66	0.92
240.14	0.00	1.29	641.1	0.156E-02	0.69	77.60	1.63	0.94
269.82	0.00	1.29	663.3	0.151E-02	0.66	84.51	1.62	0.96
299.51	0.00	1.29	685.6	0.146E-02	0.63	91.04	1.60	0.97
329.20	0.00	1.29	708.4	0.141E-02	0.61	97.27	1.59	0.98
358.88	0.00	1.29	731.8	0.137E-02	0.59	103.25	1.59	0.99
388.57	0.00	1.29	755.9	0.132E-02	0.58	109.03	1.58	1.00
418.26	0.00	1.29	780.9	0.128E-02	0.57	114.65	1.57	1.00
447.94	0.00	1.29	806.8	0.124E-02	0.56	120.14	1.57	1.01
477.63	0.00	1.29	833.5	0.120E-02	0.55	125.52	1.57	1.01
507.32	0.00	1.29	861.2	0.116E-02	0.55	130.81	1.56	1.01
537.00	0.00	1.29	889.6	0.112E-02	0.55	136.02	1.56	1.02
566.69	0.00	1.29	919.0	0.109E-02	0.54	141.17	1.56	1.02
596.38	0.00	1.29	949.1	0.105E-02	0.54	146.27	1.56	1.02
626.06	0.00	1.29	980.1	0.102E-02	0.54	151.32	1.56	1.02
655.75	0.00	1.29	1011.8	0.988E-03	0.54	156.35	1.56	1.02
685.44	0.00	1.29	1044.2	0.958E-03	0.54	161.34	1.56	1.02
715.12	0.00	1.29	1077.3	0.928E-03	0.54	166.31	1.56	1.02
744.81	0.00	1.29	1111.1	0.900E-03	0.54	171.26	1.56	1.02
774.50	0.00	1.29	1145.5	0.873E-03	0.54	176.20	1.56	1.02
804.18	0.00	1.29	1180.6	0.847E-03	0.54	181.13	1.56	1.02
833.87	0.00	1.29	1216.2	0.822E-03	0.55	186.05	1.56	1.02
863.56	0.00	1.29	1252.4	0.798E-03	0.55	190.96	1.56	1.02
893.24	0.00	1.29	1289.2	0.776E-03	0.55	195.88	1.56	1.01
922.93	0.00	1.29	1326.5	0.754E-03	0.55	200.79	1.57	1.01
952.62	0.00	1.29	1364.3	0.733E-03	0.55	205.70	1.57	1.01
982.30	0.00	1.29	1402.7	0.713E-03	0.56	210.61	1.57	1.01
1011.99	0.00	1.29	1441.5	0.694E-03	0.56	215.52	1.57	1.01
1041.68	0.00	1.29	1480.8	0.675E-03	0.56	220.44	1.57	1.01
1071.36	0.00	1.29	1520.6	0.658E-03	0.56	225.36	1.57	1.01
1101.05	0.00	1.29	1560.8	0.641E-03	0.57	230.28	1.57	1.01
1130.74	0.00	1.29	1601.5	0.624E-03	0.57	235.21	1.57	1.00
1160.42	0.00	1.29	1642.6	0.609E-03	0.57	240.15	1.57	1.00
1190.11	0.00	1.29	1684.1	0.594E-03	0.57	245.09	1.58	1.00
1219.80	0.00	1.29	1726.1	0.579E-03	0.58	250.04	1.58	1.00
1249.48	0.00	1.29	1768.4	0.565E-03	0.58	255.00	1.58	1.00
1279.17	0.00	1.29	1811.2	0.552E-03	0.58	259.97	1.58	1.00
1308.86	0.00	1.29	1854.3	0.539E-03	0.58	264.94	1.58	1.00
1338.54	0.00	1.29	1897.8	0.527E-03	0.59	269.92	1.58	1.00
1368.23	0.00	1.29	1941.7	0.515E-03	0.59	274.90	1.58	0.99
1397.92	0.00	1.29	1986.0	0.504E-03	0.59	279.90	1.59	0.99
1427.60	0.00	1.29	2030.7	0.492E-03	0.60	284.90	1.59	0.99
1457.29	0.00	1.29	2075.7	0.482E-03	0.60	289.91	1.59	0.99
1486.98	0.00	1.29	2121.0	0.471E-03	0.60	294.93	1.59	0.99
1516.66	0.00	1.29	2166.7	0.462E-03	0.60	299.96	1.59	0.99
1546.35	0.00	1.29	2212.8	0.452E-03	0.61	305.00	1.59	0.99

Cumulative travel time = 20193.0273 sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
1546.35	305.00	1.29	2212.8	0.452E-03	0.61	609.99	1.59	0.99
1555.42	305.00	1.29	2225.2	0.449E-03	0.61	611.27	1.59	0.98
1564.50	305.00	1.29	2237.5	0.447E-03	0.61	612.55	1.59	0.98
1573.57	305.00	1.29	2249.8	0.444E-03	0.61	613.84	1.60	0.98
1582.64	305.00	1.29	2262.1	0.442E-03	0.61	615.14	1.60	0.98

