

Appendix 3.10a

Contours of Cumulative 19th highest 24-hour FSP Concentration at 1.5m above Ground (Year 2048) in Lam Tei

Annex I

Marine Emission Rate for River Trade Terminal in Year 2048
River Trade Vessels

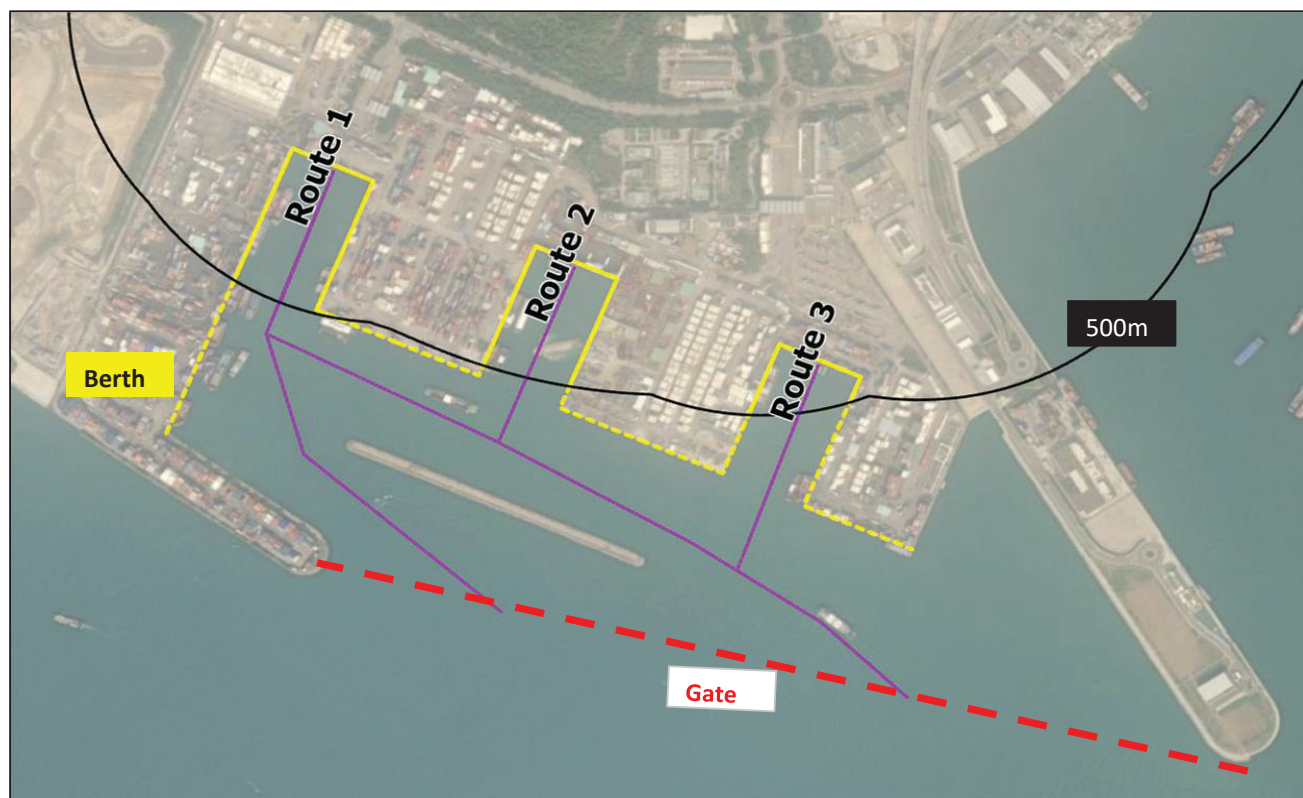
Marine Traffic Information of the Entire River Trade Terminal (RTT)

Assessment Year	2048
Assessed Vessel Type	River Trade Vessels
Location	River Trade Terminal
Total Length of Berth (m)	3050
Monthly Vessel Count for arrival and departure in RTT ^[1]	8020
Monthly Vessel Count for Hotelling at RTT ^[1]	4010
Travelling Speed (knots) ^[2]	4
Hotelling Time (hours) ^[2]	2

Notes:

[1] Monthly vessel count for maneuvering is advised by Marine Traffic Consultant and accepted by Marine Department, and that for hotelling is half of the number for maneuvering.

[2] Average travelling speed of 4 knot and average hotelling time of 2 hours are provided by Marine Traffic Consultant.



Marine Traffic Information by Routes

Sailing Route	Length of Berth within Assessment Area (m)	Monthly Vessel Count in Aug for Maneuvering within Assessment Area ^[1]	Travelling Speed (knots) ^[2]	Length of Sailing Route within Assessment Area (m) ^[4]	Monthly Vessel Count in Aug for Hotelling within Assessment Area ^[1]	Hotelling Time (hours) ^[3]
1	696	1,830	4	251	915	2
2	589	1,549	4	211	774	2
3	333	876	4	90	438	2

Notes:

[1] No information on the vessel count breakdown at different berth and routes. Hence monthly vessel count by routes is estimated by pro-rata to the length of the approached berth.

[2] Average speed of 4 knot is provided by Marine Traffic Consultant.

[3] Average hotelling time of 2 hours are provided by Marine Traffic Consultant.

[4] Possible maximum length of sailing route for each route is estimated for conservative assessment.

[5] As advised by Marine Traffic Consultant, the RTVs include container vessel, local lighter/barge/cargo junk, local bunker vessel, and tug and tow.

Marine Emission Inventory during Maneuvering

Calculation of Time-In-Mode by Route

Sailing Route	Speed (m/s) ^[1]	Length of Sailing Route within Assessment Area (m) ^[2]	Time-In-Mode (minutes) during Maneuvering ^[3]
1	2.06	251	2.03
2	2.06	211	1.71
3	2.06	90	0.73

Notes:

- [1] Average speed of 4 knot is provided by Marine Traffic Consultant and assumed to be constant throughout River Trade Terminal.
- [2] Possible maximum length of sailing route is estimated for conservative assessment.
- [3] Time-in-mode during maneuvering is derived from the length of sailing route and averaged speed within assessment area.

Total Emission Rate per Trip by Route

Sailing Route	Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]			Annual No. of Vessel Arrivals in Year 2019 ^[3]	Composite Emission Rate per Trip (g/s) ^[4]		
			NO _x	RSP	FSP		NO _x	RSP	FSP
1	1	Fully Cellular Container Vessel	1.68E-02	5.39E-04	5.22E-04	34718	1.65E-02	5.30E-04	5.14E-04
		Semi-container Vessel	1.55E-02	5.00E-04	4.85E-04	9943			
	2	Conventional Cargo Vessel	1.55E-02	4.98E-04	4.83E-04	-	1.55E-02	4.98E-04	4.83E-04
		Dry Bulk Carrier	1.62E-02	5.21E-04	5.05E-04	-			
	3	Tug	5.18E-02	2.77E-03	2.69E-03	-	5.18E-02	2.77E-03	2.69E-03
		Chemical Carrier	4.11E-02	1.80E-03	1.75E-03	247			
4	Gas Carrier	4.16E-02	1.82E-03	1.76E-03	134	4.15E-02	1.81E-03	1.76E-03	
	Oil Tanker	4.16E-02	1.82E-03	1.76E-03	419				
5	Mechanised Lighter/Barge/Cargo Junk	1.84E-02	5.98E-04	5.79E-04	-	1.84E-02	5.98E-04	5.79E-04	
	Fully Cellular Container Vessel	1.41E-02	4.53E-04	4.39E-04	34718				
2	1	Semi-container Vessel	1.31E-02	4.21E-04	4.08E-04	9943	1.39E-02	4.46E-04	4.32E-04
		Conventional Cargo Vessel	1.30E-02	4.19E-04	4.06E-04	-			
	2	Dry Bulk Carrier	1.36E-02	4.38E-04	4.25E-04	-	1.36E-02	4.38E-04	4.25E-04
		Tug	4.36E-02	2.33E-03	2.26E-03	-			
	3	Chemical Carrier	3.45E-02	1.51E-03	1.47E-03	247	3.49E-02	1.52E-03	1.48E-03
		Gas Carrier	3.50E-02	1.53E-03	1.48E-03	134			
4	Oil Tanker	3.50E-02	1.53E-03	1.48E-03	419	3.49E-02	1.52E-03	1.48E-03	
	Mechanised Lighter/Barge/Cargo Junk	1.54E-02	5.02E-04	4.87E-04	-				
5	Fully Cellular Container Vessel	6.03E-03	1.93E-04	1.87E-04	34718	5.93E-03	1.90E-04	1.84E-04	
	Semi-container Vessel	5.57E-03	1.79E-04	1.74E-04	9943				
6	Conventional Cargo Vessel	5.55E-03	1.79E-04	1.73E-04	-	5.55E-03	1.79E-04	1.73E-04	
	Dry Bulk Carrier	5.82E-03	1.87E-04	1.81E-04	-				
3	1	Tug	1.86E-02	9.92E-04	9.64E-04	-	1.86E-02	9.92E-04	9.64E-04
		Chemical Carrier	1.47E-02	6.45E-04	6.27E-04	247			
	2	Gas Carrier	1.49E-02	6.51E-04	6.33E-04	134	1.49E-02	6.49E-04	6.31E-04
		Oil Tanker	1.49E-02	6.51E-04	6.33E-04	419			
	3	Mechanised Lighter/Barge/Cargo Junk	6.58E-03	2.14E-04	2.08E-04	-	6.58E-03	2.14E-04	2.08E-04
		Fully Cellular Container Vessel	6.03E-03	1.93E-04	1.87E-04	34718			

Notes:

- [1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.
- [2] Main and auxiliary engine are assumed in operation during maneuvering for conservative assessment with reference to Table 3-25 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012). The emission rate per trip considers the emission from the engine in operation as indicated in the table "Engine in Operation", and the calculation is documented in the "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD.
- [3] Marine Traffic Consultant has provided the total number of RTVs but without breakdown into different vessel types. Hence, reference has been made to Marine Department's Vessels Arrivals by Ship Type and Ocean/River (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_y_a2.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.
- [4] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.
 $Engine\ Emission\ Rate\ per\ Trip = (i)Time-in-mode \times (ii)Engine\ Load\ Factors \times (iii)Engine\ Power \times (iv)Emission\ Factor, where$
 - (i) As indicated in the table of "calculation of Time-In-Mode by Route", time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.
 - (ii) Engine Load Factors are made reference to Table 4-7, Table 4-10 and Table 3-24 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).
 - (iii) The average engine powers are made reference to Table 4-5 and Table 4-6 of the Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).
 - (iv) The emission factor is made reference to Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) Table 4-16. Under the Air Pollution Control (Fuel for Vessels) Regulation, all vessels assumed to use MGO due to requirement to fuel switch to compliant fuel (sulphur content <=0.5%) within Hong Kong waters.

Engine in Operation

Engine	On (1) or Off (0) ^[2]
ME	1
AE	1

Modelling Parameters

Group	Sailing Route	Source ID	Type	X	Y	Base Elevation	Release Height [1]	Exit Temperature [1]	Exit velocity [1]	Internal diameter [1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx (g/s)	RSP (g/s)	FSP (g/s)
1	1	RT RM1 001	POINT	811627.3	825147	0	34.2	537	24.6	1.9	3.31E-03	1.06E-04	1.03E-04
1	1	RT RM1 002	POINT	811608.9	825100.5	0	34.2	537	24.6	1.9	3.31E-03	1.06E-04	1.03E-04
1	1	RT RM1 003	POINT	811590.4	825054	0	34.2	537	24.6	1.9	3.31E-03	1.06E-04	1.03E-04
1	1	RT RM1 004	POINT	811572	825007.6	0	34.2	537	24.6	1.9	3.31E-03	1.06E-04	1.03E-04
1	1	RT RM1 005	POINT	811553.6	824961.1	0	34.2	537	24.6	1.9	3.31E-03	1.06E-04	1.03E-04
1	2	RT RM1 006	POINT	812035.9	824974.6	0	34.2	537	24.6	1.9	3.47E-03	1.11E-04	1.08E-04
1	2	RT RM1 007	POINT	812016.8	824928.4	0	34.2	537	24.6	1.9	3.47E-03	1.11E-04	1.08E-04
1	2	RT RM1 008	POINT	811997.6	824882.2	0	34.2	537	24.6	1.9	3.47E-03	1.11E-04	1.08E-04
1	2	RT RM1 009	POINT	811978.4	824836.1	0	34.2	537	24.6	1.9	3.47E-03	1.11E-04	1.08E-04
1	3	RT RM1 010	POINT	812452.4	824799.4	0	34.2	537	24.6	1.9	3.47E-03	1.11E-04	1.08E-04
2	1	RT RM2 001	POINT	811627.3	825147	0	11	555	25	0.8	5.93E-03	1.90E-04	1.84E-04
2	1	RT RM2 002	POINT	811608.9	825100.5	0	11	555	25	0.8	3.09E-03	9.97E-05	9.66E-05
2	1	RT RM2 003	POINT	811590.4	825054	0	11	555	25	0.8	3.09E-03	9.97E-05	9.66E-05
2	1	RT RM2 004	POINT	811572	825007.6	0	11	555	25	0.8	3.09E-03	9.97E-05	9.66E-05
2	1	RT RM2 005	POINT	811553.6	824961.1	0	11	555	25	0.8	3.09E-03	9.97E-05	9.66E-05
2	2	RT RM2 006	POINT	812035.9	824974.6	0	11	555	25	0.8	3.25E-03	1.05E-04	1.02E-04
2	2	RT RM2 007	POINT	812016.8	824928.4	0	11	555	25	0.8	3.25E-03	1.05E-04	1.02E-04
2	2	RT RM2 008	POINT	811997.6	824882.2	0	11	555	25	0.8	3.25E-03	1.05E-04	1.02E-04
2	2	RT RM2 009	POINT	811978.4	824836.1	0	11	555	25	0.8	3.25E-03	1.05E-04	1.02E-04
2	3	RT RM2 010	POINT	812452.4	824799.4	0	11	555	25	0.8	5.55E-03	1.79E-04	1.73E-04
3	1	RT RM3 001	POINT	811627.3	825147	0	8	555	25	0.8	3.25E-03	1.04E-04	1.01E-04
3	1	RT RM3 002	POINT	811608.9	825100.5	0	8	555	25	0.8	3.25E-03	1.04E-04	1.01E-04
3	1	RT RM3 003	POINT	811590.4	825054	0	8	555	25	0.8	3.25E-03	1.04E-04	1.01E-04
3	1	RT RM3 004	POINT	811572	825007.6	0	8	555	25	0.8	3.25E-03	1.04E-04	1.01E-04
3	1	RT RM3 005	POINT	811553.6	824961.1	0	8	555	25	0.8	3.25E-03	1.04E-04	1.01E-04
3	2	RT RM3 006	POINT	812035.9	824974.6	0	8	555	25	0.8	3.41E-03	1.10E-04	1.06E-04
3	2	RT RM3 007	POINT	812016.8	824928.4	0	8	555	25	0.8	3.41E-03	1.10E-04	1.06E-04
3	2	RT RM3 008	POINT	811997.6	824882.2	0	8	555	25	0.8	3.41E-03	1.10E-04	1.06E-04
3	2	RT RM3 009	POINT	811978.4	824836.1	0	8	555	25	0.8	3.41E-03	1.10E-04	1.06E-04
3	3	RT RM3 010	POINT	812452.4	824799.4	0	8	555	25	0.8	5.82E-03	1.87E-04	1.81E-04
4	1	RT RM4 001	POINTHOR	811627.3	825147	0	4	694.7	8	0.2	1.04E-02	5.53E-04	5.38E-04
4	1	RT RM4 002	POINTHOR	811608.9	825100.5	0	4	694.7	8	0.2	1.04E-02	5.53E-04	5.38E-04
4	1	RT RM4 003	POINTHOR	811590.4	825054	0	4	694.7	8	0.2	1.04E-02	5.53E-04	5.38E-04
4	1	RT RM4 004	POINTHOR	811572	825007.6	0	4	694.7	8	0.2	1.04E-02	5.53E-04	5.38E-04
4	1	RT RM4 005	POINTHOR	811553.6	824961.1	0	4	694.7	8	0.2	1.04E-02	5.53E-04	5.38E-04
4	2	RT RM4 006	POINTHOR	812035.9	824974.6	0	4	694.7	8	0.2	1.09E-02	5.81E-04	5.65E-04
4	2	RT RM4 007	POINTHOR	812016.8	824928.4	0	4	694.7	8	0.2	1.09E-02	5.81E-04	5.65E-04
4	2	RT RM4 008	POINTHOR	811997.6	824882.2	0	4	694.7	8	0.2	1.09E-02	5.81E-04	5.65E-04
4	2	RT RM4 009	POINTHOR	811978.4	824836.1	0	4	694.7	8	0.2	1.09E-02	5.81E-04	5.65E-04
4	3	RT RM4 010	POINTHOR	812452.4	824799.4	0	4	694.7	8	0.2	1.86E-02	9.92E-04	9.64E-04
5	1	RT RM5 001	POINT	811627.3	825147	0	20	555	25	0.8	8.29E-03	3.62E-04	3.52E-04
5	1	RT RM5 002	POINT	811608.9	825100.5	0	20	555	25	0.8	8.29E-03	3.62E-04	3.52E-04
5	1	RT RM5 003	POINT	811590.4	825054	0	20	555	25	0.8	8.29E-03	3.62E-04	3.52E-04
5	1	RT RM5 004	POINT	811572	825007.6	0	20	555	25	0.8	8.29E-03	3.62E-04	3.52E-04
5	1	RT RM5 005	POINT	811553.6	824961.1	0	20	555	25	0.8	8.29E-03	3.62E-04	3.52E-04
5	2	RT RM5 006	POINT	812035.9	824974.6	0	20	555	25	0.8	8.71E-03	3.81E-04	3.70E-04
5	2	RT RM5 007	POINT	812016.8	824928.4	0	20	555	25	0.8	8.71E-03	3.81E-04	3.70E-04
5	2	RT RM5 008	POINT	811997.6	824882.2	0	20	555	25	0.8	8.71E-03	3.81E-04	3.70E-04
5	2	RT RM5 009	POINT	811978.4	824836.1	0	20	555	25	0.8	8.71E-03	3.81E-04	3.70E-04
5	3	RT RM5 010	POINT	812452.4	824799.4	0	20	555	25	0.8	1.49E-02	6.49E-04	6.31E-04
6	1	RT RM6 001	POINT	811627.3	825147	0	11	588	8	0.2	3.67E-03	1.20E-04	1.16E-04
6	1	RT RM6 002	POINT	811608.9	825100.5	0	11	588	8	0.2	3.67E-03	1.20E-04	1.16E-04
6	1	RT RM6 003	POINT	811590.4	825054	0	11	588	8	0.2	3.67E-03	1.20E-04	1.16E-04
6	1	RT RM6 004	POINT	811572	825007.6	0	11	588	8	0.2	3.67E-03	1.20E-04	1.16E-04
6	1	RT RM6 005	POINT	811553.6	824961.1	0	11	588	8	0.2	3.67E-03	1.20E-04	1.16E-04
6	2	RT RM6 006	POINT	812035.9	824974.6	0	11	588	8	0.2	3.86E-03	1.26E-04	1.22E-04
6	2	RT RM6 007	POINT	812016.8	824928.4	0	11	588	8	0.2	3.86E-03	1.26E-04	1.22E-04
6	2	RT RM6 008	POINT	811997.6	824882.2	0	11	588	8	0.2	3.86E-03	1.26E-04	1.22E-04
6	2	RT RM6 009	POINT	811978.4	824836.1	0	11	588	8	0.2	3.86E-03	1.26E-04	1.22E-04
6	3	RT RM6 010	POINT	812452.4	824799.4	0	11	588	8	0.2	6.58E-03	2.14E-04	2.08E-04

Notes:

[1] Modelling parameters are referred to "Generating an Hour-By-Hour Model-Ready Marine Emission Inventory, RWDI Air Inc. and Environment Canada, US EPA 17th International Emission Inventory Conference, 2-5 June 2008, Portland, Oregon", approved EIA of Tuen Mun South Extension (AERIAR-236/2022), and approved EIA of Lei Yue Mun Waterfront Enhancement Project (AERIAR-219/2018).

