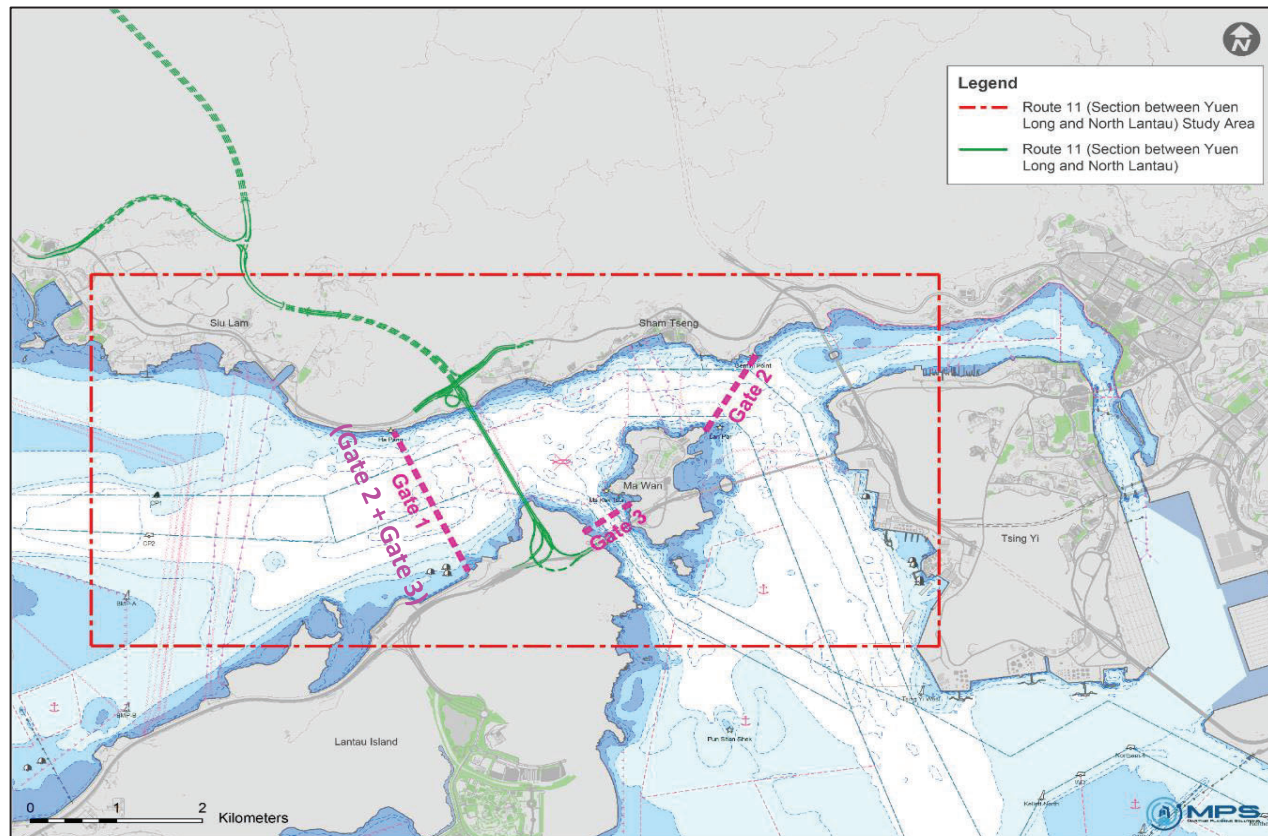


Annex I

Marine Emission Rate for Tsing Lung Tau Fairway in Year 2048
Fast Launches_Gate 2

Marine Traffic Information

Assessment Year 2048
 Assessed Vessel Type Fast Launches
 Gate 2



Marine Traffic Information from Marine Traffic Consultants

Location	Monthly Vessel Count in Dec ^[1]	Travelling Speed (knots) ^[2]	Length of Sailing Route (m) ^[3]
Gate 2	2,030	6	2,400

- Notes**
- [1] Monthly Vessel Count is advised by Marine Traffic Consultant and accepted by Marine Department.
 - [2] Average speed of 6 knot is provided by Marine Traffic Consultant.
 - [3] Possible maximum length of sailing route is estimated for conservative assessment.