1591.72	305.00	1.29	2274.3	0.440E-03	0.62	616.44	1.60	0.98
1600.79	305.00	1.29	2286.5	0.437E-03	0.62	617.74	1.60	0.98
1609.86	305.00	1.29	2298.7	0.435E-03	0.62	619.05	1.60	0.98
1618.93	305.00	1.29	2310.8	0.433E-03	0.62	620.36	1.60	0.98
1628.01	305.00	1.29	2322.8	0.431E-03	0.62	621.67	1.60	0.98
1637.08	305.00	1.29	2334.9	0.428E-03	0.63	623.00	1.60	0.98
1646.15	305.00	1.29	2346.9	0.426E-03	0.63	624.32	1.60	0.98
1655.23	305.00	1.29	2358.8	0.424E-03	0.63	625.65	1.60	0.97
1664.30	305.00	1.29	2370.8	0.422E-03	0.63	626.99	1.61	0.97
1673.37	305.00	1.29	2382.7	0.420E-03	0.63	628.32	1.61	0.97
1682.45	305.00	1.29	2394.6	0.418E-03	0.64	629.67	1.61	0.97
1691.52	305.00	1.29	2406.4	0.416E-03	0.64	631.01	1.61	0.97
1700.59	305.00	1.29	2418.2	0.414E-03	0.64	632.36	1.61	0.97
1709.66	305.00	1.29	2430.0	0.412E-03	0.64	633.72	1.61	0.97
1718.74	305.00	1.29	2441.8	0.410E-03	0.64	635.08	1.61	0.97
1727.81	305.00	1.29	2453.5	0.408E-03	0.64	636.44	1.61	0.97
1736.88	305.00	1.29	2465.2	0.406E-03	0.65	637.80	1.61	0.97
1745.96	305.00	1.29	2476.9	0.404E-03	0.65	639.17	1.61	0.97
1755.03	305.00	1.29	2488.6	0.402E-03	0.65	640.55	1.61	0.96
1764.10	305.00	1.29	2500.2	0.400E-03	0.65	641.93	1.61	0.96
1773.18	305.00	1.29	2511.9	0.398E-03	0.65	643.31	1.62	0.96
1782.25	305.00	1.29	2523.5	0.396E-03	0.65	644.69	1.62	0.96
1791.32	305.00	1.29	2535.0	0.394E-03	0.66	646.08	1.62	0.96
1800.39	305.00	1.29	2546.6	0.393E-03	0.66	647.47	1.62	0.96
1809.47	305.00	1.29	2558.1	0.391E-03	0.66	648.86	1.62	0.96
1818.54	305.00	1.29	2569.7	0.389E-03	0.66	650.26	1.62	0.96
1827.61	305.00	1.29	2581.2	0.387E-03	0.66	651.66	1.62	0.96
1836.69	305.00	1.29	2592.6	0.386E-03	0.66	653.07	1.62	0.96
1845.76	305.00	1.29	2604.1	0.384E-03	0.66	654.48	1.62	0.96
1854.83	305.00	1.29	2615.6	0.382E-03	0.67	655.89	1.62	0.96
1863.91	305.00	1.29	2627.0	0.381E-03	0.67	657.30	1.62	0.96
1872.98	305.00	1.29	2638.4	0.379E-03	0.67	658.72	1.62	0.95
1882.05	305.00	1.29	2649.8	0.377E-03	0.67	660.14	1.62	0.95
1891.12	305.00	1.29	2661.2	0.376E-03	0.67	661.56	1.63	0.95
1900.20	305.00	1.29	2672.6	0.374E-03	0.67	662.99	1.63	0.95
1909.27	305.00	1.29	2683.9	0.373E-03	0.68	664.42	1.63	0.95
1918.34	305.00	1.29	2695.3	0.371E-03	0.68	665.85	1.63	0.95
1927.42	305.00	1.29	2706.6	0.369E-03	0.68	667.29	1.63	0.95
1936.49	305.00	1.29	2717.9	0.368E-03	0.68	668.73	1.63	0.95
1945.56	305.00	1.29	2729.3	0.366E-03	0.68	670.17	1.63	0.95
1954.64	305.00	1.29	2740.6	0.365E-03	0.68	671.61	1.63	0.95
1963.71	305.00	1.29	2751.8	0.363E-03	0.68	673.06	1.63	0.95
1972.78	305.00	1.29	2763.1	0.362E-03	0.68	674.51	1.63	0.95
1981.85	305.00	1.29	2774.4	0.360E-03	0.69	675.96	1.63	0.95
1990.93	305.00	1.29	2785.6	0.359E-03	0.69	677.42	1.63	0.95
2000.00	305.00	1.29	2796.9	0.358E-03	0.69	678.87	1.63	0.94

Cumulative travel time = 26162.0820 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD242: BUOYANT TERMINAL LAYER SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222

Appendix 7.1

Legislation and Standards for Land Contamination Assessment

Legislation and Standards for Land Contamination Assessment

The relevant legislation, standards and guidelines applicable to the present study for the assessment of land contamination include:

- Annex 19 of the Technical Memorandum on Environmental Impact Assessment Ordinance (TM-EIAO), Guidelines for Assessment of Impact Assessment Process (TM-EIA), Guidelines for Assessment of Impact On Sites of Cultural Heritage and Other Impacts (Section 3: Potential Contaminated Land Issues), Environmental Protection Department (EPD), 1997;
- Guidance Note for Contaminated Land Assessment and Remediation EPD 2007;
- Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management, EPD, 2007; and
- Practice Guide for Investigation and Remediation of Contaminated Land, EPD, 2011.

Under Annex 19 of the TM-EIAO, a number of potentially contaminating historical land uses should be considered, including oil installations, gas works, metal workshops, car repair and dismantling workshops, which have the potential to cause or have caused land contamination.

In accordance with EPD's *Guidance Note for Contamination Land Assessment and Remediation*, a contamination assessment evaluation should:

- provide a clear and detailed account of the present land-use and the relevant past land history, in relation to possible land contamination;
- identify areas of potential contamination and associated impacts, risks or hazards; and
- submit a plan to evaluate the actual contamination conditions for soil and/or groundwater, if required.

The *Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management* introduces the risk based approach in land contamination assessment and present instructions for comparison of soil and groundwater data to the Risk-Based Remediation Goals (RBRGs) for 54 chemicals of concern commonly found in Hong Kong. The RBRGs were derived to suit Hong Kong conditions by following the international practice of adopting a risk-based methodology for contaminated land assessment and remediation and were designed to protect the health of people who could potentially be exposed to land impacted by chemicals under

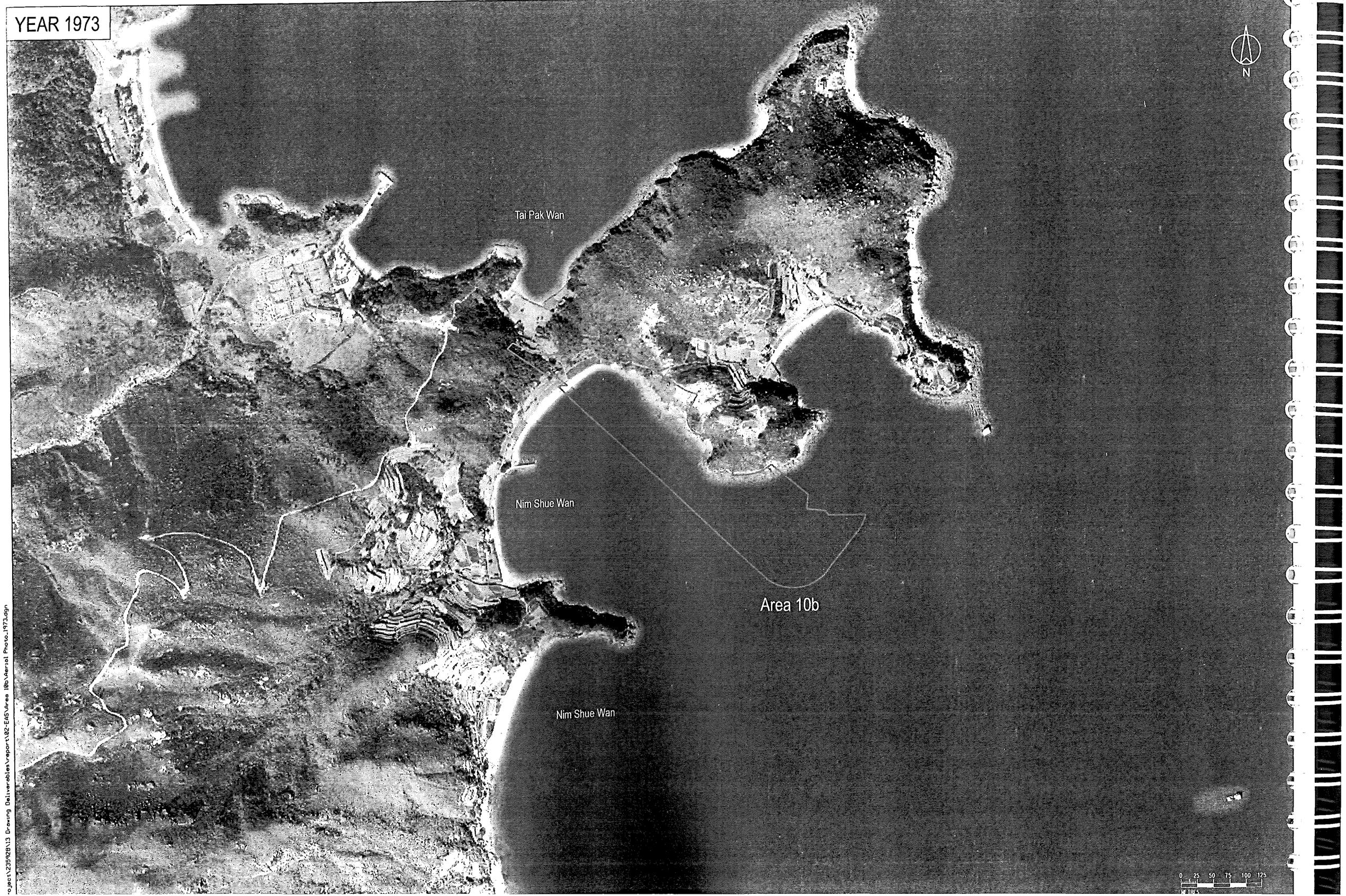
four broad post restoration land use categories. The RBRGs also serve as the remediation targets if remediation is necessary.