Marine Emission Inventory during Hotelling

Calculation of Time-In-Mode by Route

Sailing Route	Time-In-Mode (minutes) during Hotelling for 1 Hour ^[1]
1 to 3	60

Notes:

[1] Since the averaged TIM for hotelling provided by Marine Traffic Consultant is 2 hours which is larger than 1 hour, the emission rate is to calculate the emission per hour, i.e. hotelling for 60mins. The number of vessels per hour are adjusted to cater the hotelling duration.

Total Emission Rate per Trip for All Routes^[1]

Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]			Annual No. of Vessel Arrivals in Year 2019 ^[3]	Composite Emission Rate per Trip (g/s) ^[4]		
		NO _x	RSP	FSP		NO _x	RSP	FSP
1	Fully Cellular Container Vessel	1.02E-01	4.06E-03	3.96E-03	34718	1.02E-01	4.06E-03	3.96E-03
	Semi-container Vessel	1.02E-01	4.06E-03	3.96E-03	9943			
2	Conventional Cargo Vessel	1.02E-01	4.06E-03	3.96E-03	-	1.02E-01	4.06E-03	3.96E-03
3	Dry Bulk Carrier	1.02E-01	4.06E-03	3.96E-03	-	1.02E-01	4.06E-03	3.96E-03
4	Tug	1.23E-01	4.92E-03	4.80E-03	-	1.23E-01	4.92E-03	4.80E-03
5	Chemical Carrier	2.65E-01	1.06E-02	1.03E-02	247	2.65E-01	1.06E-02	1.03E-02
	Gas Carrier	2.65E-01	1.06E-02	1.03E-02	134			
	Oil Tanker	2.65E-01	1.06E-02	1.03E-02	419			
6	Mechanised Lighter/Barge/Cargo Junk	1.39E-01	5.54E-03	5.40E-03	-	1.39E-01	5.54E-03	5.40E-03

Notes:

[1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.

[2] Only auxiliary engine is assumed in operation during hotelling with reference to Table 3-25 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012). The emission rate per trip considers the emission from the engine in operation as indicated in the table "Engine in Operation", and the calculation is documented in the "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD.

[3] Marine Traffic Consultant has provided the total number of RTVs but without breakdown into different vessel types. Hence, reference has been made to Marine Department's Vessels Arrivals by Ship Type and Ocean/River (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_y_a2.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

[4] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.

Engine Emission Rate per Trip = (i) Time-in-mode x (ii) Engine Load Factors x (iii) Engine Power x (iv) Emission Factor, where

(i) As indicated in the table of "calculation of Time-In-Mode by Route", time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.

(ii) Engine Load Factors are made reference to Table 4-7, Table 4-10 and Table 3-24 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).

(iii) The average engine powers are made reference to Table 4-5 and Table 4-6 of the Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).

(iv) The emission factor is made reference to Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) Table 4-16. Under the Air Pollution Control (Fuel for Vessels) Regulation, all vessels assumed to use MGO due to requirement to fuel switch to compliant fuel (sulphur content <=0.5%) within Hong Kong waters.

Engine in Operation

Engine	On (1) or Off (0) ^[2]
AE	1

Modelling Parameters

Group	Sailing Route	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx (g/s)	RSP (g/s)	FSP (g/s)
5	1	RT RH5 005	POINT	811645.7	825193.5	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
5	1	RT RH5 006	POINT	811700.5	825170.3	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
5	1	RT RH5 007	POINT	811673.3	825105.8	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
5	1	RT RH5 008	POINT	811646.1	825041.3	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
5	1	RT RH5 009	POINT	811618.9	824976.8	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
5	2	RT RH5 010	POINT	811995.1	825045.9	0	20	555	25	0.8	3.31E-02	1.33E-03	1.29E-03
5	2	RT RH5 011	POINT	811968.0	824981.3	0	20	555	25	0.8	3.31E-02	1.33E-03	1.29E-03
5	2	RT RH5 012	POINT	811940.9	824916.8	0	20	555	25	0.8	3.31E-02	1.33E-03	1.29E-03
5	2	RT RH5 013	POINT	811913.8	824852.3	0	20	555	25	0.8	3.31E-02	1.33E-03	1.29E-03
5	2	RT RH5 014	POINT	812059.7	825018.9	0	20	555	25	0.8	3.31E-02	1.33E-03	1.29E-03
5	2	RT RH5 015	POINT	812115.1	824995.7	0	20	555	25	0.8	3.31E-02	1.33E-03	1.29E-03
5	2	RT RH5 016	POINT	812087.8	824931.2	0	20	555	25	0.8	3.31E-02	1.33E-03	1.29E-03
5	2	RT RH5 017	POINT	812060.6	824866.7	0	20	555	25	0.8	3.31E-02	1.33E-03	1.29E-03
5	3	RT RH5 018	POINT	812383.0	824806.9	0	20	555	25	0.8	6.63E-02	2.65E-03	2.59E-03
5	3	RT RH5 019	POINT	812410.2	824871.4	0	20	555	25	0.8	6.63E-02	2.65E-03	2.59E-03
5	3	RT RH5 020	POINT	812474.7	824844.2	0	20	555	25	0.8	6.63E-02	2.65E-03	2.59E-03
5	3	RT RH5 021	POINT	812529.8	824820.9	0	20	555	25	0.8	6.63E-02	2.65E-03	2.59E-03
6	1	RT RH6 001	POINT	811581.2	825220.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	1	RT RH6 002	POINT	811554.0	825156.3	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	1	RT RH6 003	POINT	811526.8	825091.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	1	RT RH6 004	POINT	811499.6	825027.3	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	1	RT RH6 005	POINT	811645.7	825193.5	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	1	RT RH6 006	POINT	811700.5	825170.3	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	1	RT RH6 007	POINT	811673.3	825105.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	1	RT RH6 008	POINT	811646.1	825041.3	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	1	RT RH6 009	POINT	811618.9	824976.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
6	2	RT RH6 010	POINT	811995.1	825045.9	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
6	2	RT RH6 011	POINT	811968.0	824981.3	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
6	2	RT RH6 012	POINT	811940.9	824916.8	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
6	2	RT RH6 013	POINT	811913.8	824852.3	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
6	2	RT RH6 014	POINT	812059.7	825018.9	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
6	2	RT RH6 015	POINT	812115.1	824995.7	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
6	2	RT RH6 016	POINT	812087.8	824931.2	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
6	2	RT RH6 017	POINT	812060.6	824866.7	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
6	3	RT RH6 018	POINT	812383.0	824806.9	0	11	588	8	0.2	3.46E-02	1.39E-03	1.35E-03
6	3	RT RH6 019	POINT	812410.2	824871.4	0	11	588	8	0.2	3.46E-02	1.39E-03	1.35E-03
6	3	RT RH6 020	POINT	812474.7	824844.2	0	11	588	8	0.2	3.46E-02	1.39E-03	1.35E-03
6	3	RT RH6 021	POINT	812529.8	824820.9	0	11	588	8	0.2	3.46E-02	1.39E-03	1.35E-03

Notes:

[1] Modelling parameters are referred to "Generating an Hour-By-Hour Model-Ready Marine Emission Inventory, RWDI Air Inc. and Environment Canada, US EPA 17th International Emission Inventory Conference, 2-5 June 2008, Portland, Oregon", approved EIA of Tuen Mun South Extension (AERIAR-236/2022), and approved EIA of Lei Yue Mun Waterfront Enhancement Project (AERIAR-219/2018).

Calculation of Multiplying Factor for Total Vessel Count**Monthly Vessel Count for Year 2048**

Sailing Route	Monthly Vessel Count in Aug for Maneuvering ^[1]	Monthly Vessel Count in Aug for Hotelling ^[1]
Route 1	1,830	915
Route 2	1,549	774
Route 3	876	438

Notes:

[1] The marine traffic data for August is provided by Marine Traffic Consultant.

Monthly Multiplying Factor derived from Marine Traffic in Year 2019

Month	Total No. of Arrivals by RTVs ^[1]	Monthly Multiplying Factor
Jan-19	5,820	1.03
Feb-19	3,401	0.60
Mar-19	5,783	1.02
Apr-19	5,411	0.96
May-19	5,766	1.02
Jun-19	5,456	0.96
Jul-19	5,645	1.00
Aug-19	5,659	1.00
Sep-19	5,382	0.95
Oct-19	5,160	0.91
Nov-19	5,534	0.98
Dec-19	5,632	1.00

Notes:

[1] Since no monthly profile is available from Marine Traffic Consultant, the annual vessel count is calculated based on monthly profile in "Monthly Vessel Arrivals by Ocean/River and Cargo/Passenger Vessels" published by Marine Department (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_m_a1.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

Hourly Multiplying Factor derived from Marine Traffic in August 2048

Hour		No. of Marine Vessels for Maneuvering of the Entire RTT ^[1]	Monthly-Hourly Multiplying Factor for Maneuvering ^[2]	No. of Marine Vessels for Hotelling for the Entire RTT ^[1]	Monthly-Hourly Multiplying Factor for Hotelling ^[2]
Start	End				
0	1	223	2.8%	112	2.8%
1	2	205	2.6%	102	2.6%
2	3	223	2.8%	112	2.8%
3	4	164	2.0%	82	2.0%
4	5	164	2.0%	82	2.0%
5	6	174	2.2%	87	2.2%
6	7	177	2.2%	88	2.2%
7	8	229	2.9%	115	2.9%
8	9	288	3.6%	144	3.6%
9	10	372	4.6%	186	4.6%
10	11	406	5.1%	203	5.1%
11	12	459	5.7%	229	5.7%
12	13	431	5.4%	215	5.4%
13	14	394	4.9%	197	4.9%
14	15	391	4.9%	195	4.9%
15	16	440	5.5%	220	5.5%
16	17	487	6.1%	243	6.1%
17	18	474	5.9%	237	5.9%
18	19	378	4.7%	189	4.7%
19	20	350	4.4%	175	4.4%
20	21	437	5.5%	219	5.5%
21	22	440	5.5%	220	5.5%
22	23	391	4.9%	195	4.9%
23	24	322	4.0%	161	4.0%

Notes:

[1] The number of vessels refers to the number of vessels going in and out the entire RTT but not the assessed route of RTT. The number of hourly marine vessels for Aug 2048 is provided by Marine Traffic Consultant. It contains the total number of marine vessels going in and out RTT for the 31 days in Aug in Year 2048 for each hour. For example, from Hour 0 to Hour 1 (i.e. first hour of 1 Aug + first hour of 2 Aug, 1st hour of 31 Aug), there are total 223 marine vessels maneuvering and total 112 marine hotelling for the first hour during the whole August.

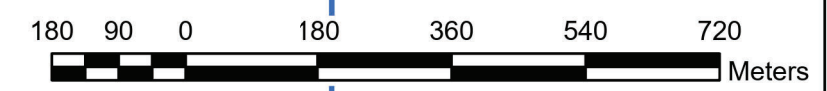
[2] The hourly profile of the entire RTT is assumed to be the same for each route.



Legend

- RTT Modelled Sources (Hotelling)
- RTT Modelled Sources (Maneuvering)
- Project Road
- Project Road (Tunnel)
- 500m Assessment Area
- PATH Grid

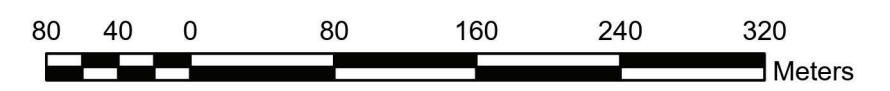
Notes:
 The modelled sources is based on the radar/AIS data provided by Marine Department.





- Legend**
- RTT Modelled Sources (Hotelling)
 - RTT Modelled Sources (Maneuvering)
 - Project Road
 - Project Raod (Tunnel)
 - 500m Assessment Area
 - PATH Grid

Notes:
The modelled sources is based on the radar/AIS data provided by Marine Department.



Annex II

Marine Emission Rate for River Trade Terminal in Year 2048
Small Craft - Boat

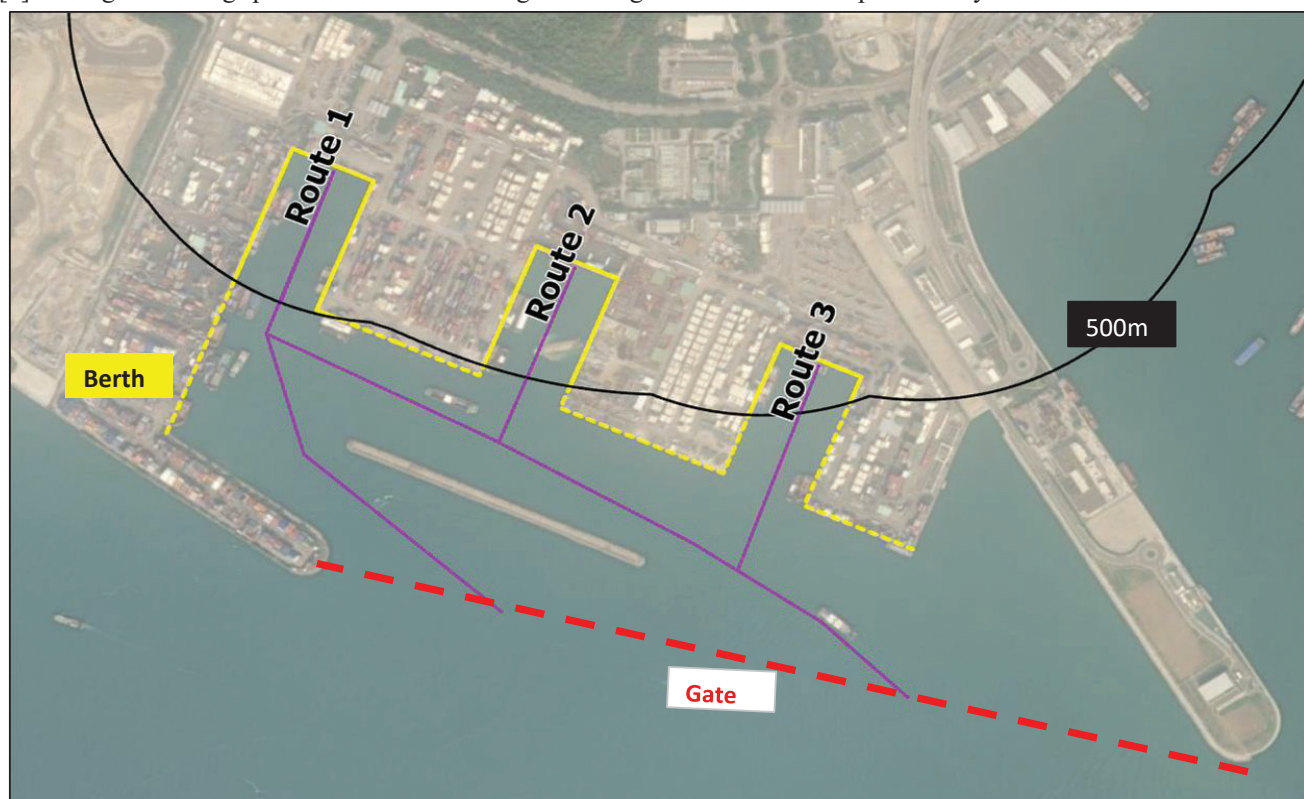
Marine Traffic Information of the Entire River Trade Terminal (RTT)

Assessment Year	2048
Assessed Vessel Type	Small Craft - Boat
Location	River Trade Terminal
Total Length of Berth (m)	3050
Monthly Vessel Count for arrival and departure in RTT ^[1]	828
Monthly Vessel Count for Hotelling at RTT ^[1]	414
Travelling Speed (knots) ^[2]	5
Hotelling Time (hours) ^[2]	1

Notes:

[1] Monthly vessel count for maneuvering is advised by Marine Traffic Consultant and accepted by Marine Department, and that for hotelling is half of the number for maneuvering.