Marine Emission Inventory

Total Emission Rate

Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]			Percentage of Vessel Counts ^[3]	Composite Emission Rate per Trip (g/s) ^[4]		
		NO _x	RSP	FSP		NO _x	RSP	FSP
1	Government Launch	0.289	0.008	0.008	60%	0.202	0.006	0.006
	Pilot Boat	0.072	0.002	0.002	40%			

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 So Kwun Wat and Tsing Lung Tau Areas" submitted to EPD.
- [3] As advised by marine traffic consultant, the fast launch is composed of 60% government launch and 40% pilot boat.
- [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 So Kwun Wat and Tsing Lung Tau Areas" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.

$$\text{Engine Emission Rate per Trip} = (i)\text{Time-in-mode} \times (ii)\text{Engine Load Factors} \times (iii)\text{Engine Power} \times (iv)\text{Emission Factor, where}$$
 - (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 calculated from actual speed provided by the Marine Traffic Consultant divided by the maximum speed based on desktop review, or made reference to Table 3-2, Table 3-3 and Table 3-56 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) The average engine powers are based on desktop review.
 - (iv) The engine emission factors are made reference to Table 3-4, Table 3-9, Table 3-38, Table 3-39 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

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)
				(g/s)	(g/s)	(g/s)							
2	1	G2_FL1_001	POINTHOR	822586.6	824415.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_002	POINTHOR	822538.8	824398.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_003	POINTHOR	822491.1	824382.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_004	POINTHOR	822443.3	824366.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_005	POINTHOR	822395.6	824350.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_006	POINTHOR	822347.8	824333.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_007	POINTHOR	822300.1	824317.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_008	POINTHOR	822252.4	824301.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_009	POINTHOR	822204.6	824285.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_010	POINTHOR	822156.9	824268.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_011	POINTHOR	822109.1	824252.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_012	POINTHOR	822061.3	824236.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_013	POINTHOR	822013.2	824221.5	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_014	POINTHOR	821965.2	824206.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_015	POINTHOR	821917.1	824191.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_016	POINTHOR	821869.1	824176	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_017	POINTHOR	821821	824160.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_018	POINTHOR	821772.9	824145.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_019	POINTHOR	821724.9	824130.5	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_020	POINTHOR	821676.8	824115.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_021	POINTHOR	821628.8	824100.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_022	POINTHOR	821580.7	824085	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_023	POINTHOR	821532.7	824069.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_024	POINTHOR	821484.6	824054.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_025	POINTHOR	821436	824042.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_026	POINTHOR	821386.6	824033.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_027	POINTHOR	821337.1	824024.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_028	POINTHOR	821287.7	824016.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_029	POINTHOR	821238.3	824007.5	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_030	POINTHOR	821188.9	823998.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_031	POINTHOR	821139.4	823990.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_032	POINTHOR	821090	823981.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_033	POINTHOR	821040.6	823972.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_034	POINTHOR	823109.9	824095.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_035	POINTHOR	823062.9	824077.5	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_036	POINTHOR	823015.8	824059.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_037	POINTHOR	822968.7	824040.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_038	POINTHOR	822921.6	824022.5	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_039	POINTHOR	822874.5	824004.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_040	POINTHOR	822827.5	823985.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_041	POINTHOR	822780.4	823967.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_042	POINTHOR	822733.3	823949	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_043	POINTHOR	822686.2	823930.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_044	POINTHOR	822639.1	823912.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-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)
				(g/s)	(g/s)	(g/s)							