The EPD's *Practice Guide for Investigation and Remediation of Contaminated Land* includes a summary of the general steps of a contamination assessment study, which include site appraisal, site investigation and remediation.

Appendix 7.2

Historical Aerial Photos for Discovery Bay

YEAR 1973

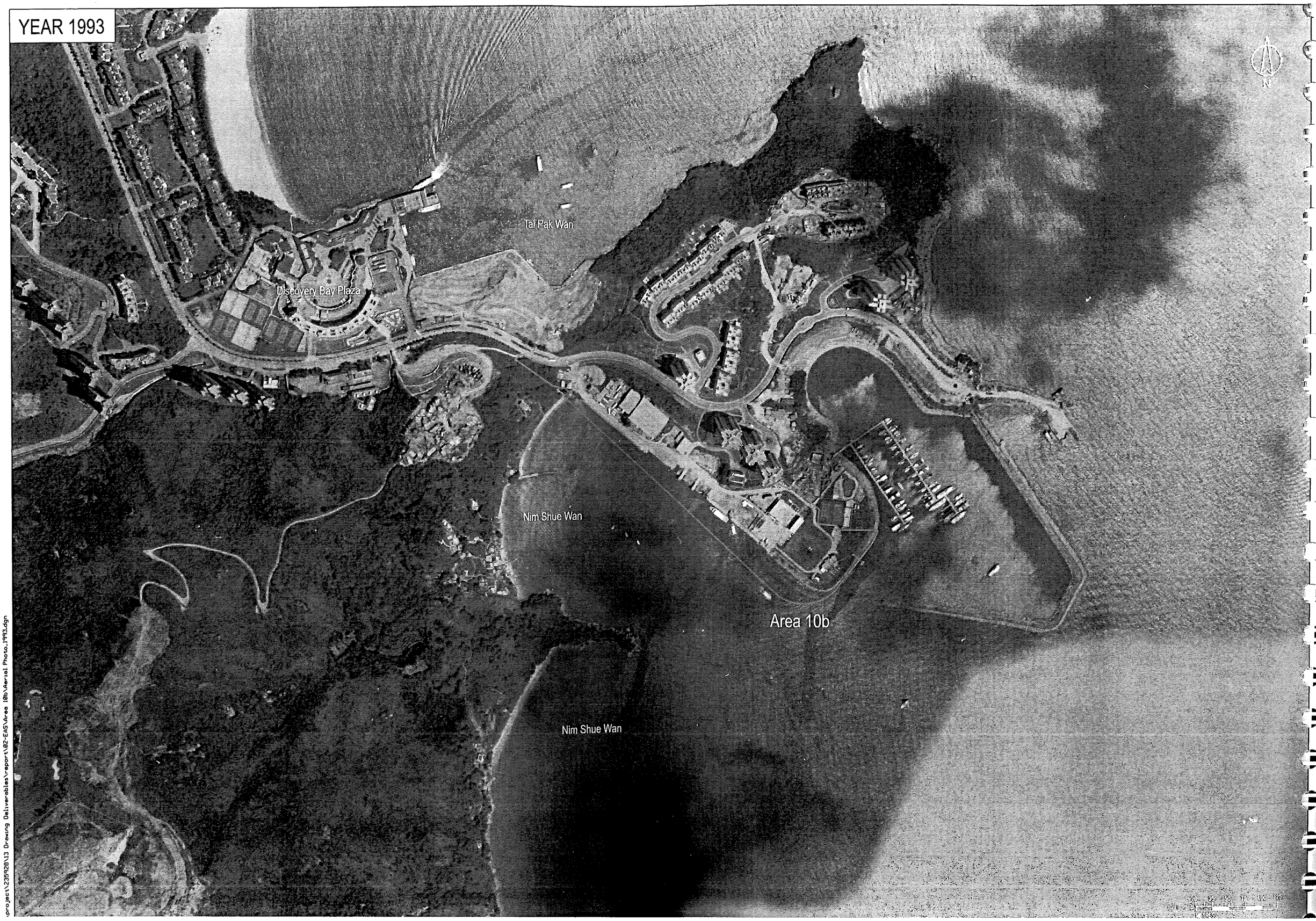


YEAR 1982

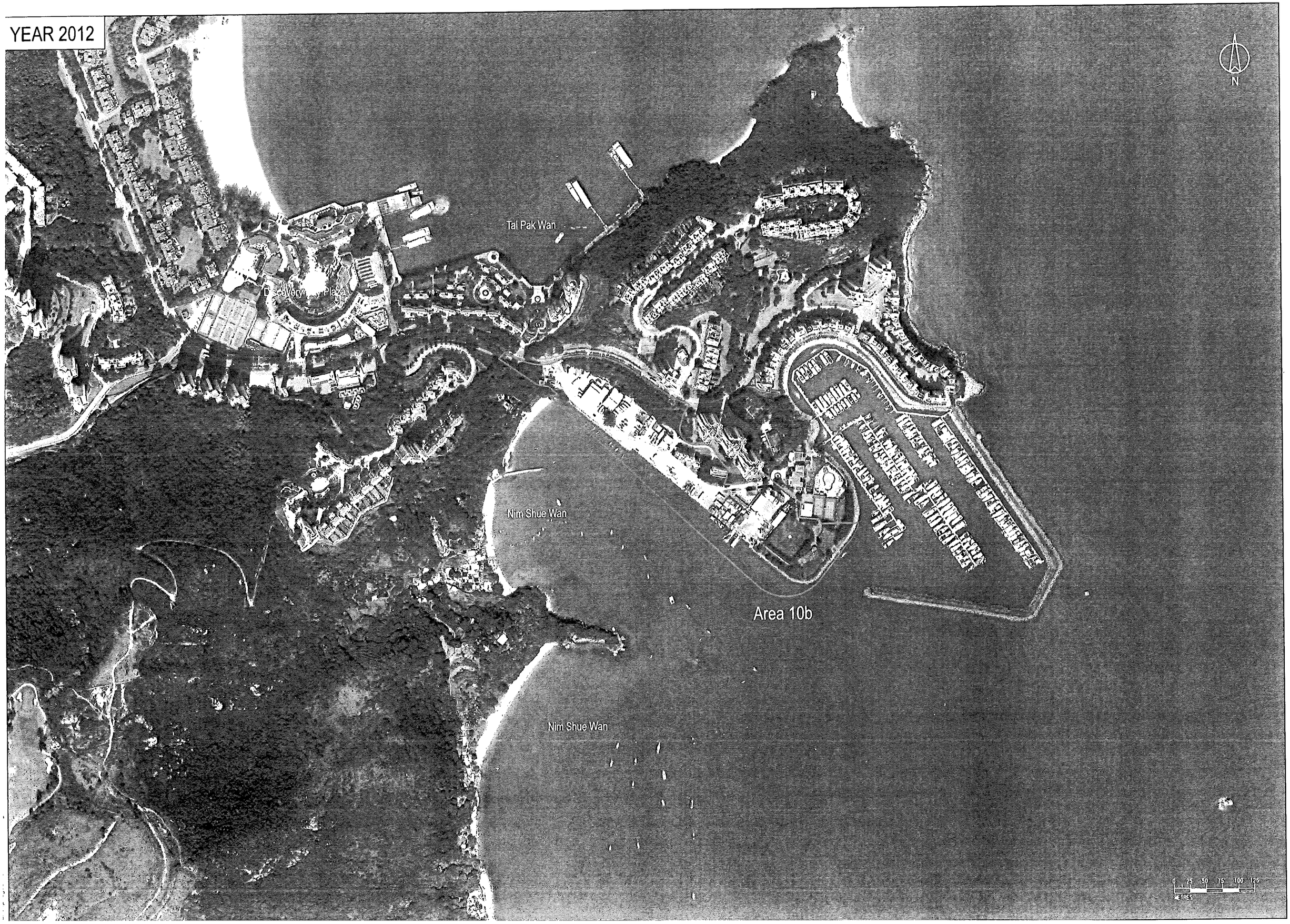
Area 10b

Kim Shue Wan

YEAR 1993



YEAR 2012


N
Tai Pak Wan
Nim Shue Wan
Nim Shue Wan
Area 10b
0 25 50 75 100 125
METRES

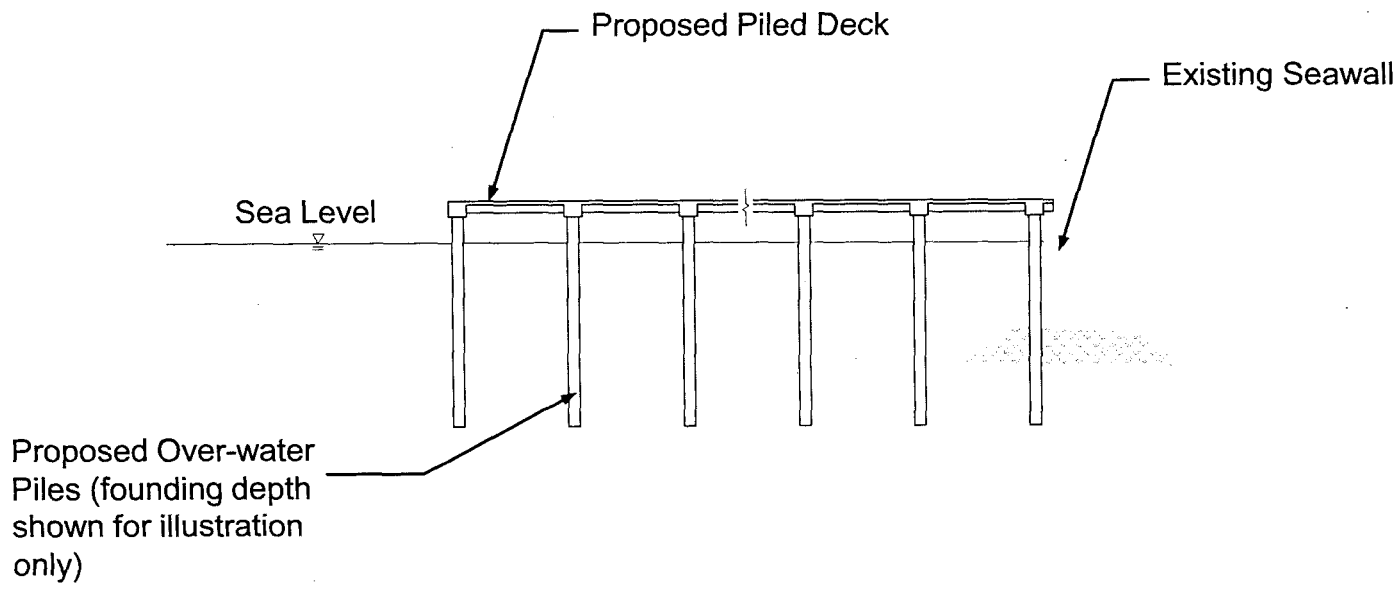
Annex F

Typical Construction Method for Piling Works