[2] Average travelling speed of 5 knot and average hotelling time of 1 hours are provided by Marine Traffic Consultant.



Marine Traffic Information by Routes

Sailing Route	Length of Berth within Assessment Area (m)	Monthly Vessel Count in Aug for Maneuvering within Assessment Area ^[1]	Travelling Speed (knots) ^[2]	Length of Sailing Route within Assessment Area (m) ^[4]	Monthly Vessel Count in Aug for Hotelling within Assessment Area ^[1]	Hotelling Time (hours) ^[3]
1	696	189	5	251	94	1
2	589	160	5	211	80	1
3	333	90	5	90	45	1

Notes:

[1] No information on the vessel count breakdown at different berth and routes. Hence monthly vessel count by routes is estimated by pro-rata to the length of the approached berth.

[2] Average speed of 5 knot is provided by Marine Traffic Consultant.

[3] Average hotelling time of 1 hours are provided by Marine Traffic Consultant.

[4] Possible maximum length of sailing route for each route is estimated for conservative assessment.

[5] As advised by Marine Traffic Consultant, the small crafts include work boat, tugboat and Boats. For the calculation of marine emission for tug boat and work boat, please refer to "Marine Emission Rate for River Trade Terminal in Year 2048 for Small Craft - Work Boat and Tugboat".

Marine Emission Inventory during Maneuvering

Calculation of Time-In-Mode by Route

Sailing Route	Speed (m/s) ^[1]	Length of Sailing Route within Assessment Area (m) ^[2]	Time-In-Mode (minutes) during Maneuvering ^[3]
1	2.57	251	1.63
2	2.57	211	1.37
3	2.57	90	0.58

Notes:

- [1] Average speed of 5 knot is provided by Marine Traffic Consultant and assumed to be constant throughout River Trade Terminal.
- [2] Possible maximum length of sailing route is estimated for conservative assessment.
- [3] Time-in-mode during maneuvering is derived from the length of sailing route and averaged speed within assessment area.

Total Emission Rate per Trip by Route

Sailing Route	Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]		
			NO _x	RSP	FSP
1	1	Boat	6.07E-04	1.66E-05	1.66E-05
2	1	Boat	5.10E-04	1.39E-05	1.39E-05
3	1	Boat	2.18E-04	5.95E-06	5.95E-06

Notes:

- [1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.
- [2] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.
Engine Emission Rate per Trip = (i)Time-in-mode x (ii)Engine Load Factors x (iii) Engine Power x (iv) Emission Factor, where
- (i) As indicated in the table of "Calculation of Time-In-Mode by Route", time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.
- (ii) Engine Load Factors are made reference to Table 3-2 and Table 3-3 of USEPA (2008) – "Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder".
- (iii) As advised by the Operator, the boat is small only. However, due to privacy issue, they cannot release more information. There is no photo on the boat. The average engine powers are made reference to the engine power of typical small crafts in River Trade Terminal provided by the Operator.
- (iv) The engine emission factors are made reference to Table 3-4 and Table 3-58 of USEPA (2008) – "Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder". Tier 2 emission factors are adopted, which assumed the age of vessels is >40 years old in Year 2048 for conservative assessment. Emission factors of FSP is assumed to be the same as those of RSP.

Modelling Parameters

Group	Sailing Route	Source ID	Type	X (m)	Y (m)	Base Elevation (mpd)	Release Height ^[1] (m)	Exit Temperature ^[1] (K)	Exit velocity ^[1] (m/s)	Internal diameter ^[1] (m)	Emission Rate per Trip		
											NO _x (g/s)	RSP (g/s)	FSP (g/s)
1	1	RT_PM1_001	POINTHOR	811627.3	825147	0	1.3	773	8	0.7	1.21E-04	3.32E-06	3.32E-06
1	1	RT_PM1_002	POINTHOR	811608.9	825100.5	0	1.3	773	8	0.7	1.21E-04	3.32E-06	3.32E-06
1	1	RT_PM1_003	POINTHOR	811590.4	825054	0	1.3	773	8	0.7	1.21E-04	3.32E-06	3.32E-06
1	1	RT_PM1_004	POINTHOR	811572	825007.6	0	1.3	773	8	0.7	1.21E-04	3.32E-06	3.32E-06
1	1	RT_PM1_005	POINTHOR	811553.6	824961.1	0	1.3	773	8	0.7	1.21E-04	3.32E-06	3.32E-06
1	2	RT_PM1_006	POINTHOR	812035.9	824974.6	0	1.3	773	8	0.7	1.28E-04	3.48E-06	3.48E-06
1	2	RT_PM1_007	POINTHOR	812016.8	824928.4	0	1.3	773	8	0.7	1.28E-04	3.48E-06	3.48E-06
1	2	RT_PM1_008	POINTHOR	811997.6	824882.2	0	1.3	773	8	0.7	1.28E-04	3.48E-06	3.48E-06
1	2	RT_PM1_009	POINTHOR	811978.4	824836.1	0	1.3	773	8	0.7	1.28E-04	3.48E-06	3.48E-06
1	3	RT_PM1_010	POINTHOR	812452.4	824799.4	0	1.3	773	8	0.7	2.18E-04	5.95E-06	5.95E-06

Notes:

- [1] The release height refers to HK China Ferry Terminal in Approved EIA of Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1 – Investigation, Design and Construction (AEIAR-179/2013) and other modelling parameters such as exit temperature, exit velocity and internal diameter refers to Expansion of Hong Kong Airport into a Three-Runway System (AEIAR-185/2014).

Marine Emission Inventory during Hotelling

Calculation of Time-In-Mode by Route

Sailing Route	Time-In-Mode (minutes) during Hotelling for 1 Hour ^[1]
1 to 3	60

Notes:

[1] The averaged TIM for hotelling provided by Marine Traffic Consultant is 1 hour and the emission rate is to calculate the emission per hour, i.e. hotelling for 60mins. The number of vessels per hour are adjusted to cater the hotelling duration.

Total Emission Rate per Trip for All Routes^[1]

Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]		
		NO _x	RSP	FSP
1	Boat	2.24E-02	6.12E-04	6.12E-04

Notes:

[1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.

[2] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.

Engine Emission Rate per Trip = (i)Time-in-mode x (ii)Engine Load Factors x (iii) Engine Power x (iv) Emission Factor, where

(i) As indicated in the table of "Calculation of Time-In-Mode by Route", time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.

(ii) Engine Load Factors are made reference to Table 3-2 and Table 3-3 of USEPA (2008) – "Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder".

(iii) As advised by the Operator, the boat is small only. However, due to privacy issue, they cannot release more information. There is no photo on the boat. The average engine powers are made reference to the engine power of typical small crafts in River Trade Terminal provided by the Operator.

(iv) The engine emission factors are made reference to Table 3-4 and Table 3-58 of USEPA (2008) – "Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder". Tier 2 emission factors are adopted, which assumed the age of vessels is >40 years old in Year 2048 for conservative assessment. Emission factors of FSP is assumed to be the same as those of RSP.

Modelling Parameters

Group	Sailing Route	Source ID	Type	X (m)	Y (m)	Base Elevation (mpd)	Release Height ^[1] (m)	Exit Temperature ^[1] (K)	Exit velocity ^[1] (m/s)	Internal diameter ^[1] (m)	Emission Rate per Trip		
											NO _x (g/s)	RSP (g/s)	FSP (g/s)
1	1	RT PH1 001	POINTHOR	811581.2	825220.8	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	1	RT PH1 002	POINTHOR	811554.0	825156.3	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	1	RT PH1 003	POINTHOR	811526.8	825091.8	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	1	RT PH1 004	POINTHOR	811499.6	825027.3	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	1	RT PH1 005	POINTHOR	811645.7	825193.5	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	1	RT PH1 006	POINTHOR	811700.5	825170.3	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	1	RT PH1 007	POINTHOR	811673.3	825105.8	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	1	RT PH1 008	POINTHOR	811646.1	825041.3	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	1	RT PH1 009	POINTHOR	811618.9	824976.8	0	1.3	773	8	0.7	2.49E-03	6.80E-05	6.80E-05
1	2	RT PH1 010	POINTHOR	811995.1	825045.9	0	1.3	773	8	0.7	2.80E-03	7.65E-05	7.65E-05
1	2	RT PH1 011	POINTHOR	811968.0	824981.3	0	1.3	773	8	0.7	2.80E-03	7.65E-05	7.65E-05
1	2	RT PH1 012	POINTHOR	811940.9	824916.8	0	1.3	773	8	0.7	2.80E-03	7.65E-05	7.65E-05
1	2	RT PH1 013	POINTHOR	811913.8	824852.3	0	1.3	773	8	0.7	2.80E-03	7.65E-05	7.65E-05
1	2	RT PH1 014	POINTHOR	812059.7	825018.9	0	1.3	773	8	0.7	2.80E-03	7.65E-05	7.65E-05
1	2	RT PH1 015	POINTHOR	812115.1	824995.7	0	1.3	773	8	0.7	2.80E-03	7.65E-05	7.65E-05
1	2	RT PH1 016	POINTHOR	812087.8	824931.2	0	1.3	773	8	0.7	2.80E-03	7.65E-05	7.65E-05
1	2	RT PH1 017	POINTHOR	812060.6	824866.7	0	1.3	773	8	0.7	2.80E-03	7.65E-05	7.65E-05
1	3	RT PH1 018	POINTHOR	812383.0	824806.9	0	1.3	773	8	0.7	5.60E-03	1.53E-04	1.53E-04
1	3	RT PH1 019	POINTHOR	812410.2	824871.4	0	1.3	773	8	0.7	5.60E-03	1.53E-04	1.53E-04
1	3	RT PH1 020	POINTHOR	812474.7	824844.2	0	1.3	773	8	0.7	5.60E-03	1.53E-04	1.53E-04
1	3	RT PH1 021	POINTHOR	812529.8	824820.9	0	1.3	773	8	0.7	5.60E-03	1.53E-04	1.53E-04

Notes:

[1] The release height refers to HK China Ferry Terminal in Approved EIA of Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1 – Investigation, Design and Construction (AEIAR-179/2013) and other modelling parameters such as exit temperature, exit velocity and internal diameter refers to Expansion of Hong Kong Airport into a Three-Runway System (AEIAR-185/2014)

Calculation of Multiplying Factor for Total Vessel Count**Monthly Vessel Count for Year 2048**

Sailing Route	Monthly Vessel Count in Aug for Maneuvering ^[1]	Monthly Vessel Count in Aug for Hotelling ^[1]
Route 1	189	94
Route 2	160	80
Route 3	90	45

Notes:

[1] The marine traffic data for August is provided by Marine Traffic Consultant.

Monthly Multiplying Factor derived from Marine Traffic in Year 2019

Month	Total No. of Arrivals by RTVs ^[1]	Monthly Multiplying Factor
Jan-19	5,820	1.03
Feb-19	3,401	0.60
Mar-19	5,783	1.02
Apr-19	5,411	0.96
May-19	5,766	1.02
Jun-19	5,456	0.96
Jul-19	5,645	1.00
Aug-19	5,659	1.00
Sep-19	5,382	0.95
Oct-19	5,160	0.91
Nov-19	5,534	0.98
Dec-19	5,632	1.00

Notes:

[1] Since no monthly profile is available from Marine Traffic Consultant, the annual vessel count is calculated based on monthly profile in "Monthly Vessel Arrivals by Ocean/River and Cargo/Passenger Vessels" published by Marine Department (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_m_a1.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

Hourly Multiplying Factor derived from Marine Traffic in August 2048

Hour		No. of Marine Vessels for Maneuvering of the Entire RTT ^[1]	Monthly-Hourly Multiplying Factor for Maneuvering ^[2]	No. of Marine Vessels for Hotelling for the Entire RTT ^[1]	Monthly-Hourly Multiplying Factor for Hotelling ^[2]
Start	End				
0	1	223	2.8%	112	2.8%
1	2	205	2.6%	102	2.6%
2	3	223	2.8%	112	2.8%
3	4	164	2.0%	82	2.0%
4	5	164	2.0%	82	2.0%
5	6	174	2.2%	87	2.2%
6	7	177	2.2%	88	2.2%
7	8	229	2.9%	115	2.9%
8	9	288	3.6%	144	3.6%
9	10	372	4.6%	186	4.6%
10	11	406	5.1%	203	5.1%
11	12	459	5.7%	229	5.7%
12	13	431	5.4%	215	5.4%
13	14	394	4.9%	197	4.9%
14	15	391	4.9%	195	4.9%
15	16	440	5.5%	220	5.5%
16	17	487	6.1%	243	6.1%
17	18	474	5.9%	237	5.9%
18	19	378	4.7%	189	4.7%
19	20	350	4.4%	175	4.4%
20	21	437	5.5%	219	5.5%
21	22	440	5.5%	220	5.5%
22	23	391	4.9%	195	4.9%
23	24	322	4.0%	161	4.0%

Notes:

[1] The number of vessels refers to the number of vessels going in and out the entire RTT but not the assessed route of RTT .The number of hourly marine vessels for Aug 2048 is provided by Marine Traffic Consultant. It contains the total number of marine vessels going in and out RTT for the 31 days in Aug in Year 2048 for each hour. For example, from Hour 0 to Hour 1 (i.e. first hour of 1 Aug + first hour of 2 Aug, 1st hour of 31 Aug), there are total 223 marine vessels maneuvering and total 112 marine hotelling for the first hour during the whole August. Since there is no information, the hourly profile of small craft is adopted for the small craft (boat).

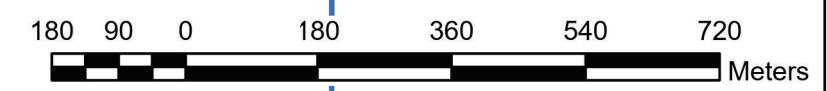
[2] The hourly profile of the entire RTT is assumed to be the same for each route.



Legend

- RTT Modelled Sources (Hotelling)
- RTT Modelled Sources (Maneuvering)
- Project Road
- Project Road (Tunnel)
- 500m Assessment Area
- PATH Grid

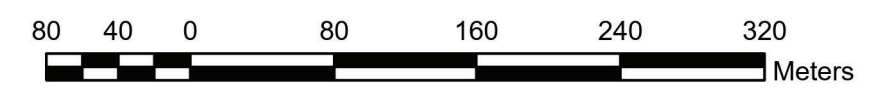
Notes:
 The modelled sources is based on the radar/AIS data provided by Marine Department.





- Legend**
- RTT Modelled Sources (Hotelling)
 - RTT Modelled Sources (Maneuvering)
 - Project Road
 - Project Raod (Tunnel)
 - 500m Assessment Area
 - PATH Grid

Notes:
The modelled sources is based on the radar/AIS data provided by Marine Department.



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Annex III

Marine Emission Rate for River Trade Terminal in Year 2048
Small Craft - Work Boat and Tugboat

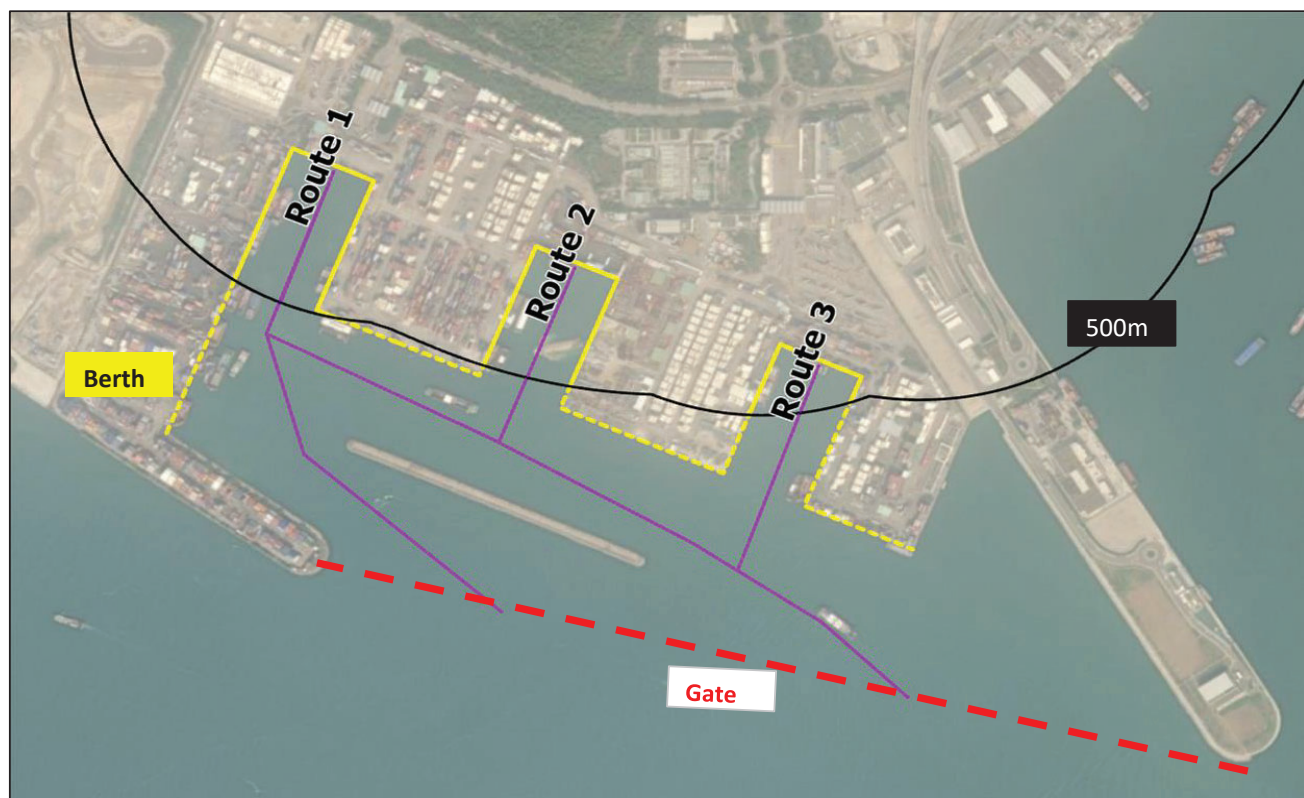
Marine Traffic Information of the Entire River Trade Terminal (RTT)

Assessment Year	2048
Assessed Vessel Type	Small Craft - Work Boat and Tugboat
Location	River Trade Terminal
Total Length of Berth (m)	3050
Monthly Vessel Count for arrival and departure in RTT ^[1]	207
Monthly Vessel Count for Hotelling at RTT ^[1]	104
Travelling Speed (knots) ^[2]	5
Hotelling Time (hours) ^[2]	1

Notes:

[1] Monthly vessel count for maneuvering is advised by Marine Traffic Consultant and accepted by Marine Department, and that for hotelling is half of the number for maneuvering.