2	1	G2_FL1_045	POINTHOR	822592.1	823893.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_046	POINTHOR	822545	823875.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_047	POINTHOR	822497.9	823857.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_048	POINTHOR	822450.8	823838.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_049	POINTHOR	822403.7	823820.5	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_050	POINTHOR	822356.7	823802.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_051	POINTHOR	822309.6	823783.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_052	POINTHOR	822263.5	823763	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_053	POINTHOR	822218.7	823738.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_054	POINTHOR	822174	823714.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_055	POINTHOR	822129.3	823690.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_056	POINTHOR	822084.5	823666.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_057	POINTHOR	822039.8	823642	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_058	POINTHOR	821995	823617.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_059	POINTHOR	821950.3	823593.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_060	POINTHOR	821905.6	823569.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_061	POINTHOR	821860.8	823545.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_062	POINTHOR	821816.1	823521	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_063	POINTHOR	821771.3	823496.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_064	POINTHOR	821726.6	823472.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_065	POINTHOR	821681.8	823448.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_066	POINTHOR	821637.1	823424.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_067	POINTHOR	821592.4	823400	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_068	POINTHOR	821547.6	823375.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_069	POINTHOR	821502.9	823351.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_070	POINTHOR	821456.3	823332.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_071	POINTHOR	821409.1	823314	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_072	POINTHOR	821361.9	823295.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_073	POINTHOR	821314.7	823277.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_074	POINTHOR	821267.5	823259.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_075	POINTHOR	821220.4	823241.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_076	POINTHOR	821173.2	823223.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_077	POINTHOR	821126	823205.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_078	POINTHOR	823114.1	823658.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_079	POINTHOR	823070.4	823631.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_080	POINTHOR	823026.7	823605.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_081	POINTHOR	822983.1	823579.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_082	POINTHOR	822939.4	823553	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_083	POINTHOR	822895.7	823526.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_084	POINTHOR	822852	823500.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_085	POINTHOR	822808.3	823474	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_086	POINTHOR	822764.6	823447.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_087	POINTHOR	822720.9	823421.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05
2	1	G2_FL1_088	POINTHOR	822677.2	823395	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-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)
2	1	G2_FL1_089	POINTHOR	822633.5	823368.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_090	POINTHOR	822589.8	823342.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_091	POINTHOR	822546.1	823316	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_092	POINTHOR	822502.5	823289.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_093	POINTHOR	822458.8	823263.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_094	POINTHOR	822415	823237.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_095	POINTHOR	822371.3	823210.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_096	POINTHOR	822327.6	823184.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_097	POINTHOR	822283.9	823158.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_098	POINTHOR	822240.2	823132	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_099	POINTHOR	822196.5	823105.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_100	POINTHOR	822152.7	823079.5	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_101	POINTHOR	822109	823053.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_102	POINTHOR	822065.3	823026.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_103	POINTHOR	822021.6	823000.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_104	POINTHOR	821977.9	822974.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_105	POINTHOR	821933.8	822948.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_106	POINTHOR	821889.2	822924.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_107	POINTHOR	821844.7	822899.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_108	POINTHOR	821800.2	822874.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_109	POINTHOR	821755.7	822850.2	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_110	POINTHOR	821711.1	822825.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_111	POINTHOR	821666.6	822800.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_112	POINTHOR	821622.1	822776.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_113	POINTHOR	821577.6	822751.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_114	POINTHOR	821533.1	822726.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_115	POINTHOR	821488.5	822702.3	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_116	POINTHOR	821443.8	822678.1	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_117	POINTHOR	821399	822654	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_118	POINTHOR	821354.2	822629.9	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_119	POINTHOR	821309.4	822605.8	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_120	POINTHOR	821264.6	822581.7	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_121	POINTHOR	821219.8	822557.6	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_122	POINTHOR	821175	822533.5	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	
2	1	G2_FL1_123	POINTHOR	821130.3	822509.4	0	6	773	8	0.7	1.64E-03	4.58E-05	4.58E-05	