Locations of SPS

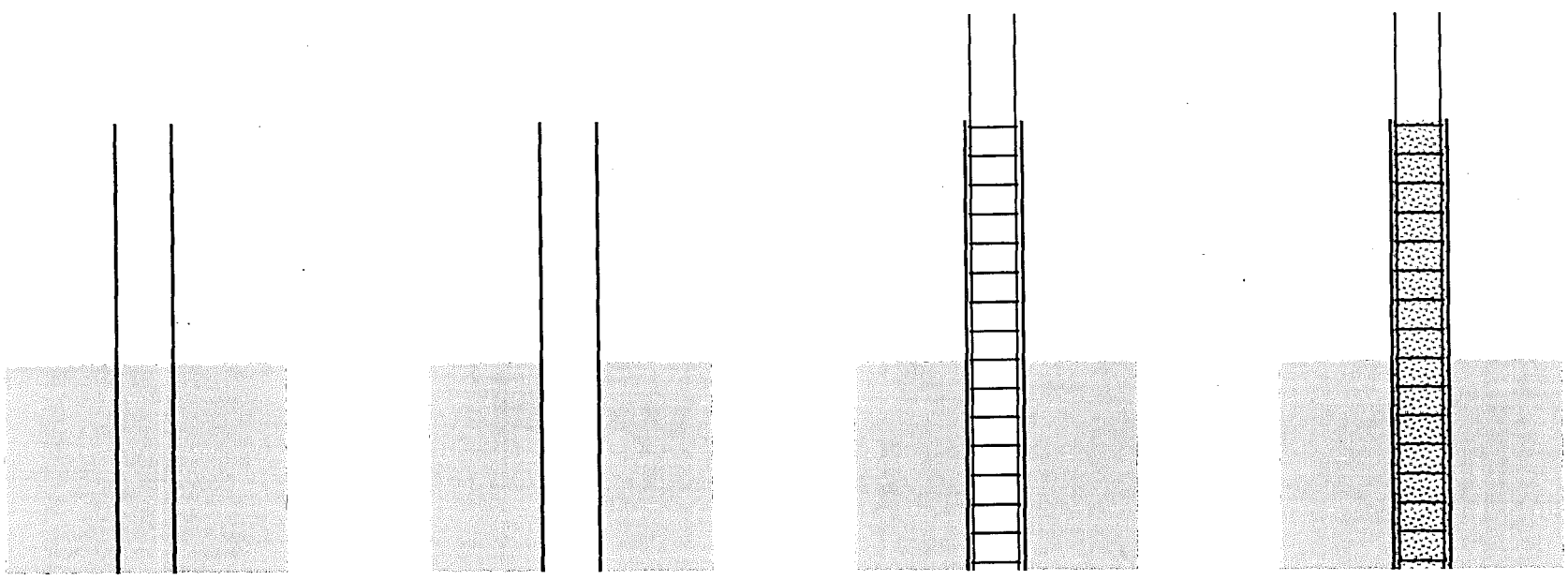
Justification of Sewage Treatment Level

Typical Piled Deck Section



ARUP

Typical Sequence of Marine Piling Works

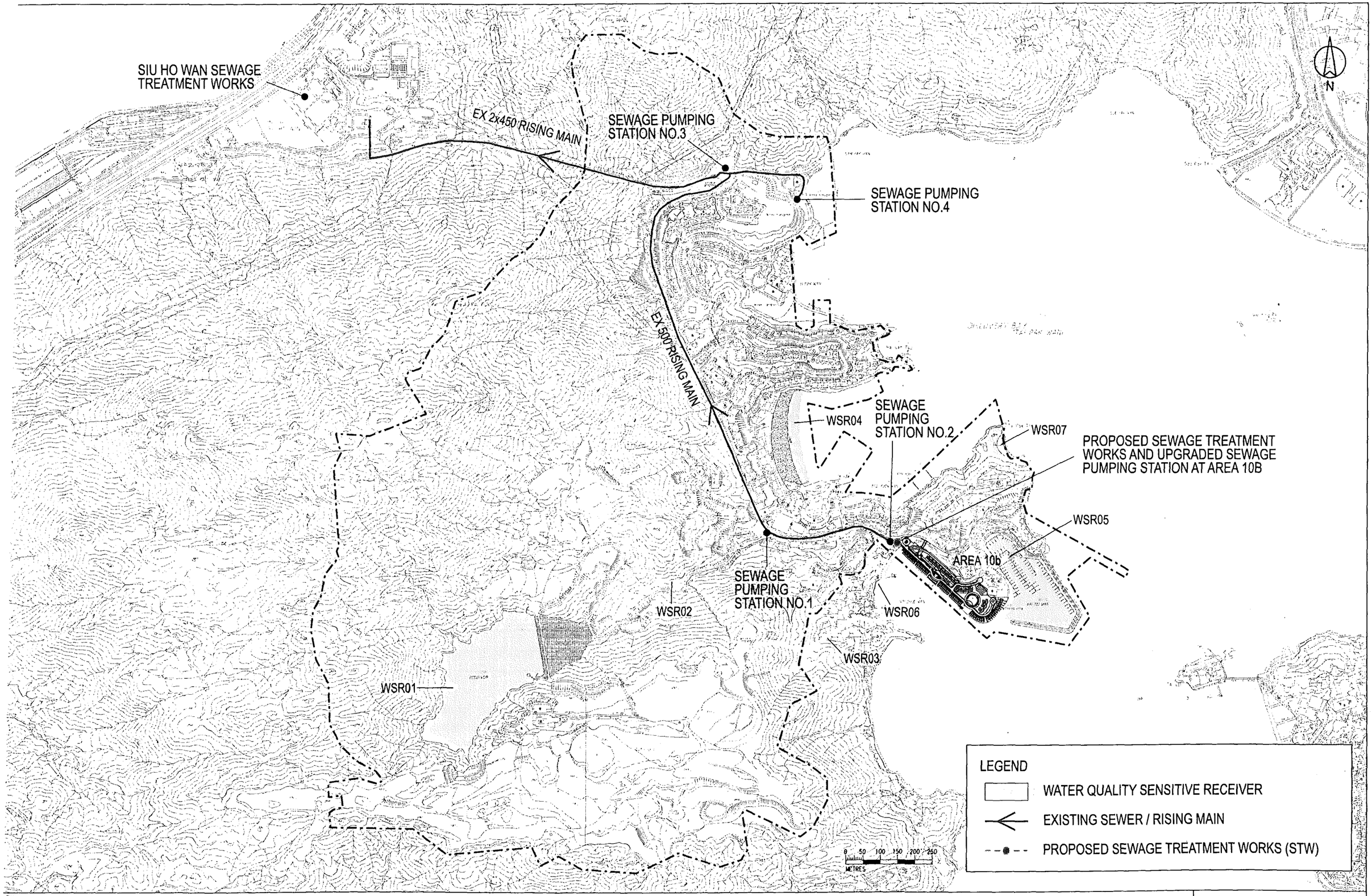


Stage 1
Install steel casing into seabed

Stage 2
Remove soil/rock inside casing

Stage 3
Install permanent steel reinforcements

Stage 4
Pour concrete inside casing



Title

DISCOVERY BAY - OPTIMIZATION OF LAND USE

Annex F2

	Scale	Drawing Title
JAN 17	AS SHOWN	EXISTING AND PROPOSED SEWERAGE LAYOUT PLAN
GL	Job No. 235928	

ARUP

Annex F3

Discovery Bay – Area 10b: Justification for the Proposed Sewage Treatment Level

Sewage Treatment Level of Planned and Existing Sewage Treatment Works on South Lantau

The proposed STW for Area 10b has a capacity of 1,100 m^3/day and will adopt the MBR technology to treat the sewage generated by the planned population in Area 10b to appropriate level before discharge. **Table 1** compares the flow rates and discharge limits for the key pollutants from the proposed STW and the STW as adopted in Outlying Islands Sewerage Stage 2 – South Lantau Sewerage Works (South Lantau EIA) which also involves a new STW discharging into the water of South Lantau.