[2] Average travelling speed of 5 knot and average hotelling time of 1 hours are provided by Marine Traffic Consultant.



Marine Traffic Information by Routes

Sailing Route	Length of Berth within Assessment Area (m)	Monthly Vessel Count in Aug for Maneuvering within Assessment Area ^[1]	Travelling Speed (knots) ^[2]	Length of Sailing Route within Assessment Area (m) ^[4]	Monthly Vessel Count in Aug for Hotelling within Assessment Area ^[1]	Hotelling Time (hours) ^[3]
1	696	47	5	251	24	1
2	589	40	5	211	20	1
3	333	23	5	90	11	1

Notes:

[1] No information on the vessel count breakdown at different berth and routes. Hence monthly vessel count by routes is estimated by pro-rata to the length of the approached berth.

[2] Average speed of 5 knot is provided by Marine Traffic Consultant.

[3] Average hotelling time of 1 hours are provided by Marine Traffic Consultant.

[4] Possible maximum length of sailing route for each route is estimated for conservative assessment.

[5] As advised by Marine Traffic Consultant, the small crafts include tugboat, work boat and passenger boat. For the calculation of marine emission for passenger boat, please refer to "Marine Emission Rate for Tsing Lung Tau Fairway in Year 2048 for Small Crafts - Passenger Boat".

Marine Emission Inventory during Maneuvering

Calculation of Time-In-Mode by Route

Sailing Route	Speed (m/s) ^[1]	Length of Sailing Route within Assessment Area (m) ^[2]	Time-In-Mode (minutes) during Maneuvering ^[3]
1	2.57	251	1.63
2	2.57	211	1.37
3	2.57	90	0.58

Notes

- [1] Average speed of 5 knot is provided by Marine Traffic Consultant and assumed to be constant throughout River Trade Terminal.
- [2] Possible maximum length of sailing route is estimated for conservative assessment.
- [3] Time-in-mode during maneuvering is derived from the length of sailing route and averaged speed within assessment area.

Total Emission Rate per Trip by Route

Sailing Route	Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^{[2],[3]}		
			NO _x	RSP	FSP
1	1	Work Boat	9.29E-03	3.16E-04	3.07E-04
	2	Tugboat	1.97E-02	1.06E-03	1.03E-03
2	1	Work Boat	7.81E-03	2.66E-04	2.58E-04
	2	Tugboat	1.66E-02	8.90E-04	8.66E-04
3	1	Work Boat	3.33E-03	1.13E-04	1.10E-04
	2	Tugboat	7.07E-03	3.80E-04	3.69E-04

Notes

- [1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.
- [2] Main and auxiliary engine are assumed in operation during maneuvering for conservative assessment with reference to Table 3-25 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012). The emission rate per trip considers the emission from the engine in operation as indicated in the table "Engine in Operation", and the calculation is documented in the "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD.
- [3] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.
 $Engine\ Emission\ Rate\ per\ Trip = (i)Time-in-mode \times (ii)Engine\ Load\ Factors \times (iii)Engine\ Power \times (iv)Emission\ Factor\ where$
- (i) As indicated in the table of "Calculation of Time-In-Mode by Route", time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.
- (ii) Engine Load Factors are made reference to Table 4-7, Table 4-10 and Table 3-24 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).
- (iii) The engine powers are made reference to Table 4-5 and Table 4-6 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) - cargo junk of GRT 0-499 class and tug of GRT 0-499 (average of Grade II tug boat of locally licensed vessel).
- (iv) The emission factor is made reference to Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) Table 4-16. Under the Air Pollution Control (Fuel for Vessels) Regulation, all vessels assumed to use MGO due to requirement to fuel switch to compliant fuel (sulphur content <=0.5%) within Hong Kong waters.

Engine in Operation

Engine	On (1) or Off (0) ^[2]
ME	1
AE	1

Modelling Parameters

Group	Sailing Route	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NO _x (g/s)	RSP (g/s)	FSP (g/s)
1	1	RT_TM1_001	POINT	811627.3	825147	0	11	588	8	0.2	1.86E-03	6.33E-05	6.14E-05
1	1	RT_TM1_002	POINT	811608.9	825100.5	0	11	588	8	0.2	1.86E-03	6.33E-05	6.14E-05
1	1	RT_TM1_003	POINT	811590.4	825054	0	11	588	8	0.2	1.86E-03	6.33E-05	6.14E-05
1	1	RT_TM1_004	POINT	811572	825007.6	0	11	588	8	0.2	1.86E-03	6.33E-05	6.14E-05
1	1	RT_TM1_005	POINT	811553.6	824961.1	0	11	588	8	0.2	1.86E-03	6.33E-05	6.14E-05
1	2	RT_TM1_006	POINT	812035.9	824974.6	0	11	588	8	0.2	1.95E-03	6.65E-05	6.45E-05
1	2	RT_TM1_007	POINT	812016.8	824928.4	0	11	588	8	0.2	1.95E-03	6.65E-05	6.45E-05
1	2	RT_TM1_008	POINT	811997.6	824882.2	0	11	588	8	0.2	1.95E-03	6.65E-05	6.45E-05
1	2	RT_TM1_009	POINT	811978.4	824836.1	0	11	588	8	0.2	1.95E-03	6.65E-05	6.45E-05
1	3	RT_TM1_010	POINT	812452.4	824799.4	0	11	588	8	0.2	3.33E-03	1.13E-04	1.10E-04
2	1	RT_TM2_001	POINTHOR	811627.3	825147	0	4	694.7	8	0.3	3.94E-03	2.12E-04	2.06E-04
2	1	RT_TM2_002	POINTHOR	811608.9	825100.5	0	4	694.7	8	0.3	3.94E-03	2.12E-04	2.06E-04
2	1	RT_TM2_003	POINTHOR	811590.4	825054	0	4	694.7	8	0.3	3.94E-03	2.12E-04	2.06E-04
2	1	RT_TM2_004	POINTHOR	811572	825007.6	0	4	694.7	8	0.3	3.94E-03	2.12E-04	2.06E-04
2	1	RT_TM2_005	POINTHOR	811553.6	824961.1	0	4	694.7	8	0.3	3.94E-03	2.12E-04	2.06E-04
2	2	RT_TM2_006	POINTHOR	812035.9	824974.6	0	4	694.7	8	0.3	4.14E-03	2.23E-04	2.16E-04
2	2	RT_TM2_007	POINTHOR	812016.8	824928.4	0	4	694.7	8	0.3	4.14E-03	2.23E-04	2.16E-04
2	2	RT_TM2_008	POINTHOR	811997.6	824882.2	0	4	694.7	8	0.3	4.14E-03	2.23E-04	2.16E-04
2	2	RT_TM2_009	POINTHOR	811978.4	824836.1	0	4	694.7	8	0.3	4.14E-03	2.23E-04	2.16E-04
2	3	RT_TM2_010	POINTHOR	812452.4	824799.4	0	4	694.7	8	0.3	7.07E-03	3.80E-04	3.69E-04

Notes:

- [1] Modelling parameters are referred to Tuen Mun South Extension (AERIAR-236/2022).

Marine Emission Inventory during Hotelling

Calculation of Time-In-Mode by Route

Sailing Route	Time-In-Mode (minutes) during Hotelling for 1 Hour ^[1]
1 to 3	60

Notes:
 [1] The averaged TIM for hotelling provided by Marine Traffic Consultant is 1 hour and the emission rate is to calculate the emission per hour, i.e. hotelling for 60mins.

Total Emission Rate per Trip for All Routes^[1]

Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^{[2],[3]}		
		NO _x	RSP	FSP
1	Work Boat	1.39E-01	5.54E-03	5.40E-03
2	Tugboat	3.94E-02	1.58E-03	1.54E-03

Notes
 [1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.
 [2] Only auxiliary engine is assumed in operation during hotelling with reference to Table 3-25 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012). The emission rate per trip considers the emission from the engine in operation as indicated in the table "Engine in Operation", and the calculation is documented in the "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD.

Engine in Operation

Engine	On (1) or Off (0) ^[2]
AE	1

[3] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.

$Engine\ Emission\ Rate\ per\ Trip = (i)Time-in-mode \times (ii)Engine\ Load\ Factors \times (iii) Engine\ Power \times (iv) Emission\ Factor, where$

- (i) As indicated in the table of "Calculation of Time-In-Mode by Route", time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.
- (ii) Engine Load Factors are made reference to Table 4-7, Table 4-10 and Table 3-24 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).
- (iii) The engine powers are made reference to Table 4-5 and Table 4-6 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) - cargo junk of GRT 0-499 class and tug of GRT 0-499 (average of Grade II tug boat of locally licensed vessel).
- (iv) The emission factor is made reference to Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) Table 4-16. Under the Air Pollution Control (Fuel for Vessels) Regulation, all vessels assumed to use MGO due to requirement to fuel switch to compliant fuel (sulphur content <=0.5%) within Hong Kong waters.

Modelling Parameters

Group	Sailing Route	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
											(m)	(m)	(mpd)
											(g/s)	(g/s)	(g/s)
1	1	RT TH1 001	POINT	811581.2	825220.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	1	RT TH1 002	POINT	811554.0	825156.3	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	1	RT TH1 003	POINT	811526.8	825091.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	1	RT TH1 004	POINT	811499.6	825027.3	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	1	RT TH1 005	POINT	811645.7	825193.5	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	1	RT TH1 006	POINT	811700.5	825170.3	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	1	RT TH1 007	POINT	811673.3	825105.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	1	RT TH1 008	POINT	811646.1	825041.3	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	1	RT TH1 009	POINT	811618.9	824976.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
1	2	RT TH1 010	POINT	811995.1	825045.9	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
1	2	RT TH1 011	POINT	811968.0	824981.3	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
1	2	RT TH1 012	POINT	811940.9	824916.8	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
1	2	RT TH1 013	POINT	811913.8	824852.3	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
1	2	RT TH1 014	POINT	812059.7	825018.9	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
1	2	RT TH1 015	POINT	812115.1	824995.7	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
1	2	RT TH1 016	POINT	812087.8	824931.2	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
1	2	RT TH1 017	POINT	812060.6	824866.7	0	11	588	8	0.2	1.73E-02	6.93E-04	6.75E-04
1	3	RT TH1 018	POINT	812383.0	824806.9	0	11	588	8	0.2	3.46E-02	1.39E-03	1.35E-03
1	3	RT TH1 019	POINT	812410.2	824871.4	0	11	588	8	0.2	3.46E-02	1.39E-03	1.35E-03
1	3	RT TH1 020	POINT	812474.7	824844.2	0	11	588	8	0.2	3.46E-02	1.39E-03	1.35E-03
1	3	RT TH1 021	POINT	812529.8	824820.9	0	11	588	8	0.2	3.46E-02	1.39E-03	1.35E-03
2	1	RT TH2 001	POINTHOR	811581.2	825220.8	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	1	RT TH2 002	POINTHOR	811554.0	825156.3	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	1	RT TH2 003	POINTHOR	811526.8	825091.8	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	1	RT TH2 004	POINTHOR	811499.6	825027.3	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	1	RT TH2 005	POINTHOR	811645.7	825193.5	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	1	RT TH2 006	POINTHOR	811700.5	825170.3	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	1	RT TH2 007	POINTHOR	811673.3	825105.8	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	1	RT TH2 008	POINTHOR	811646.1	825041.3	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	1	RT TH2 009	POINTHOR	811618.9	824976.8	0	4	694.7	8	0.3	4.38E-03	1.75E-04	1.71E-04
2	2	RT TH2 010	POINTHOR	811995.1	825045.9	0	4	694.7	8	0.3	4.93E-03	1.97E-04	1.92E-04
2	2	RT TH2 011	POINTHOR	811968.0	824981.3	0	4	694.7	8	0.3	4.93E-03	1.97E-04	1.92E-04
2	2	RT TH2 012	POINTHOR	811940.9	824916.8	0	4	694.7	8	0.3	4.93E-03	1.97E-04	1.92E-04
2	2	RT TH2 013	POINTHOR	811913.8	824852.3	0	4	694.7	8	0.3	4.93E-03	1.97E-04	1.92E-04
2	2	RT TH2 014	POINTHOR	812059.7	825018.9	0	4	694.7	8	0.3	4.93E-03	1.97E-04	1.92E-04
2	2	RT TH2 015	POINTHOR	812115.1	824995.7	0	4	694.7	8	0.3	4.93E-03	1.97E-04	1.92E-04
2	2	RT TH2 016	POINTHOR	812087.8	824931.2	0	4	694.7	8	0.3	4.93E-03	1.97E-04	1.92E-04
2	2	RT TH2 017	POINTHOR	812060.6	824866.7	0	4	694.7	8	0.3	4.93E-03	1.97E-04	1.92E-04
2	3	RT TH2 018	POINTHOR	812383.0	824806.9	0	4	694.7	8	0.3	9.85E-03	3.94E-04	3.84E-04
2	3	RT TH2 019	POINTHOR	812410.2	824871.4	0	4	694.7	8	0.3	9.85E-03	3.94E-04	3.84E-04
2	3	RT TH2 020	POINTHOR	812474.7	824844.2	0	4	694.7	8	0.3	9.85E-03	3.94E-04	3.84E-04
2	3	RT TH2 021	POINTHOR	812529.8	824820.9	0	4	694.7	8	0.3	9.85E-03	3.94E-04	3.84E-04

Notes:
 [1] For reference of modelling parameter, please see "Modelling Parameters of Marine Vessel from Approved EIA Studies".

Calculation of Multiplying Factor for Total Vessel Count**Monthly Vessel Count for Year 2048**

Sailing Route	Monthly Vessel Count in Aug for Maneuvering ^[1]	Monthly Vessel Count in Aug for Hotelling ^[1]
Route 1	47	24
Route 2	40	20
Route 3	23	11

Notes:

[1] The marine traffic data for August is provided by Marine Traffic Consultant.