Notes:
 [1] Modelling parameters are referred to 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**

Marine Gate	Monthly Vessel Count in Dec ^[1]
Gate 2	2,030

Notes:

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

Monthly Profile of Marine Traffic for Year 2019

Month	Monthly Multiplying Factor
Jan-19	1.00
Feb-19	0.90
Mar-19	1.00
Apr-19	0.97
May-19	1.00
Jun-19	0.97
Jul-19	1.00
Aug-19	1.00
Sep-19	0.97
Oct-19	1.00
Nov-19	0.97
Dec-19	1.00

Notes:

[1] No monthly profile is available from Marine Traffic Consultant and port statistics. Same number of vessel count each day is assumed.

Hourly Multiplying Factor derived from Marine Traffic in December 2048

Hour		Gate 2	
Start	End	No. of Marine Vessels ^[1]	Hourly Multiplying Factor
0	1	29	1.4%
1	2	29	1.4%
2	3	24	1.2%
3	4	41	2.0%
4	5	24	1.2%
5	6	135	6.7%
6	7	118	5.8%
7	8	111	5.5%
8	9	102	5.0%
9	10	99	4.9%
10	11	130	6.4%
11	12	86	4.2%
12	13	106	5.2%
13	14	85	4.2%
14	15	100	4.9%
15	16	95	4.7%
16	17	108	5.3%
17	18	156	7.7%
18	19	112	5.5%
19	20	85	4.2%
20	21	102	5.0%
21	22	64	3.2%
22	23	45	2.2%
23	24	44	2.2%

Notes:

[1] The number of hourly marine vessels for Dec 2048 is provided by Marine Traffic Consultant. It contains the total number of marine vessels for the 31 days in December in Year 2048 for each hour. For example, from Hour 0 to Hour 1 (i.e. first hour of 1 Dec + first hour of 2 Dec, 1st hour of 31 Dec), there are total 29 marine vessels for the first hour during the whole December.