It can be seen from **Table 1** that the proposed STW has adopted the same treatment technology as the South Lantau STW (SLSTW). Although the flow rate for the proposed STW is much lower than that in the SLSTW, the concentration of *E. coli* has been purposefully reduced to 10 counts/100ml which is significantly lower than that of 1,000 counts/100ml in the SLSTW. In fact, the proposed discharge limit of 10 counts/100mL is even lower than the WQO and hence any risk of human contact has been proactively addressed. In terms of TIN, it can also be noted that the discharge from the proposed STW would reach a concentration of 20mg/L which is also lower than the 30 mg/L as adopted in the SLSTW. It can therefore be seen that the discharge limit in the proposed STW for Area 10b is by all aspects much better than that adopted in the SLSTW which is also discharging into the sea area off South Lantau.

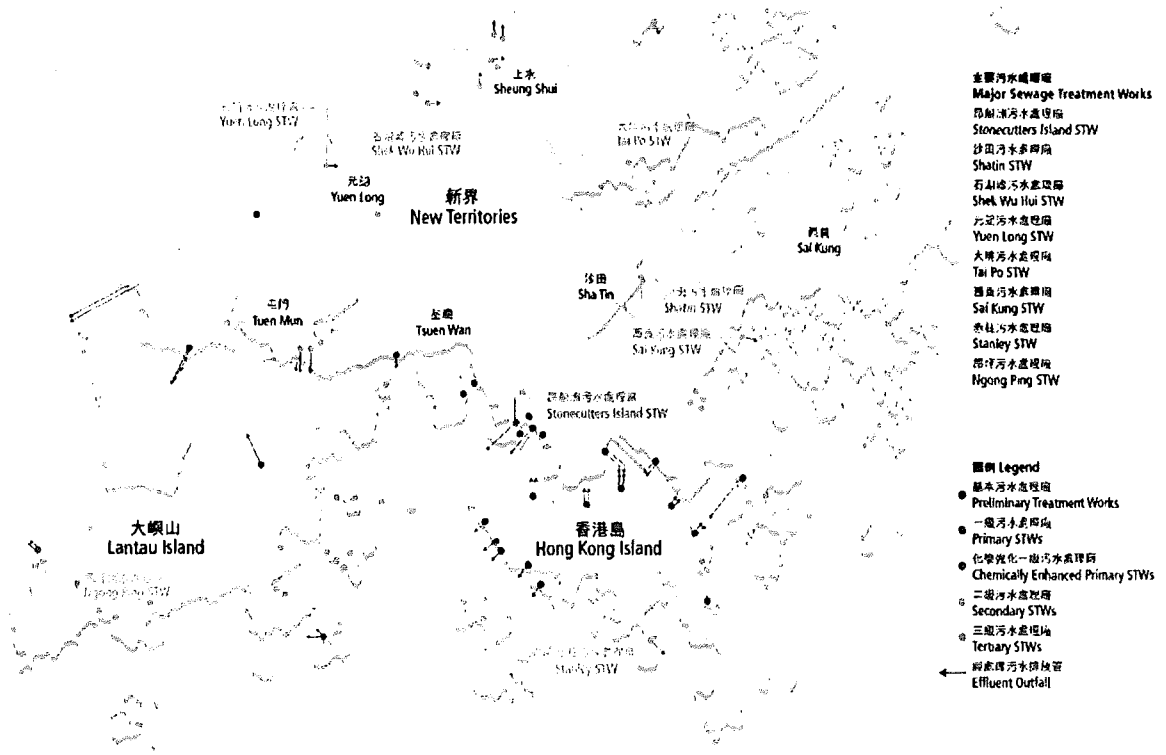
Table 1 Comparison of Effluent Discharge Standards against South Lantau EIA

Parameters	Present Study (for Area 10b)	South Lantau EIA[1]
Treatment technology	MBR	MBR
Flow Rate: m^3/day	1,100	5,800
NH3-N: mg/L	8	Not provided in EIA
TIN : mg/L	20	30
TP: mg/L	2	Not provided in EIA
SS: mg/L	30	30
E. coli: counts/100ml	10	1,000

[1] Application No.: EIA-247/2016

Apart from the planned STW, the MBR technology is also comparable to the existing sewage treatment technology adopted on South Lantau and its surrounding outlying islands. The MBR technology is composed of activated sludge treatment and microfiltration/ultrafiltration which can be classified as secondary treatment level. As shown in **Figure 1**, the majority of the existing STWs on South Lantau and its surrounding outlying islands are implementing secondary treatment level. Therefore, the adopted MBR is also consistent with the existing sewage treatment technology in South Lantau.

Figure 1 Sewage Treatment Technology in Hong Kong



[1] DSD Sustainability Report 2015-16

Comparison of the change of TIN between the current study and South Lantau EIA

According to the preliminary water quality assessment presented in *Technical Note - Preliminary Water Quality Assessment of Area 10b*, the nearest WSR is the Hai Tei Wan Marina at approximately 320m from the discharge point. The predicted increase in TIN (in depth-averaged as per WQO) between the with and without the proposed STW scenarios is about 0.007 mg/L. Taking into account of the baseline condition of 0.35mg/L, the percentage of increase is only 2 %. Compared with the relevant WSRs considered in the South Lantau EIA in which the increase in depth-averaged TIN is up to 33% (e.g. Tong Fuk Beach SR11: 33% in dry season and 12.5% in wet season), the increase in depth-averaged TIN due to the project is not significant.

Besides, an analysis on the TIN concentration within the effluent plume in addition to the depth-averaged one is also carried out. Compared with the baseline TIN condition of 0.35 mg/L, the preliminary water quality assessment showed that the increase of TIN within the plume at the nearest WSR (Hai Tei Wan Marina) is up to 0.064 mg/L or 18.3% during wet season when the ambient flow is 0.013 m/s. This figure, compared with the aforementioned 33% increase in depth-averaged TIN from the South Lantau EIA is more or less in the same order.

Based on the analysis on the depth-averaged TIN and TIN within the effluent plume, it can thus be seen that the proposed treatment level of the proposed STW in terms of TIN has ensured that the elevation of TIN at WSRs is very low as compared to other approved EIA Report.

Table 2 Predicted depth-averaged TIN level in the worst case scenario

WSR	TIN (mg/L)		
	Without Project	**With Project**	**% Increase**
Hai Tei Wan Marina [1]	0.35	0.357	2

[1] Water Depth = approx. 4.5 m

Notwithstanding the above clarifications, the Project Proponent of Area 10b still commits to review the effectiveness of any suitable technology available at the time of detailed design that could deliver discharge limits that are as good as or even better than that proposed now.