Monthly Multiplying Factor derived from Marine Traffic in Year 2019

Month	Total No. of Arrivals by RTVs ^[1]	Monthly Multiplying Factor
Jan-19	5,820	1.03
Feb-19	3,401	0.60
Mar-19	5,783	1.02
Apr-19	5,411	0.96
May-19	5,766	1.02
Jun-19	5,456	0.96
Jul-19	5,645	1.00
Aug-19	5,659	1.00
Sep-19	5,382	0.95
Oct-19	5,160	0.91
Nov-19	5,534	0.98
Dec-19	5,632	1.00

Notes:

[1] Since no monthly profile is available from Marine Traffic Consultant, the annual vessel count is calculated based on monthly profile in "Monthly Vessel Arrivals by Ocean/River and Cargo/Passenger Vessels" published by Marine Department (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_m_a1.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

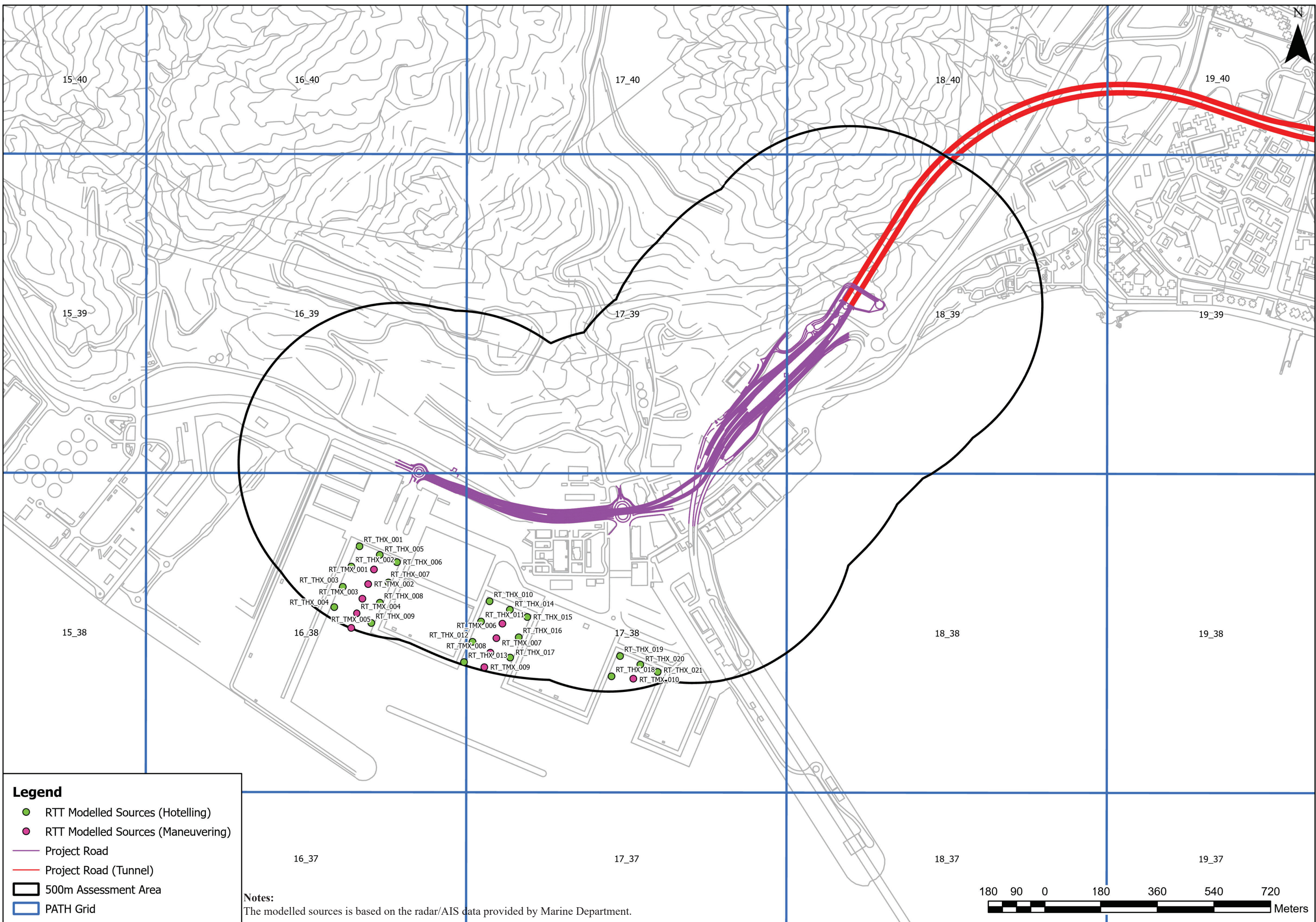
Hourly Multiplying Factor derived from Marine Traffic in August 2048

Hour		No. of Marine Vessels for Maneuvering of the Entire RTT ^[1]	Monthly-Hourly Multiplying Factor for Maneuvering ^[2]	No. of Marine Vessels for Hotelling for the Entire RTT ^[1]	Monthly-Hourly Multiplying Factor for Hotelling ^[2]
Start	End				
0	1	223	2.8%	112	2.8%
1	2	205	2.6%	102	2.6%
2	3	223	2.8%	112	2.8%
3	4	164	2.0%	82	2.0%
4	5	164	2.0%	82	2.0%
5	6	174	2.2%	87	2.2%
6	7	177	2.2%	88	2.2%
7	8	229	2.9%	115	2.9%
8	9	288	3.6%	144	3.6%
9	10	372	4.6%	186	4.6%
10	11	406	5.1%	203	5.1%
11	12	459	5.7%	229	5.7%
12	13	431	5.4%	215	5.4%
13	14	394	4.9%	197	4.9%
14	15	391	4.9%	195	4.9%
15	16	440	5.5%	220	5.5%
16	17	487	6.1%	243	6.1%
17	18	474	5.9%	237	5.9%
18	19	378	4.7%	189	4.7%
19	20	350	4.4%	175	4.4%
20	21	437	5.5%	219	5.5%
21	22	440	5.5%	220	5.5%
22	23	391	4.9%	195	4.9%
23	24	322	4.0%	161	4.0%

Notes:

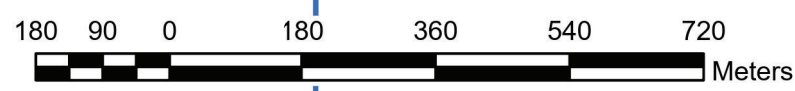
[1] The number of vessels refers to the number of vessels going in and out the entire RTT but not the assessed route of RTT. The number of hourly marine vessels for Aug 2048 is provided by Marine Traffic Consultant. It contains the total number of marine vessels going in and out RTT for the 31 days in Aug in Year 2048 for each hour. For example, from Hour 0 to Hour 1 (i.e. first hour of 1 Aug + first hour of 2 Aug, 1st hour of 31 Aug), there are total 223 marine vessels maneuvering and total 112 marine hotelling for the first hour during the whole August. Since there is no information, the hourly profile of river trade terminal is adopted for the small craft (tug and workboat).

[2] The hourly profile of the entire RTT is assumed to be the same for each route.



- Legend**
- RTT Modelled Sources (Hotelling)
 - RTT Modelled Sources (Maneuvering)
 - Project Road
 - Project Road (Tunnel)
 - 500m Assessment Area
 - PATH Grid

Notes:
 The modelled sources is based on the radar/AIS data provided by Marine Department.



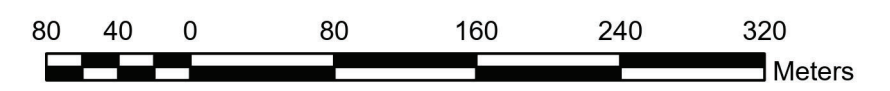
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Legend

- RTT Modelled Sources (Hotelling)
- RTT Modelled Sources (Maneuvering)
- Project Road
- Project Raod (Tunnel)
- 500m Assessment Area
- PATH Grid

Notes:
The modelled sources is based on the radar/AIS data provided by Marine Department.

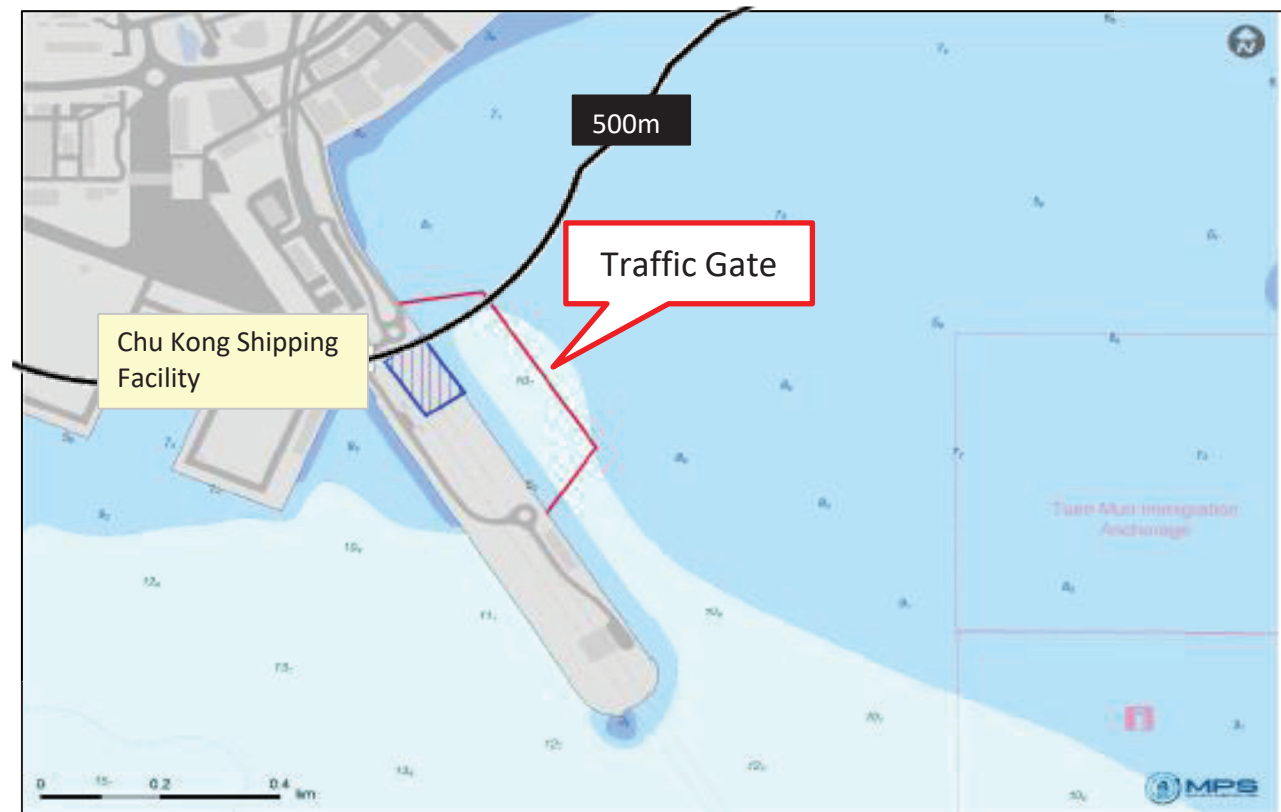


Appendix 3.10b

Contours of Cumulative 19th highest 24-hour
FSP Concentration at 1.5m above Ground
(Year 2048) in Pillar Point

Marine Traffic Information

Assessment Year 2048
Assessed Vessel Type River Trade Vessels
Location Chu Kong Shipping Facility



Marine Traffic Information from Marine Traffic Consultants

Location	Monthly Vessel Count in Aug for Maneuvering ^[1]	Travelling Speed (knots) ^[2]	Length of Sailing Route within Assessment Area(m) ^[3]
Chu Kong Shipping Facility	2,212	3	1,000

Notes

- [1] Monthly vessel count for maneuvering is advised by Marine Traffic Consultant and accepted by Marine Department.
- [2] Average speed of 3 knot is provided by Marine Traffic Consultant. The hotelling location is beyond 500m Assessment area and not included in the assessment.
- [3] Possible maximum length of sailing route within assessment area is estimated for conservative assessment.
- [4] As advised by Marine Traffic Consultant, the RTVs include container vessel, local lighter/barge/cargo junk, local bunker vessel, and tug and tow.

Marine Emission Inventory during Maneuvering**Total Emission Rate**

Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]			Annual No. of Vessel Arrivals in Year 2019 ^[3]	Composite Emission Rate per Trip (g/s) ^[4]		
		NO _x	RSP	FSP		NO _x	RSP	FSP
1	Fully Cellular Container Vessel	8.93E-02	2.86E-03	2.77E-03	34718	8.78E-02	2.82E-03	2.73E-03
	Semi-container Vessel	8.25E-02	2.66E-03	2.58E-03	9943			
2	Conventional Cargo Vessel	8.22E-02	2.65E-03	2.57E-03	-	8.22E-02	9.61E-03	9.34E-03
3	Dry Bulk Carrier	8.62E-02	2.77E-03	2.68E-03	-	8.62E-02	2.77E-03	2.68E-03
4	Tug	2.75E-01	1.47E-02	1.43E-02	-	2.75E-01	1.47E-02	1.43E-02
5	Chemical Carrier	2.18E-01	9.56E-03	9.29E-03	247	2.20E-01	9.62E-03	9.35E-03
	Gas Carrier	2.21E-01	9.65E-03	9.37E-03	134			
	Oil Tanker	2.21E-01	9.65E-03	9.37E-03	419			
6	Mechanised Lighter/Barge/Cargo Junk	9.75E-02	3.18E-03	3.08E-03	-	9.75E-02	3.18E-03	3.08E-03

Engine in Operation

Engine	On (1) or Off (0) ^[2]
ME	1
AE	1

Notes:

[1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.

[2] Main and auxiliary engine are assumed in operation during maneuvering for conservative assessment with reference to Table 3-25 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012). The emission rate per trip considers the emission from the engine in operation as indicated in the table "Engine in Operation", and the calculation is documented in the "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD.

[3] Marine Traffic Consultant has provided the total number of RTVs but without breakdown into different vessel types. Hence, reference has been made to Marine Department's Vessels Arrivals by Ship Type and Ocean/River (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_y_a2.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

[4] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.

Engine Emission Rate per Trip = (i)Time-in-mode x (ii)Engine Load Factors x (iii) Engine Power x (iv) Emission Factor, where

(i) Time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.

(ii) Engine Load Factors are made reference to Table 4-7, Table 4-10 and Table 3-24 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).

(iii) The average engine powers are made reference to Table 4-5 and Table 4-6 of the Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).

(iv) The emission factor is made reference to Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) Table 4-16. Under the Air Pollution Control (Fuel for Vessels) Regulation, all vessels assumed to use MGO due to requirement to fuel switch to compliant fuel (sulphur content <=0.5%) within Hong Kong waters.