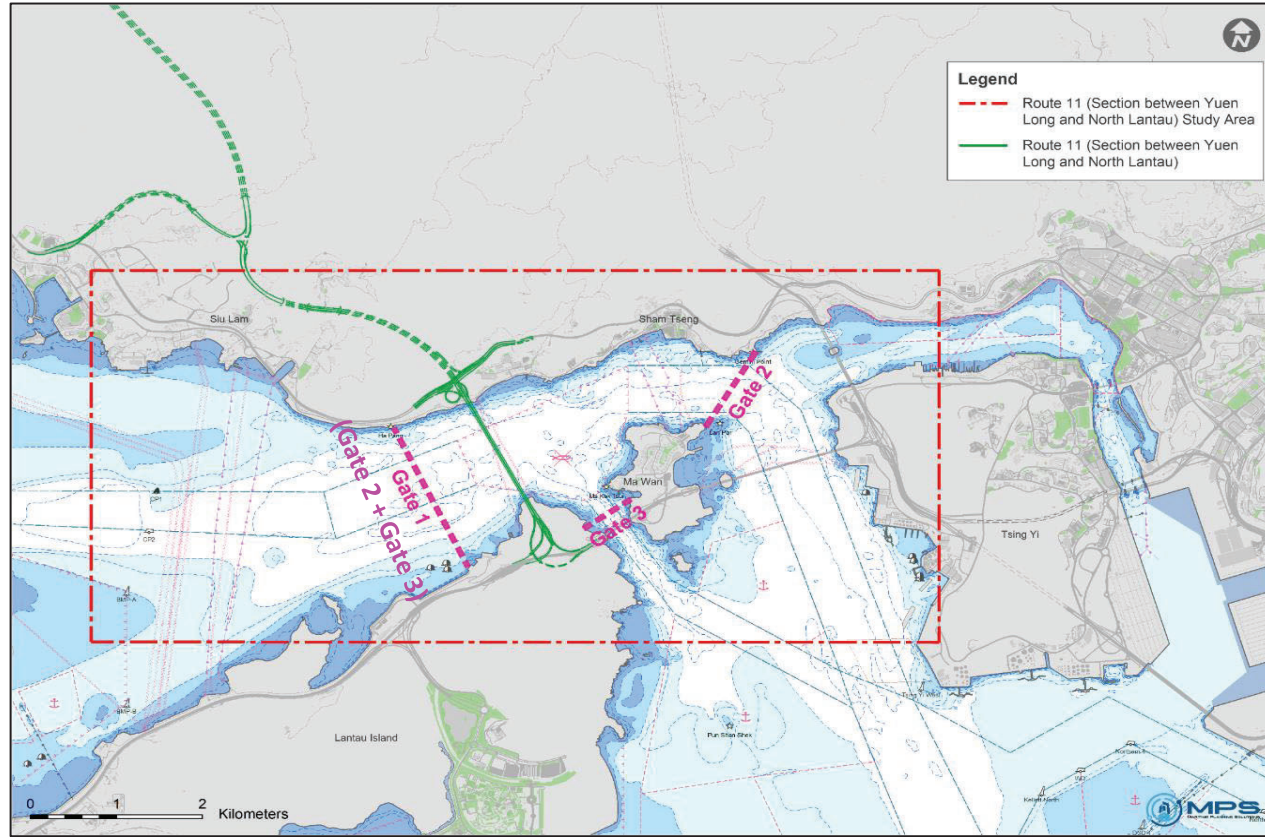
Annex II

Marine Emission Rate for Tsing Lung Tau Fairway in Year 2048

Fast Launches_Gate 3

Marine Traffic Information

Assessment Year 2048
 Assessed Vessel Type Fast Launches
 Gate 3



Marine Traffic Information from Marine Traffic Consultants

Location	Monthly Vessel Count in Dec ^[1]	Travelling Speed (knots) ^[2]	Length of Sailing Route (m) ^[3]
Gate 3	485	7	4,000

- Notes:**
- [1] Monthly Vessel Count is advised by Marine Traffic Consultant and accepted by Marine Department.
 - [2] Average speed of 6 knot is provided by Marine Traffic Consultant.
 - [3] Possible maximum length of sailing route is estimated for conservative assessment.

Marine Emission Inventory

Total Emission Rate

Group ^[1]	Vessel Type	Emission Rate per Trip (g/s) ^[2]			Percentage of Vessel Counts ^[3]	Composite Emission Rate per Trip (g/s) ^[4]		
		NO _x	RSP	FSP		NO _x	RSP	FSP
1	Government Launch	0.470	0.013	0.013	60%	0.330	0.009	0.009
	Pilot Boat	0.120	0.003	0.003	40%			

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 So Kwun Wat and Tsing Lung Tau Areas" submitted to EPD.
- [3] As advised by marine traffic consultant, the fast launch is composed of 60% government launch and 40% pilot boat.
- [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 So Kwun Wat and Tsing Lung Tau Areas" submitted to EPD and emission rates are evenly apportioned into point sources in the model as shown in subsequent pages of this Appendix.

$$\text{Engine Emission Rate per Trip} = (i)\text{Time-in-mode} \times (ii)\text{Engine Load Factors} \times (iii)\text{Engine Power} \times (iv)\text{Emission Factor, where}$$
 - (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 calculated from actual speed provided by the Marine Traffic Consultant divided by the maximum speed based on desktop review, or made reference to Table 3-2, Table 3-3 and Table 3-56 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) The average engine powers are based on desktop review.
 - (iv) The engine emission factors are made reference to Table 3-4, Table 3-9, Table 3-38, Table 3-39 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