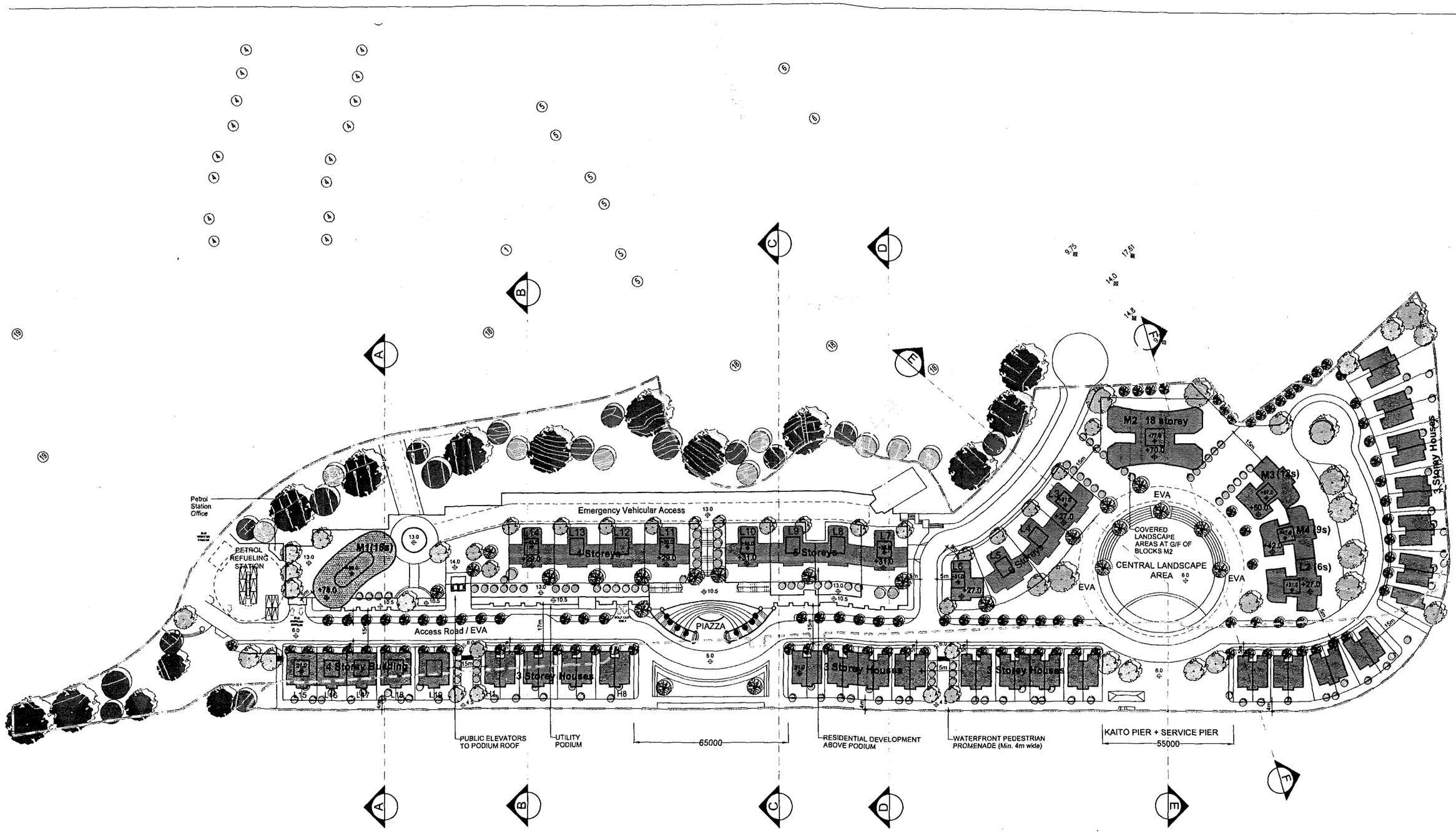
In addition, the flow in the CORMIX is assumed to be always in the same direction towards the WSR. In reality, the flow direction will change during ebb and flood tides. So the effluent plume will have half of the time to flow in one direction reaching the WSR, and the other half of the time to flow in the other direction away from the WSR. So indeed the TIN concentration at the WSR would be further reduced. Results from the *Technical Note - Preliminary Water Quality Assessment of Area 10b* is hence based on a conservative side.

Notwithstanding the above clarifications, the Project Proponent of Area 10b still commits to review the effectiveness of any suitable technology available at the time of detailed design that could deliver discharge limits that are as good as that proposed now. In particular, it is noted that some of the existing STWs beyond South Lantau can achieve an even lower total nitrogen concentration, say 10 mg/L in Peng Chau STW. The possibility to reduce the total nitrogen level to similar level will be further explored during the detailed design stage.

Annex G

Revised Concept Plan

(Bounty Pier deleted)