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
				(g/s)	(g/s)	(g/s)							
Chu Kong Shipping Facility	1	CK_RM1_001	POINT	812875.6	824841.3	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_002	POINT	812854.5	824886.7	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_003	POINT	812833.4	824932	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_004	POINT	812812.4	824977.4	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_005	POINT	812795	825024.2	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_006	POINT	812778.3	825071.3	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_007	POINT	812761.5	825118.5	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_008	POINT	812744.8	825165.6	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_009	POINT	812731	825204.5	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_010	POINT	812979.4	824910.6	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_011	POINT	813008.7	824951.1	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_012	POINT	813036.3	824992.6	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_013	POINT	813056.4	825038.3	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_014	POINT	813076.5	825084.1	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_015	POINT	813096.6	825129.9	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_016	POINT	813113.5	825176.8	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_017	POINT	813128	825224.6	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_018	POINT	813148.3	825270.3	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_019	POINT	813172.9	825313.6	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_020	POINT	813201.6	825354.6	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_021	POINT	813237.5	825389.2	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_022	POINT	813274.2	825423.2	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_023	POINT	813310.8	825457.2	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_024	POINT	813357.1	825473.9	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_025	POINT	813405.3	825487.1	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_026	POINT	813453.5	825500.3	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_027	POINT	813479.2	825507.3	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_028	POINT	812905.2	824857.8	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_029	POINT	812912.2	824907.3	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_030	POINT	812919.2	824956.8	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_031	POINT	812924.8	825006.4	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_032	POINT	812927.5	825056.4	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_033	POINT	812930.1	825106.3	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_034	POINT	812932.8	825156.2	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_035	POINT	812935.4	825206.1	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_036	POINT	812938.1	825256.1	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_037	POINT	812940.7	825306	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_038	POINT	812943.4	825355.9	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	1	CK_RM1_039	POINT	812945.2	825389.4	0	34.2	537	24.6	1.9	2.25E-03	7.22E-05	7.00E-05
Chu Kong Shipping Facility	2	CK_RM2_001	POINT	812875.6	824841.3	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_002	POINT	812854.5	824886.7	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_003	POINT	812833.4	824932	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_004	POINT	812812.4	824977.4	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_005	POINT	812795	825024.2	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_006	POINT	812778.3	825071.3	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_007	POINT	812761.5	825118.5	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_008	POINT	812744.8	825165.6	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_009	POINT	812731	825204.5	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_010	POINT	812979.4	824910.6	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
											(g/s)	(g/s)	(g/s)
Chu Kong Shipping Facility	2	CK_RM2_011	POINT	813008.7	824951.1	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_012	POINT	813036.3	824992.6	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_013	POINT	813056.4	825038.3	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_014	POINT	813076.5	825084.1	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_015	POINT	813096.6	825129.9	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_016	POINT	813113.5	825176.8	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_017	POINT	813128	825224.6	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_018	POINT	813148.3	825270.3	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_019	POINT	813172.9	825313.6	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_020	POINT	813201.6	825354.6	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_021	POINT	813237.5	825389.2	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_022	POINT	813274.2	825423.2	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_023	POINT	813310.8	825457.2	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_024	POINT	813357.1	825473.9	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_025	POINT	813405.3	825487.1	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_026	POINT	813453.5	825500.3	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_027	POINT	813479.2	825507.3	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_028	POINT	812905.2	824857.8	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_029	POINT	812912.2	824907.3	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_030	POINT	812919.2	824956.8	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_031	POINT	812924.8	825006.4	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_032	POINT	812927.5	825056.4	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_033	POINT	812930.1	825106.3	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_034	POINT	812932.8	825156.2	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_035	POINT	812935.4	825206.1	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_036	POINT	812938.1	825256.1	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_037	POINT	812940.7	825306	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_038	POINT	812943.4	825355.9	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	2	CK_RM2_039	POINT	812945.2	825389.4	0	11	555	25	0.8	2.11E-03	2.46E-04	2.39E-04
Chu Kong Shipping Facility	3	CK_RM3_001	POINT	812875.6	824841.3	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_002	POINT	812854.5	824886.7	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_003	POINT	812833.4	824932	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_004	POINT	812812.4	824977.4	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_005	POINT	812795	825024.2	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_006	POINT	812778.3	825071.3	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_007	POINT	812761.5	825118.5	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_008	POINT	812744.8	825165.6	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_009	POINT	812731	825204.5	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_010	POINT	812979.4	824910.6	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_011	POINT	813008.7	824951.1	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_012	POINT	813036.3	824992.6	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_013	POINT	813056.4	825038.3	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_014	POINT	813076.5	825084.1	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_015	POINT	813096.6	825129.9	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_016	POINT	813113.5	825176.8	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_017	POINT	813128	825224.6	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_018	POINT	813148.3	825270.3	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_019	POINT	813172.9	825313.6	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_020	POINT	813201.6	825354.6	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
				(g/s)	(g/s)	(g/s)							
Chu Kong Shipping Facility	3	CK_RM3_021	POINT	813237.5	825389.2	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_022	POINT	813274.2	825423.2	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_023	POINT	813310.8	825457.2	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_024	POINT	813357.1	825473.9	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_025	POINT	813405.3	825487.1	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_026	POINT	813453.5	825500.3	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_027	POINT	813479.2	825507.3	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_028	POINT	812905.2	824857.8	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_029	POINT	812912.2	824907.3	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_030	POINT	812919.2	824956.8	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_031	POINT	812924.8	825006.4	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_032	POINT	812927.5	825056.4	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_033	POINT	812930.1	825106.3	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_034	POINT	812932.8	825156.2	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_035	POINT	812935.4	825206.1	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_036	POINT	812938.1	825256.1	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_037	POINT	812940.7	825306	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_038	POINT	812943.4	825355.9	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	3	CK_RM3_039	POINT	812945.2	825389.4	0	8	555	25	0.8	2.21E-03	7.10E-05	6.88E-05
Chu Kong Shipping Facility	4	CK_RM4_001	POINTHOR	812875.6	824841.3	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_002	POINTHOR	812854.5	824886.7	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_003	POINTHOR	812833.4	824932	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_004	POINTHOR	812812.4	824977.4	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_005	POINTHOR	812795	825024.2	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_006	POINTHOR	812778.3	825071.3	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_007	POINTHOR	812761.5	825118.5	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_008	POINTHOR	812744.8	825165.6	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_009	POINTHOR	812731	825204.5	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_010	POINTHOR	812979.4	824910.6	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_011	POINTHOR	813008.7	824951.1	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_012	POINTHOR	813036.3	824992.6	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_013	POINTHOR	813056.4	825038.3	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_014	POINTHOR	813076.5	825084.1	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_015	POINTHOR	813096.6	825129.9	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_016	POINTHOR	813113.5	825176.8	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_017	POINTHOR	813128	825224.6	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_018	POINTHOR	813148.3	825270.3	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_019	POINTHOR	813172.9	825313.6	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_020	POINTHOR	813201.6	825354.6	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_021	POINTHOR	813237.5	825389.2	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_022	POINTHOR	813274.2	825423.2	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_023	POINTHOR	813310.8	825457.2	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_024	POINTHOR	813357.1	825473.9	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_025	POINTHOR	813405.3	825487.1	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_026	POINTHOR	813453.5	825500.3	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_027	POINTHOR	813479.2	825507.3	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_028	POINTHOR	812905.2	824857.8	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_029	POINTHOR	812912.2	824907.3	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_030	POINTHOR	812919.2	824956.8	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
				(g/s)	(g/s)	(g/s)							
Chu Kong Shipping Facility	4	CK_RM4_031	POINTHOR	812924.8	825006.4	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_032	POINTHOR	812927.5	825056.4	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_033	POINTHOR	812930.1	825106.3	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_034	POINTHOR	812932.8	825156.2	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_035	POINTHOR	812935.4	825206.1	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_036	POINTHOR	812938.1	825256.1	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_037	POINTHOR	812940.7	825306	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_038	POINTHOR	812943.4	825355.9	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	4	CK_RM4_039	POINTHOR	812945.2	825389.4	0	4	694.7	8	0.2	7.06E-03	3.77E-04	3.66E-04
Chu Kong Shipping Facility	5	CK_RM5_001	POINT	812875.6	824841.3	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_002	POINT	812854.5	824886.7	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_003	POINT	812833.4	824932	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_004	POINT	812812.4	824977.4	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_005	POINT	812795	825024.2	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_006	POINT	812778.3	825071.3	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_007	POINT	812761.5	825118.5	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_008	POINT	812744.8	825165.6	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_009	POINT	812731	825204.5	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_010	POINT	812979.4	824910.6	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_011	POINT	813008.7	824951.1	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_012	POINT	813036.3	824992.6	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_013	POINT	813056.4	825038.3	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_014	POINT	813076.5	825084.1	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_015	POINT	813096.6	825129.9	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_016	POINT	813113.5	825176.8	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_017	POINT	813128	825224.6	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_018	POINT	813148.3	825270.3	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_019	POINT	813172.9	825313.6	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_020	POINT	813201.6	825354.6	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_021	POINT	813237.5	825389.2	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_022	POINT	813274.2	825423.2	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_023	POINT	813310.8	825457.2	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_024	POINT	813357.1	825473.9	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_025	POINT	813405.3	825487.1	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_026	POINT	813453.5	825500.3	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_027	POINT	813479.2	825507.3	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_028	POINT	812905.2	824857.8	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_029	POINT	812912.2	824907.3	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_030	POINT	812919.2	824956.8	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_031	POINT	812924.8	825006.4	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_032	POINT	812927.5	825056.4	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_033	POINT	812930.1	825106.3	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_034	POINT	812932.8	825156.2	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_035	POINT	812935.4	825206.1	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_036	POINT	812938.1	825256.1	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_037	POINT	812940.7	825306	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_038	POINT	812943.4	825355.9	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	5	CK_RM5_039	POINT	812945.2	825389.4	0	20	555	25	0.8	5.65E-03	2.47E-04	2.40E-04
Chu Kong Shipping Facility	6	CK_RM6_001	POINT	812875.6	824841.3	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx (g/s)	RSP (g/s)	FSP (g/s)
Chu Kong Shipping Facility	6	CK_RM6_002	POINT	812854.5	824886.7	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_003	POINT	812833.4	824932	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_004	POINT	812812.4	824977.4	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_005	POINT	812795	825024.2	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_006	POINT	812778.3	825071.3	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_007	POINT	812761.5	825118.5	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_008	POINT	812744.8	825165.6	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_009	POINT	812731	825204.5	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_010	POINT	812979.4	824910.6	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_011	POINT	813008.7	824951.1	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_012	POINT	813036.3	824992.6	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_013	POINT	813056.4	825038.3	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_014	POINT	813076.5	825084.1	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_015	POINT	813096.6	825129.9	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_016	POINT	813113.5	825176.8	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_017	POINT	813128	825224.6	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_018	POINT	813148.3	825270.3	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_019	POINT	813172.9	825313.6	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_020	POINT	813201.6	825354.6	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_021	POINT	813237.5	825389.2	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_022	POINT	813274.2	825423.2	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_023	POINT	813310.8	825457.2	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_024	POINT	813357.1	825473.9	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_025	POINT	813405.3	825487.1	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_026	POINT	813453.5	825500.3	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_027	POINT	813479.2	825507.3	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_028	POINT	812905.2	824857.8	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_029	POINT	812912.2	824907.3	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_030	POINT	812919.2	824956.8	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_031	POINT	812924.8	825006.4	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_032	POINT	812927.5	825056.4	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_033	POINT	812930.1	825106.3	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_034	POINT	812932.8	825156.2	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_035	POINT	812935.4	825206.1	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_036	POINT	812938.1	825256.1	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_037	POINT	812940.7	825306	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_038	POINT	812943.4	825355.9	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05
Chu Kong Shipping Facility	6	CK_RM6_039	POINT	812945.2	825389.4	0	11	588	8	0.2	2.50E-03	8.14E-05	7.89E-05

Notes:

[1] Modelling parameters are referred to "Generating an Hour-By-Hour Model-Ready Marine Emission Inventory, RWDI Air Inc. and Environment Canada, US EPA 17th International Emission Inventory Conference, 2-5 June 2008, Portland, Oregon", approved EIA of Tuen Mun South Extension (AERIAR-236/2022), and approved EIA of Lei Yue Mun Waterfront Enhancement Project (AERIAR-219/2018).

Calculation of Multiplying Factor for Total Vessel Count**Monthly Vessel Count for Year 2048**

Location	Monthly Vessel Count in Aug for Maneuvering ^[1]
Chu Kong Shipping Facility	2,212

Notes:

[1] The marine traffic data for August is provided by Marine Traffic Consultant.

Monthly Multiplying Factor derived from Marine Traffic in Year 2019

Month	Total No. of Arrivals by RTVs ^[1]	Monthly Multiplying Factor
Jan-19	5,820	1.03
Feb-19	3,401	0.60
Mar-19	5,783	1.02
Apr-19	5,411	0.96
May-19	5,766	1.02
Jun-19	5,456	0.96
Jul-19	5,645	1.00
Aug-19	5,659	1.00
Sep-19	5,382	0.95
Oct-19	5,160	0.91
Nov-19	5,534	0.98
Dec-19	5,632	1.00

Notes:

[1] Since no monthly profile is available from Marine Traffic Consultant, the annual vessel count is calculated based on monthly profile in "Monthly Vessel Arrivals by Ocean/River and Cargo/Passenger Vessels" published by Marine Department (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_m_a1.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

Hourly Multiplying Factor derived from Marine Traffic in August 2048

Hour		Chu Kong Shipping Facility	
Start	End	No. of Marine Vessels for Maneuvering ^[1]	Monthly-Hourly Multiplying Factor
0	1	93	4.2%
1	2	124	5.6%
2	3	90	4.1%
3	4	81	3.7%
4	5	93	4.2%
5	6	68	3.1%
6	7	90	4.1%
7	8	31	1.4%
8	9	47	2.1%
9	10	68	3.1%
10	11	84	3.8%
11	12	81	3.7%
12	13	65	2.9%
13	14	96	4.3%
14	15	93	4.2%
15	16	115	5.2%
16	17	78	3.5%
17	18	112	5.1%
18	19	105	4.7%
19	20	136	6.1%
20	21	130	5.9%
21	22	149	6.7%
22	23	115	5.2%
23	24	68	3.1%

Notes:

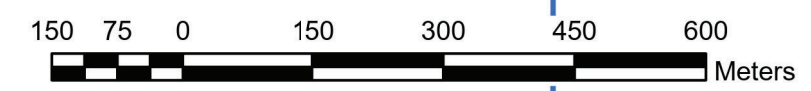
[1] The number of hourly marine vessels for Aug 2048 is provided by Marine Traffic Consultant. It contains the total number of marine vessels for the 31 days in Aug in Year 2048 for each hour. For example, from Hour 0 to Hour 1 (i.e. first hour of 1 Aug + first hour of 2 Aug, 1st hour of 31 Aug), there are total 93 marine vessels maneuvering for the first hour during the whole August.

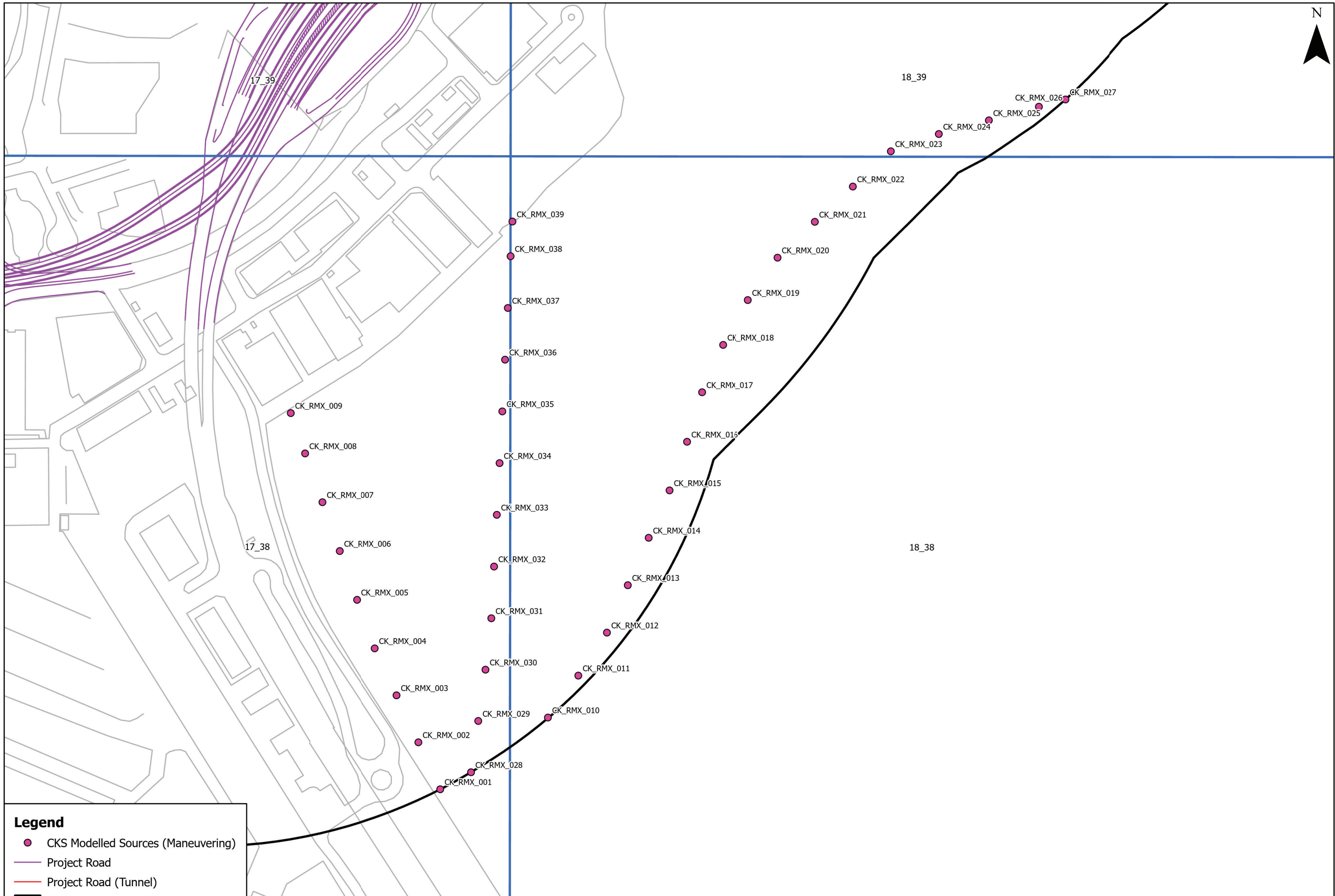


Legend

- CKS Modelled Sources (Maneuvering)
- Project Road
- Project Road (Tunnel)
- 500m Assessment Area
- PATH Grid

Notes:
 The modelled sources is based on the radar/AIS data provided by Marine Department.





Legend

- CKS Modelled Sources (Maneuvering)
- Project Road
- Project Road (Tunnel)
- ▭ 500m Assessment Area
- ▭ PATH Grid

Notes:
The modelled sources is based on the radar/AIS data provided by Marine Department.

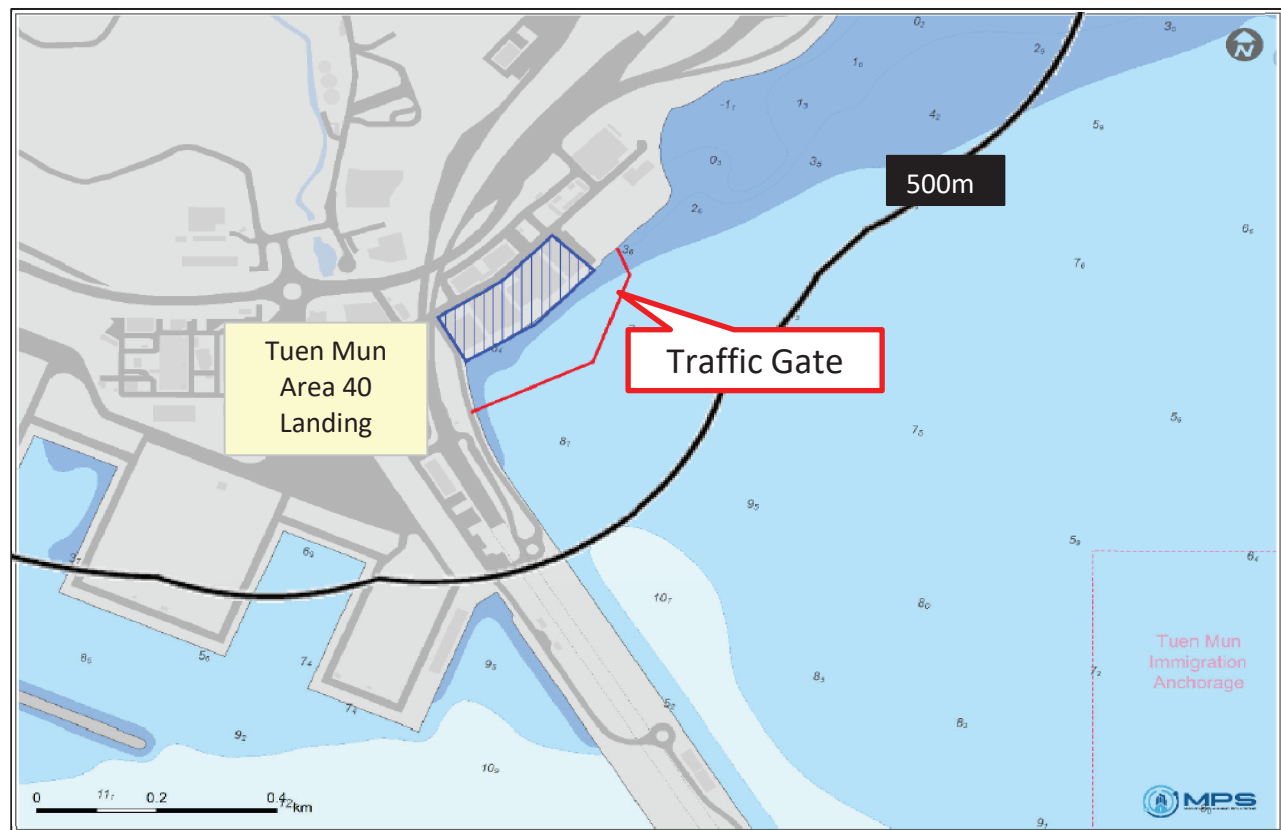


Appendix 3.10c

Contours of Cumulative 19th highest 24-hour FSP Concentration at 1.5m above Ground (Year 2048) in Sam Shing

Marine Traffic Information

Assessment Year 2048
Assessed Vessel Type River Trade Vessels
Location Tuen Mun Area 40 Landing



Marine Traffic Information from Marine Traffic Consultants

Location	Monthly Vessel Count for Maneuvering ^[1]	Monthly Vessel Count for Hotelling ^[1]	Travelling Speed (knots) ^[2]	Length of Sailing Route within Assessment Area (m) ^[3]	Hotelling Time (hours) ^[2]
Tuen Mun Area 40 Landing	1,259	630	2	800	4

Notes

- [1] Monthly vessel count for maneuvering is provided Marine Traffic Consultant and accepted by Marine Department, and that for hotelling is half of the number for maneuvering.
- [2] Average speed of 2 knots and average hotelling time of 4 hours are provided by Marine Traffic Consultant.
- [3] Possible maximum length of sailing route within assessment area is estimated for conservative assessment.
- [4] As advised by Marine Traffic Consultant, the RTVs at Landing Area 40 include local lighter/barge/cargo junk, local bunker vessel, and tug and tow.