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)	NO _x
											(g/s)	(g/s)	(g/s)
3	1	G3_FL1_001	POINTHOR	824144.7	822488.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_002	POINTHOR	824112.6	822529.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_003	POINTHOR	824080.5	822570.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_004	POINTHOR	824048.4	822612.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_005	POINTHOR	824016.4	822653.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_006	POINTHOR	823984.3	822694.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_007	POINTHOR	823952.2	822736.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_008	POINTHOR	823920.1	822777.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_009	POINTHOR	823888	822818.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_010	POINTHOR	823855.9	822860.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_011	POINTHOR	823823.8	822901.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_012	POINTHOR	823791.8	822942.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_013	POINTHOR	823759.7	822984.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_014	POINTHOR	823727.6	823025.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_015	POINTHOR	823695.5	823066.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_016	POINTHOR	823663.4	823108.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_017	POINTHOR	823631.3	823149.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_018	POINTHOR	823599.2	823190.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-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)
				(g/s)	(g/s)	(g/s)							
3	1	G3_FL1_019	POINTHOR	823567.2	823232.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_020	POINTHOR	823535.1	823273.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_021	POINTHOR	823503	823314.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_022	POINTHOR	823470.9	823356.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_023	POINTHOR	823438.8	823397.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_024	POINTHOR	823402.2	823432.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_025	POINTHOR	823358.3	823458.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_026	POINTHOR	823314.5	823484.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_027	POINTHOR	823270.6	823510.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_028	POINTHOR	823226.7	823536.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_029	POINTHOR	823182.8	823562.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_030	POINTHOR	823139	823588.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_031	POINTHOR	823095.1	823614.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_032	POINTHOR	823051.2	823640.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_033	POINTHOR	823007.4	823666.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_034	POINTHOR	822963.5	823692.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_035	POINTHOR	822919.6	823718.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_036	POINTHOR	822875	823742.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_037	POINTHOR	822827.8	823760.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_038	POINTHOR	822780.5	823778.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_039	POINTHOR	822733.2	823796.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_040	POINTHOR	822686	823813.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_041	POINTHOR	822638.7	823831.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_042	POINTHOR	822591.5	823849.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_043	POINTHOR	822544.2	823867.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_044	POINTHOR	822496.9	823885.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_045	POINTHOR	822449.7	823902.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_046	POINTHOR	822402.4	823920.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_047	POINTHOR	822355.1	823938.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_048	POINTHOR	822307.9	823956.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_049	POINTHOR	822259.5	823970	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_050	POINTHOR	822211	823983.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_051	POINTHOR	822162.5	823997.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_052	POINTHOR	822114.1	824010.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_053	POINTHOR	822065.2	824021.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_054	POINTHOR	822015.1	824022.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_055	POINTHOR	821965.1	824024.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_056	POINTHOR	821915	824026.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_057	POINTHOR	821865	824028.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_058	POINTHOR	821814.9	824030.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_059	POINTHOR	821764.9	824031.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_060	POINTHOR	821714.8	824033.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_061	POINTHOR	821664.8	824033.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_062	POINTHOR	821614.8	824029.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-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)
3	1	G3_FL1_063	POINTHOR	821564.9	824025.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_064	POINTHOR	821514.9	824022.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_065	POINTHOR	821465.8	824012.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_066	POINTHOR	821417.3	823999.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_067	POINTHOR	821368.8	823985.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_068	POINTHOR	821320.3	823972.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_069	POINTHOR	821271.7	823959.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_070	POINTHOR	821222.6	823953.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_071	POINTHOR	821172.7	823957.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_072	POINTHOR	821122.8	823961.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_073	POINTHOR	821072.8	823965.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_074	POINTHOR	821022.9	823970	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_075	POINTHOR	824043.8	822434.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_076	POINTHOR	824011.1	822475.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_077	POINTHOR	823978.4	822516.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_078	POINTHOR	823945.7	822557.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_079	POINTHOR	823913.1	822597.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_080	POINTHOR	823880.4	822638.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_081	POINTHOR	823847.7	822679.