EXISTING OZP BOUNDARY FOR AREA 10b

PROPOSED OZP BOUNDARY FOR AREA 10b

PODIUM EXTENT

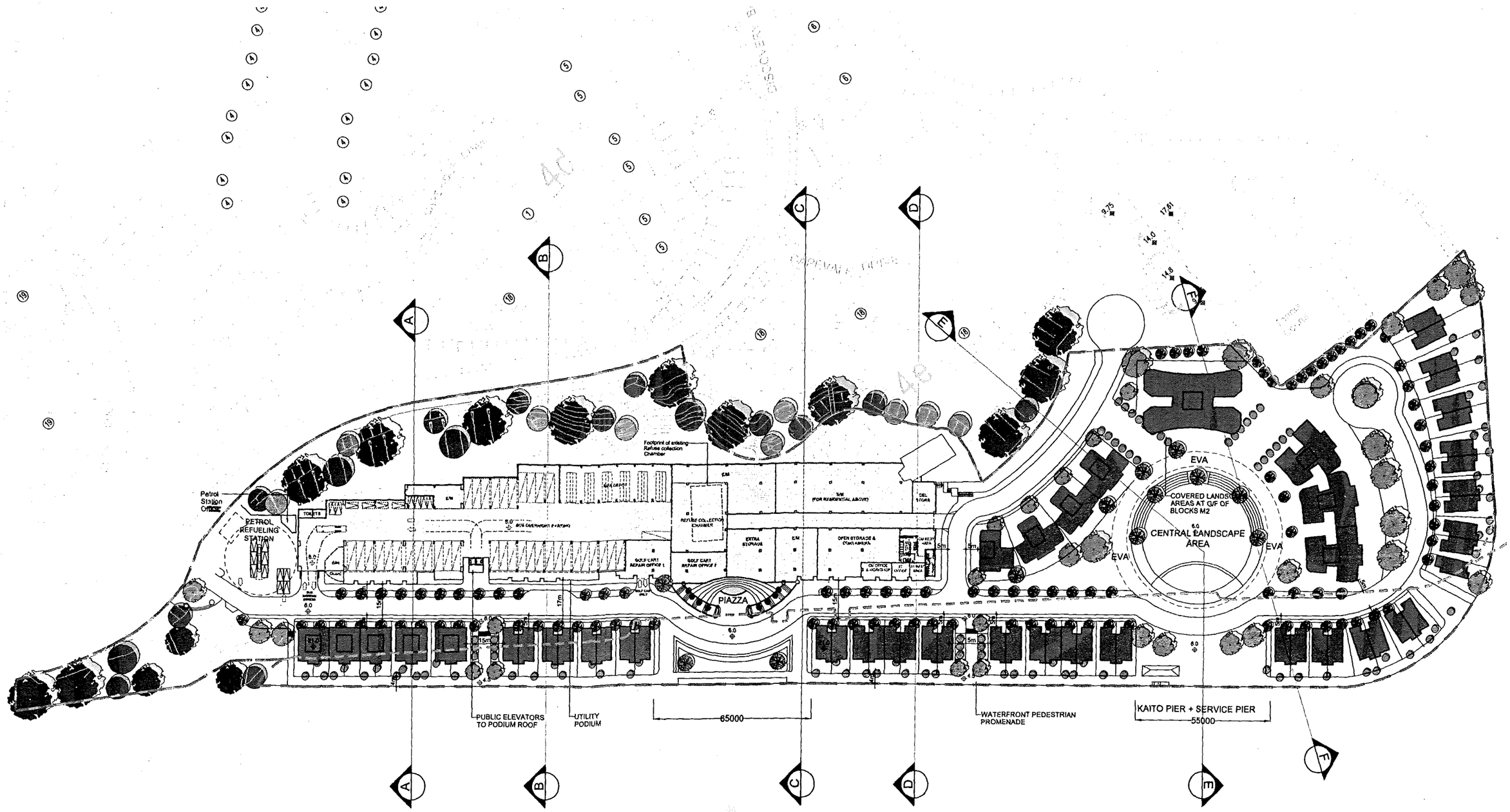
0 20 40 50m

AREA 10b
PROPOSED RESIDENTIAL DEVELOPMENT

Rev.2, Aug 2016

CONCEPT PLAN
Master Layout

Rev.3, Oct 2016



EXISTING OZP BOUNDARY FOR AREA 10b

PROPOSED OZP BOUNDARY FOR AREA 10b

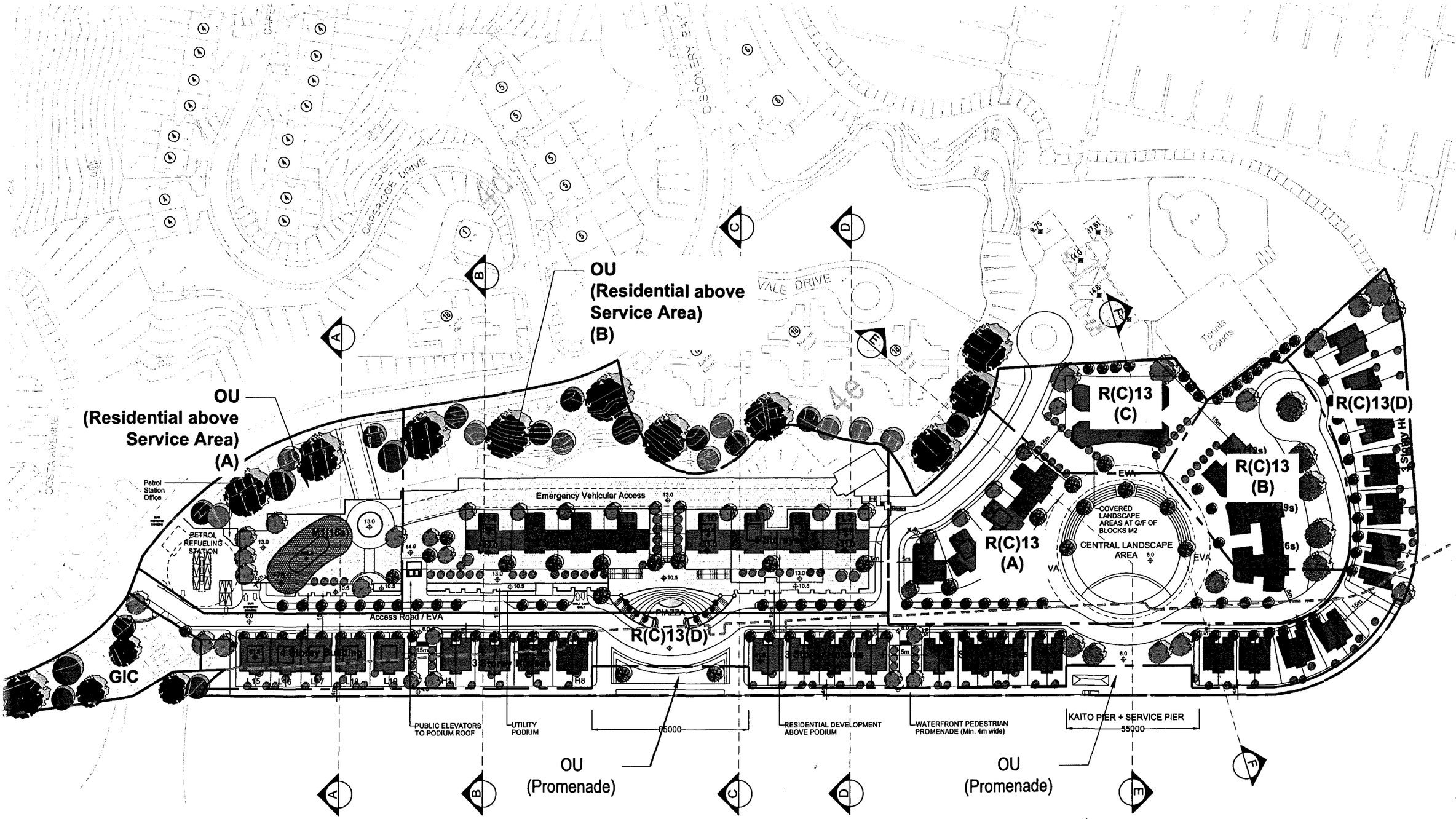
PODIUM EXTENT

0 20 40 50m

AREA 10b
PROPOSED RESIDENTIAL DEVELOPMENT

CONCEPT PLAN
Ground Floor Layout

Rev.3, Oct 2016



EXISTING OZP BOUNDARY FOR AREA 10b

PROPOSED OZP BOUNDARY FOR AREA 10b

PODIUM EXTENT

0 20 40 50m

AREA 10b
PROPOSED RESIDENTIAL DEVELOPMENT

CONCEPT PLAN
ZONING PLAN
Rev.3, Oct 2016