Marine Emission Inventory during Maneuvering**Total Emission Rate**

Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]			Annual No. of Vessel Arrivals in Year 2019 ^[3]	Composite Emission Rate per Trip (g/s) ^[4]		
		NO _x	RSP	FSP		NO _x	RSP	FSP
1	Conventional Cargo Vessel	9.86E-02	3.18E-03	3.08E-03	-	9.86E-02	3.18E-03	3.08E-03
2	Dry Bulk Carrier	1.03E-01	3.32E-03	3.22E-03	-	1.03E-01	3.32E-03	3.22E-03
3	Tug	3.30E-01	1.76E-02	1.71E-02	-	3.30E-01	1.76E-02	1.71E-02
4	Chemical Carrier	2.62E-01	1.15E-02	1.11E-02	247	2.64E-01	1.15E-02	1.12E-02
	Gas Carrier	2.65E-01	1.16E-02	1.12E-02	134			
	Oil Tanker	2.65E-01	1.16E-02	1.12E-02	419			
5	Mechanised Lighter/Barge/Cargo Junk	1.17E-01	3.81E-03	3.69E-03	-	1.17E-01	3.81E-03	3.69E-03

Engine in Operation

Engine	On (1) or Off (0) ^[2]
ME	1
AE	1

Notes:

[1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.

[2] Main and auxiliary engine are assumed in operation during maneuvering for conservative assessment with reference to Table 3-25 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012). The emission rate per trip considers the emission from the engine in operation as indicated in the table "Engine in Operation", and the calculation is documented in the "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD.

[3] Marine Traffic Consultant has provided the total number of RTVs but without breakdown into different vessel types. Hence, reference has been made to Marine Department's Vessels Arrivals by Ship Type and Ocean/River (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_y_a2.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

[4] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.

Engine Emission Rate per Trip = (i)Time-in-mode x (ii)Engine Load Factors x (iii) Engine Power x (iv) Emission Factor, where

(i) Time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.

(ii) Engine Load Factors are made reference to Table 4-7, Table 4-10 and Table 3-24 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).

(iii) The average engine powers are made reference to Table 4-5 and Table 4-6 of the Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).

(iv) The emission factor is made reference to Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) Table 4-16. Under the Air Pollution Control (Fuel for Vessels) Regulation, all vessels assumed to use MGO due to requirement to fuel switch to compliant fuel (sulphur content ≤0.5%) within Hong Kong waters.

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
				(g/s)	(g/s)	(g/s)							
Tuen Mun Area 40 Landing	1	LA_RM1_001	POINT	812742.6	825145.3	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_002	POINT	812765.9	825101.5	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_003	POINT	812784.5	825055.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_004	POINT	812803.2	825008.7	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_005	POINT	812821.8	824962.3	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_006	POINT	812840.4	824915.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_007	POINT	812859.1	824869.5	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_008	POINT	812980.3	825343.0	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_009	POINT	813028.6	825330.0	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_010	POINT	813070.1	825345.4	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_011	POINT	813107.5	825378.6	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_012	POINT	813144.8	825411.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_013	POINT	813182.2	825445.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_014	POINT	813219.5	825478.3	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_015	POINT	813263.6	825488.6	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_016	POINT	813313.0	825480.7	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_017	POINT	813362.4	825472.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_018	POINT	813411.7	825465.0	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_019	POINT	812871.5	825234.7	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_020	POINT	812914.0	825208.4	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_021	POINT	812956.6	825182.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_022	POINT	813000.9	825161.0	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_023	POINT	813050.6	825155.6	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_024	POINT	813100.3	825150.2	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_025	POINT	812806.7	825182.0	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_026	POINT	812840.3	825145.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_027	POINT	812874.0	825108.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_028	POINT	812907.7	825071.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_029	POINT	812941.3	825034.2	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_030	POINT	812975.0	824997.2	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_031	POINT	813008.7	824960.2	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_032	POINT	812839.5	825210.7	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_033	POINT	812878.5	825179.5	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_034	POINT	812917.6	825148.2	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_035	POINT	812956.6	825116.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_036	POINT	812997.9	825088.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_037	POINT	813039.8	825061.6	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_038	POINT	812773.0	825164.0	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_039	POINT	812801.2	825122.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_040	POINT	812827.0	825080.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_041	POINT	812852.9	825037.3	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_042	POINT	812878.7	824994.5	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_043	POINT	812904.5	824951.7	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_044	POINT	812930.4	824908.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_045	POINT	812902.8	825264.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_046	POINT	812948.6	825244.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_047	POINT	812994.5	825224.2	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_048	POINT	813040.7	825208.6	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_049	POINT	813089.3	825220.4	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
											(g/s)	(g/s)	(g/s)
Tuen Mun Area 40 Landing	1	LA_RM1_050	POINT	813137.8	825232.4	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_051	POINT	813186.2	825245.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_052	POINT	812925.3	825289.7	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_053	POINT	812972.5	825273.4	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_054	POINT	813019.8	825257.2	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_055	POINT	813067.2	825256.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_056	POINT	813114.6	825272.8	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_057	POINT	813162.0	825288.6	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_058	POINT	813209.4	825304.5	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_059	POINT	813248.7	825335.0	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_060	POINT	813287.6	825366.3	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_061	POINT	813329.5	825393.5	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_062	POINT	812955.2	825318.7	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_063	POINT	813003.6	825305.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_064	POINT	813051.6	825296.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_065	POINT	813095.5	825319.9	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_066	POINT	813139.4	825343.8	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_067	POINT	813183.4	825367.7	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_068	POINT	813223.0	825398.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_069	POINT	813264.8	825423.0	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_070	POINT	813314.6	825427.5	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	1	LA_RM1_071	POINT	813364.4	825432.1	0	11	555	25	0.8	1.39E-03	4.48E-05	4.34E-05
Tuen Mun Area 40 Landing	2	LA_RM2_001	POINT	812742.6	825145.3	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_002	POINT	812765.9	825101.5	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_003	POINT	812784.5	825055.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_004	POINT	812803.2	825008.7	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_005	POINT	812821.8	824962.3	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_006	POINT	812840.4	824915.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_007	POINT	812859.1	824869.5	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_008	POINT	812980.3	825343	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_009	POINT	813028.6	825330	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_010	POINT	813070.1	825345.4	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_011	POINT	813107.5	825378.6	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_012	POINT	813144.8	825411.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_013	POINT	813182.2	825445.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_014	POINT	813219.5	825478.3	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_015	POINT	813263.6	825488.6	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_016	POINT	813313	825480.7	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_017	POINT	813362.4	825472.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_018	POINT	813411.7	825465	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_019	POINT	812871.5	825234.7	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_020	POINT	812914	825208.4	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_021	POINT	812956.6	825182.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_022	POINT	813000.9	825161	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_023	POINT	813050.6	825155.6	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_024	POINT	813100.3	825150.2	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_025	POINT	812806.7	825182	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_026	POINT	812840.3	825145.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_027	POINT	812874	825108.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
				(g/s)	(g/s)	(g/s)							
Tuen Mun Area 40 Landing	2	LA_RM2_028	POINT	812907.7	825071.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_029	POINT	812941.3	825034.2	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_030	POINT	812975	824997.2	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_031	POINT	813008.7	824960.2	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_032	POINT	812839.5	825210.7	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_033	POINT	812878.5	825179.5	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_034	POINT	812917.6	825148.2	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_035	POINT	812956.6	825116.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_036	POINT	812997.9	825088.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_037	POINT	813039.8	825061.6	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_038	POINT	812773	825164	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_039	POINT	812801.2	825122.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_040	POINT	812827	825080.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_041	POINT	812852.9	825037.3	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_042	POINT	812878.7	824994.5	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_043	POINT	812904.5	824951.7	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_044	POINT	812930.4	824908.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_045	POINT	812902.8	825264.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_046	POINT	812948.6	825244.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_047	POINT	812994.5	825224.2	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_048	POINT	813040.7	825208.6	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_049	POINT	813089.3	825220.4	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_050	POINT	813137.8	825232.4	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_051	POINT	813186.2	825245.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_052	POINT	812925.3	825289.7	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_053	POINT	812972.5	825273.4	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_054	POINT	813019.8	825257.2	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_055	POINT	813067.2	825256.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_056	POINT	813114.6	825272.8	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_057	POINT	813162	825288.6	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_058	POINT	813209.4	825304.5	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_059	POINT	813248.7	825335	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_060	POINT	813287.6	825366.3	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_061	POINT	813329.5	825393.5	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_062	POINT	812955.2	825318.7	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_063	POINT	813003.6	825305.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_064	POINT	813051.6	825296.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_065	POINT	813095.5	825319.9	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_066	POINT	813139.4	825343.8	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_067	POINT	813183.4	825367.7	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_068	POINT	813223	825398.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_069	POINT	813264.8	825423	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_070	POINT	813314.6	825427.5	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	2	LA_RM2_071	POINT	813364.4	825432.1	0	8	555	25	0.8	1.46E-03	4.68E-05	4.53E-05
Tuen Mun Area 40 Landing	3	LA_RM3_001	POINTHOR	812742.6	825145.3	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_002	POINTHOR	812765.9	825101.5	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_003	POINTHOR	812784.5	825055.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_004	POINTHOR	812803.2	825008.7	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_005	POINTHOR	812821.8	824962.3	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
											(g/s)	(g/s)	(g/s)
Tuen Mun Area 40 Landing	3	LA_RM3_006	POINTHOR	812840.4	824915.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_007	POINTHOR	812859.1	824869.5	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_008	POINTHOR	812980.3	825343	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_009	POINTHOR	813028.6	825330	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_010	POINTHOR	813070.1	825345.4	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_011	POINTHOR	813107.5	825378.6	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_012	POINTHOR	813144.8	825411.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_013	POINTHOR	813182.2	825445.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_014	POINTHOR	813219.5	825478.3	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_015	POINTHOR	813263.6	825488.6	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_016	POINTHOR	813313	825480.7	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_017	POINTHOR	813362.4	825472.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_018	POINTHOR	813411.7	825465	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_019	POINTHOR	812871.5	825234.7	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_020	POINTHOR	812914	825208.4	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_021	POINTHOR	812956.6	825182.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_022	POINTHOR	813000.9	825161	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_023	POINTHOR	813050.6	825155.6	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_024	POINTHOR	813100.3	825150.2	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_025	POINTHOR	812806.7	825182	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_026	POINTHOR	812840.3	825145.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_027	POINTHOR	812874	825108.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_028	POINTHOR	812907.7	825071.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_029	POINTHOR	812941.3	825034.2	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_030	POINTHOR	812975	824997.2	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_031	POINTHOR	813008.7	824960.2	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_032	POINTHOR	812839.5	825210.7	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_033	POINTHOR	812878.5	825179.5	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_034	POINTHOR	812917.6	825148.2	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_035	POINTHOR	812956.6	825116.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_036	POINTHOR	812997.9	825088.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_037	POINTHOR	813039.8	825061.6	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_038	POINTHOR	812773	825164	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_039	POINTHOR	812801.2	825122.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_040	POINTHOR	812827	825080.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_041	POINTHOR	812852.9	825037.3	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_042	POINTHOR	812878.7	824994.5	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_043	POINTHOR	812904.5	824951.7	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_044	POINTHOR	812930.4	824908.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_045	POINTHOR	812902.8	825264.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_046	POINTHOR	812948.6	825244.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_047	POINTHOR	812994.5	825224.2	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_048	POINTHOR	813040.7	825208.6	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_049	POINTHOR	813089.3	825220.4	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_050	POINTHOR	813137.8	825232.4	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_051	POINTHOR	813186.2	825245.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_052	POINTHOR	812925.3	825289.7	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_053	POINTHOR	812972.5	825273.4	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_054	POINTHOR	813019.8	825257.2	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
											(g/s)	(g/s)	(g/s)
Tuen Mun Area 40 Landing	3	LA_RM3_055	POINTHOR	813067.2	825256.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_056	POINTHOR	813114.6	825272.8	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_057	POINTHOR	813162	825288.6	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_058	POINTHOR	813209.4	825304.5	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_059	POINTHOR	813248.7	825335	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_060	POINTHOR	813287.6	825366.3	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_061	POINTHOR	813329.5	825393.5	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_062	POINTHOR	812955.2	825318.7	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_063	POINTHOR	813003.6	825305.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_064	POINTHOR	813051.6	825296.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_065	POINTHOR	813095.5	825319.9	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_066	POINTHOR	813139.4	825343.8	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_067	POINTHOR	813183.4	825367.7	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_068	POINTHOR	813223	825398.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_069	POINTHOR	813264.8	825423	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_070	POINTHOR	813314.6	825427.5	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	3	LA_RM3_071	POINTHOR	813364.4	825432.1	0	4	694.7	8	0.2	4.65E-03	2.48E-04	2.41E-04
Tuen Mun Area 40 Landing	4	LA_RM4_001	POINT	812742.6	825145.3	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_002	POINT	812765.9	825101.5	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_003	POINT	812784.5	825055.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_004	POINT	812803.2	825008.7	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_005	POINT	812821.8	824962.3	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_006	POINT	812840.4	824915.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_007	POINT	812859.1	824869.5	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_008	POINT	812980.3	825343	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_009	POINT	813028.6	825330	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_010	POINT	813070.1	825345.4	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_011	POINT	813107.5	825378.6	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_012	POINT	813144.8	825411.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_013	POINT	813182.2	825445.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_014	POINT	813219.5	825478.3	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_015	POINT	813263.6	825488.6	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_016	POINT	813313	825480.7	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_017	POINT	813362.4	825472.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_018	POINT	813411.7	825465	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_019	POINT	812871.5	825234.7	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_020	POINT	812914	825208.4	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_021	POINT	812956.6	825182.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_022	POINT	813000.9	825161	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_023	POINT	813050.6	825155.6	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_024	POINT	813100.3	825150.2	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_025	POINT	812806.7	825182	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_026	POINT	812840.3	825145.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_027	POINT	812874	825108.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_028	POINT	812907.7	825071.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_029	POINT	812941.3	825034.2	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_030	POINT	812975	824997.2	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_031	POINT	813008.7	824960.2	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_032	POINT	812839.5	825210.7	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
				(g/s)	(g/s)	(g/s)							
Tuen Mun Area 40 Landing	4	LA_RM4_033	POINT	812878.5	825179.5	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_034	POINT	812917.6	825148.2	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_035	POINT	812956.6	825116.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_036	POINT	812997.9	825088.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_037	POINT	813039.8	825061.6	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_038	POINT	812773	825164	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_039	POINT	812801.2	825122.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_040	POINT	812827	825080.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_041	POINT	812852.9	825037.3	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_042	POINT	812878.7	824994.5	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_043	POINT	812904.5	824951.7	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_044	POINT	812930.4	824908.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_045	POINT	812902.8	825264.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_046	POINT	812948.6	825244.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_047	POINT	812994.5	825224.2	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_048	POINT	813040.7	825208.6	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_049	POINT	813089.3	825220.4	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_050	POINT	813137.8	825232.4	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_051	POINT	813186.2	825245.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_052	POINT	812925.3	825289.7	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_053	POINT	812972.5	825273.4	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_054	POINT	813019.8	825257.2	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_055	POINT	813067.2	825256.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_056	POINT	813114.6	825272.8	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_057	POINT	813162	825288.6	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_058	POINT	813209.4	825304.5	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_059	POINT	813248.7	825335	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_060	POINT	813287.6	825366.3	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_061	POINT	813329.5	825393.5	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_062	POINT	812955.2	825318.7	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_063	POINT	813003.6	825305.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_064	POINT	813051.6	825296.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_065	POINT	813095.5	825319.9	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_066	POINT	813139.4	825343.8	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_067	POINT	813183.4	825367.7	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_068	POINT	813223	825398.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_069	POINT	813264.8	825423	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_070	POINT	813314.6	825427.5	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	4	LA_RM4_071	POINT	813364.4	825432.1	0	20	555	25	0.8	3.72E-03	1.63E-04	1.58E-04
Tuen Mun Area 40 Landing	5	LA_RM5_001	POINT	812742.6	825145.3	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_002	POINT	812765.9	825101.5	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_003	POINT	812784.5	825055.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_004	POINT	812803.2	825008.7	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_005	POINT	812821.8	824962.3	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_006	POINT	812840.4	824915.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_007	POINT	812859.1	824869.5	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_008	POINT	812980.3	825343	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_009	POINT	813028.6	825330	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_010	POINT	813070.1	825345.4	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx	RSP	FSP
											(g/s)	(g/s)	(g/s)
Tuen Mun Area 40 Landing	5	LA_RM5_011	POINT	813107.5	825378.6	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_012	POINT	813144.8	825411.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_013	POINT	813182.2	825445.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_014	POINT	813219.5	825478.3	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_015	POINT	813263.6	825488.6	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_016	POINT	813313	825480.7	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_017	POINT	813362.4	825472.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_018	POINT	813411.7	825465	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_019	POINT	812871.5	825234.7	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_020	POINT	812914	825208.4	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_021	POINT	812956.6	825182.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_022	POINT	813000.9	825161	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_023	POINT	813050.6	825155.6	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_024	POINT	813100.3	825150.2	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_025	POINT	812806.7	825182	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_026	POINT	812840.3	825145.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_027	POINT	812874	825108.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_028	POINT	812907.7	825071.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_029	POINT	812941.3	825034.2	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_030	POINT	812975	824997.2	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_031	POINT	813008.7	824960.2	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_032	POINT	812839.5	825210.7	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_033	POINT	812878.5	825179.5	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_034	POINT	812917.6	825148.2	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_035	POINT	812956.6	825116.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_036	POINT	812997.9	825088.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_037	POINT	813039.8	825061.6	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_038	POINT	812773	825164	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_039	POINT	812801.2	825122.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_040	POINT	812827	825080.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_041	POINT	812852.9	825037.3	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_042	POINT	812878.7	824994.5	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_043	POINT	812904.5	824951.7	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_044	POINT	812930.4	824908.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_045	POINT	812902.8	825264.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_046	POINT	812948.6	825244.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_047	POINT	812994.5	825224.2	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_048	POINT	813040.7	825208.6	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_049	POINT	813089.3	825220.4	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_050	POINT	813137.8	825232.4	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_051	POINT	813186.2	825245.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_052	POINT	812925.3	825289.7	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_053	POINT	812972.5	825273.4	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_054	POINT	813019.8	825257.2	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_055	POINT	813067.2	825256.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_056	POINT	813114.6	825272.8	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_057	POINT	813162	825288.6	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_058	POINT	813209.4	825304.5	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05
Tuen Mun Area 40 Landing	5	LA_RM5_059	POINT	813248.7	825335	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height ^[1]	Exit Temperature ^[1]	Exit velocity ^[1]	Internal diameter ^[1]	Emission Rate per Trip			
				(m)	(m)						(mpd)	(m)	(K)	(m/s)
												(g/s)	(g/s)	(g/s)
Tuen Mun Area 40 Landing	5	LA_RM5_060	POINT	813287.6	825366.3	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_061	POINT	813329.5	825393.5	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_062	POINT	812955.2	825318.7	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_063	POINT	813003.6	825305.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_064	POINT	813051.6	825296.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_065	POINT	813095.5	825319.9	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_066	POINT	813139.4	825343.8	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_067	POINT	813183.4	825367.7	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_068	POINT	813223	825398.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_069	POINT	813264.8	825423	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_070	POINT	813314.6	825427.5	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	
Tuen Mun Area 40 Landing	5	LA_RM5_071	POINT	813364.4	825432.1	0	11	588	8	0.2	1.65E-03	5.37E-05	5.20E-05	

Notes:

[1] Modelling parameters are referred to "Generating an Hour-By-Hour Model-Ready Marine Emission Inventory, RWDI Air Inc. and Environment Canada, US EPA 17th International Emission Inventory Conference, 2-5 June 2008, Portland, Oregon", approved EIA of Tuen Mun South Extension (AERIAR-236/2022), and approved EIA of Lei Yue Mun Waterfront Enhancement Project (AERIAR-219/2018).

Marine Emission Inventory during Hotelling**Total Emission Rate**

Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]			Annual No. of Vessel Arrivals in Year 2019 ^[3]	Composite Emission Rate per Trip (g/s) ^[4]		
		NO _x	RSP	FSP		NO _x	RSP	FSP
1	Conventional Cargo Vessel	1.02E-01	4.06E-03	3.96E-03	-	1.02E-01	4.06E-03	3.96E-03
2	Dry Bulk Carrier	1.02E-01	4.06E-03	3.96E-03	-	1.02E-01	4.06E-03	3.96E-03
3	Tug	1.23E-01	4.92E-03	4.80E-03	-	1.23E-01	4.92E-03	4.80E-03
4	Chemical Carrier	2.65E-01	1.06E-02	1.03E-02	247	2.65E-01	1.06E-02	1.03E-02
	Gas Carrier	2.65E-01	1.06E-02	1.03E-02	134			
	Oil Tanker	2.65E-01	1.06E-02	1.03E-02	419			
5	Mechanised Lighter/Barge/Cargo Junk	1.39E-01	5.54E-03	5.40E-03	-	1.39E-01	5.54E-03	5.40E-03

Engine in Operation

Engine	On (1) or Off (0) ^[2]
AE	1

Notes:

[1] The vessel type is grouped according to the modelling parameter (i.e. stack height, exit temperature, exit velocity etc). Vessel types with the identical modelling parameters will be grouped.

[2] Only auxiliary engine is assumed in operation during hotelling with reference to Table 3-25 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012). The emission rate per trip considers the emission from the engine in operation as indicated in the table "Engine in Operation", and the calculation is documented in the "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD.

[3] Marine Traffic Consultant has provided the total number of RTVs but without breakdown into different vessel types. Hence, reference has been made to Marine Department's Vessels Arrivals by Ship Type and Ocean/River (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_y_a2.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

[4] The emission rate per trip is calculated based on the following equation. Breakdown is provided and documented in "Technical Notes on Marine Emission for Pillar Point Area" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.

Engine Emission Rate per Trip = (i)Time-in-mode x (ii)Engine Load Factors x (iii) Engine Power x (iv) Emission Factor, where

(i) As indicated in the table of "calculation of Time-In-Mode by Route", time-in-mode is calculated from the average speed and possible maximum length of sailing route within assessment area provided by Marine Traffic Consultant.

(ii) Engine Load Factors are made reference to Table 4-7, Table 4-10 and Table 3-24 of Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).

(iii) The average engine powers are made reference to Table 4-5 and Table 4-6 of the Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012).

(iv) The emission factor is made reference to Study on Marine Vessels Emission Inventory Final Report (HKUST, February 2012) Table 4-16. Under the Air Pollution Control (Fuel for Vessels) Regulation, all vessels assumed to use MGO due to requirement to fuel switch to compliant fuel (sulphur content <=0.5%) within Hong Kong waters.

Modelling Parameters

Gate	Group	Source ID	Type	X	Y	Base Elevation	Release Height [1]	Exit Temperature [1]	Exit velocity [1]	Internal diameter [1]	Emission Rate per Trip		
				(m)	(m)	(mpd)	(m)	(K)	(m/s)	(m)	NOx (g/s)	RSP (g/s)	FSP (g/s)
Tuen Mun Area 40 Landing	1	LA_RH1_001	POINT	812712.3	825185.0	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	1	LA_RH1_002	POINT	812742.1	825203.4	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	1	LA_RH1_003	POINT	812771.9	825221.7	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	1	LA_RH1_004	POINT	812801.7	825240.1	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	1	LA_RH1_005	POINT	812829.6	825261.2	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	1	LA_RH1_006	POINT	812855.6	825284.6	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	1	LA_RH1_007	POINT	812880.9	825308.8	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	1	LA_RH1_008	POINT	812906.2	825333.0	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	1	LA_RH1_009	POINT	812931.5	825357.1	0	11	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_001	POINT	812712.3	825185.0	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_002	POINT	812742.1	825203.4	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_003	POINT	812771.9	825221.7	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_004	POINT	812801.7	825240.1	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_005	POINT	812829.6	825261.2	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_006	POINT	812855.6	825284.6	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_007	POINT	812880.9	825308.8	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_008	POINT	812906.2	825333.0	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	2	LA_RH2_009	POINT	812931.5	825357.1	0	8	555	25	0.8	1.13E-02	4.51E-04	4.40E-04
Tuen Mun Area 40 Landing	3	LA_RH3_001	POINTHOR	812712.3	825185.0	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	3	LA_RH3_002	POINTHOR	812742.1	825203.4	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	3	LA_RH3_003	POINTHOR	812771.9	825221.7	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	3	LA_RH3_004	POINTHOR	812801.7	825240.1	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	3	LA_RH3_005	POINTHOR	812829.6	825261.2	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	3	LA_RH3_006	POINTHOR	812855.6	825284.6	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	3	LA_RH3_007	POINTHOR	812880.9	825308.8	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	3	LA_RH3_008	POINTHOR	812906.2	825333.0	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	3	LA_RH3_009	POINTHOR	812931.5	825357.1	0	4	694.7	8	0.2	1.37E-02	5.47E-04	5.33E-04
Tuen Mun Area 40 Landing	4	LA_RH4_001	POINT	812712.3	825185.0	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	4	LA_RH4_002	POINT	812742.1	825203.4	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	4	LA_RH4_003	POINT	812771.9	825221.7	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	4	LA_RH4_004	POINT	812801.7	825240.1	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	4	LA_RH4_005	POINT	812829.6	825261.2	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	4	LA_RH4_006	POINT	812855.6	825284.6	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	4	LA_RH4_007	POINT	812880.9	825308.8	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	4	LA_RH4_008	POINT	812906.2	825333.0	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	4	LA_RH4_009	POINT	812931.5	825357.1	0	20	555	25	0.8	2.95E-02	1.18E-03	1.15E-03
Tuen Mun Area 40 Landing	5	LA_RH5_001	POINT	812712.3	825185.0	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
Tuen Mun Area 40 Landing	5	LA_RH5_002	POINT	812742.1	825203.4	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
Tuen Mun Area 40 Landing	5	LA_RH5_003	POINT	812771.9	825221.7	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
Tuen Mun Area 40 Landing	5	LA_RH5_004	POINT	812801.7	825240.1	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
Tuen Mun Area 40 Landing	5	LA_RH5_005	POINT	812829.6	825261.2	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
Tuen Mun Area 40 Landing	5	LA_RH5_006	POINT	812855.6	825284.6	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
Tuen Mun Area 40 Landing	5	LA_RH5_007	POINT	812880.9	825308.8	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
Tuen Mun Area 40 Landing	5	LA_RH5_008	POINT	812906.2	825333.0	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04
Tuen Mun Area 40 Landing	5	LA_RH5_009	POINT	812931.5	825357.1	0	11	588	8	0.2	1.54E-02	6.16E-04	6.00E-04

Notes:

[1] Modelling parameters are referred to "Generating an Hour-By-Hour Model-Ready Marine Emission Inventory, RWDI Air Inc. and Environment Canada, US EPA 17th International Emission Inventory Conference, 2-5 June 2008, Portland, Oregon", approved EIA of Tuen Mun South Extension (AERIAR-236/2022), and approved EIA of Lei Yue Mun Waterfront Enhancement Project (AERIAR-219/2018).

Calculation of Multiplying Factor for Total Vessel Count**Monthly Vessel Count for Year 2048**

Location	Monthly Vessel Count in Aug for Maneuvering ^[1]	Monthly Vessel Count in Aug for Hotelling ^[1]
Tuen Mun Area 40 Landing	1,259	630

Notes:

[1] The marine traffic data for August is provided by Marine Traffic Consultant.

Monthly Multiplying Factor derived from Marine Traffic in Year 2019

Month	Total No. of Arrivals by RTVs ^[1]	Monthly Multiplying Factor
Jan-19	5,820	1.03
Feb-19	3,401	0.60
Mar-19	5,783	1.02
Apr-19	5,411	0.96
May-19	5,766	1.02
Jun-19	5,456	0.96
Jul-19	5,645	1.00
Aug-19	5,659	1.00
Sep-19	5,382	0.95
Oct-19	5,160	0.91
Nov-19	5,534	0.98
Dec-19	5,632	1.00

Notes:

[1] Since no monthly profile is available from Marine Traffic Consultant, the annual vessel count is calculated based on monthly profile in "Monthly Vessel Arrivals by Ocean/River and Cargo/Passenger Vessels" published by Marine Department (https://www.mardep.gov.hk/en/fact/pdf/portstat_2_m_a1.pdf). Due to the pandemic situation, there was a significant change in marine traffic from Year 2020 to Year 2022. In view of this, the monthly profile of Year 2019 is considered the most appropriate and therefore adopted and assumed the same for future years.

Hourly Multiplying Factor derived from Marine Traffic in August 2048

Hour		Tuen Mun Area 40 Landing			
Start	End	No. of Marine Vessels for Maneuvering ^[1]	Monthly-Hourly Multiplying Factor	No. of Marine Vessels for Hotelling ^[1]	Monthly-Hourly Multiplying Factor
0	1	22	1.7%	11	1.7%
1	2	12	1.0%	6	1.0%
2	3	12	1.0%	6	1.0%
3	4	12	1.0%	6	1.0%
4	5	25	2.0%	13	2.0%
5	6	22	1.7%	11	1.7%
6	7	59	4.7%	30	4.7%
7	8	59	4.7%	30	4.7%
8	9	59	4.7%	30	4.7%
9	10	56	4.4%	28	4.4%
10	11	34	2.7%	17	2.7%
11	12	65	5.2%	33	5.2%
12	13	56	4.4%	28	4.4%
13	14	65	5.2%	33	5.2%
14	15	90	7.1%	45	7.1%
15	16	71	5.6%	36	5.6%
16	17	78	6.2%	39	6.2%
17	18	78	6.2%	39	6.2%
18	19	102	8.1%	51	8.1%
19	20	81	6.4%	41	6.4%
20	21	71	5.6%	36	5.6%
21	22	37	2.9%	19	2.9%
22	23	50	4.0%	25	4.0%
23	24	43	3.4%	22	3.4%

Notes:

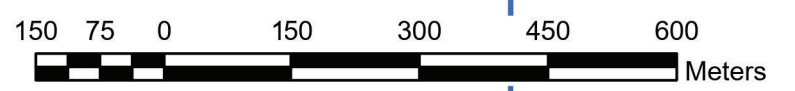
[1] The number of hourly marine vessels for Aug 2048 is provided by Marine Traffic Consultant. It contains the total number of marine vessels for the 31 days in Aug in Year 2048 for each hour. For example, from Hour 0 to Hour 1 (i.e. first hour of 1 Aug + first hour of 2 Aug, 1st hour of 31 Aug), there are total 22 marine vessels maneuvering and total 11 marine hotelling for the first hour during the whole August.

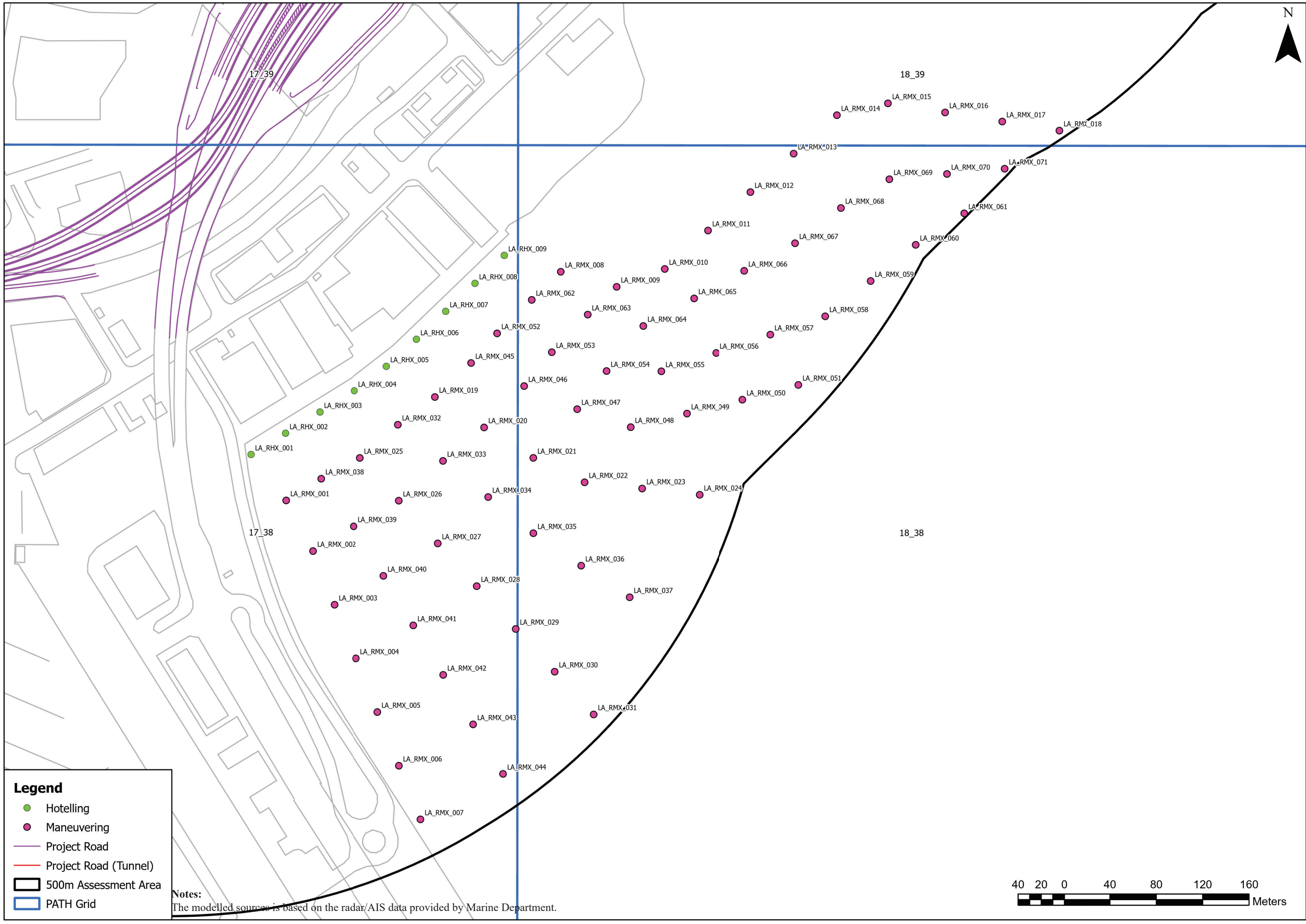


Legend

- Hotelling
- Maneuvering
- Project Road
- Project Road (Tunnel)
- ▭ 500m Assessment Area
- ▭ PATH Grid

Notes:
The modelled sources is based on the radar/AIS data provided by Marine Department.





- Legend**
- Hotelling
 - Maneuvering
 - Project Road
 - Project Road (Tunnel)
 - ▭ 500m Assessment Area
 - ▭ PATH Grid

Notes:
The modelled sources is based on the radar/AIS data provided by Marine Department.