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_082	POINTHOR	823815	822720.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_083	POINTHOR	823782.4	822761	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_084	POINTHOR	823749.7	822801.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_085	POINTHOR	823717	822842.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_086	POINTHOR	823684.3	822883.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_087	POINTHOR	823651.7	822924.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_088	POINTHOR	823618.3	822964.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_089	POINTHOR	823578.1	822996.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_090	POINTHOR	823537.8	823028.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_091	POINTHOR	823497.6	823060.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_092	POINTHOR	823457.3	823092.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_093	POINTHOR	823417.1	823124.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_094	POINTHOR	823376.9	823156.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_095	POINTHOR	823336.6	823188.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_096	POINTHOR	823296.4	823220.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_097	POINTHOR	823256.1	823252.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_098	POINTHOR	823215.9	823284.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_099	POINTHOR	823175.7	823316.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_100	POINTHOR	823133.6	823345.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_101	POINTHOR	823086.8	823364.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_102	POINTHOR	823040	823383.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_103	POINTHOR	822993.1	823402.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_104	POINTHOR	822946.3	823421.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_105	POINTHOR	822899.5	823440.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05	
3	1	G3_FL1_106	POINTHOR	822852.7	823459.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-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)
				(g/s)	(g/s)	(g/s)							
3	1	G3_FL1_107	POINTHOR	822805.8	823478.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_108	POINTHOR	822757.8	823491.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_109	POINTHOR	822707.8	823494.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_110	POINTHOR	822657.8	823497.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_111	POINTHOR	822607.8	823500	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_112	POINTHOR	822557.8	823502.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_113	POINTHOR	822507.7	823505.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_114	POINTHOR	822457.7	823508	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_115	POINTHOR	822407.7	823510.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_116	POINTHOR	822357.7	823513.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_117	POINTHOR	822307.7	823516	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_118	POINTHOR	822257.6	823518.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_119	POINTHOR	822207.6	823521.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_120	POINTHOR	822159.6	823506.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_121	POINTHOR	822111.8	823490.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_122	POINTHOR	822063.9	823474.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_123	POINTHOR	822016	823459	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_124	POINTHOR	821968.2	823443.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_125	POINTHOR	821920.3	823427.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_126	POINTHOR	821872.4	823411.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_127	POINTHOR	821824.6	823395.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_128	POINTHOR	821776.7	823379.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_129	POINTHOR	821728.8	823363.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_130	POINTHOR	821681	823348.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_131	POINTHOR	821633.1	823332.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_132	POINTHOR	821585.2	823316.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_133	POINTHOR	821537.4	823300.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_134	POINTHOR	821489.5	823284.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_135	POINTHOR	821441.6	823268.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_136	POINTHOR	821393.8	823253.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_137	POINTHOR	821345.9	823237.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_138	POINTHOR	821298	823221.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_139	POINTHOR	821250.2	823205.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_140	POINTHOR	821202.3	823189.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_141	POINTHOR	821154.4	823173.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_142	POINTHOR	823881.7	822431.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_143	POINTHOR	823851	822474.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_144	POINTHOR	823820.2	822516.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_145	POINTHOR	823789.5	822559.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_146	POINTHOR	823758.8	822601.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_147	POINTHOR	823728.1	822644.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_148	POINTHOR	823697.4	822686.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_149	POINTHOR	823660.6	822722.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_150	POINTHOR	823621.9	822757.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-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)
3	1	G3_FL1_151	POINTHOR	823583.3	822791.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_152	POINTHOR	823544.6	822825.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_153	POINTHOR	823506	822859.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_154	POINTHOR	823467.3	822894	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_155	POINTHOR	823428.6	822928.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_156	POINTHOR	823390	822962.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_157	POINTHOR	823351.3	822996.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_158	POINTHOR	823312.7	823030.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_159	POINTHOR	823274	823065.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_160	POINTHOR	823235.4	823099.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_161	POINTHOR	823192	823124.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_162	POINTHOR	823144.6	823141.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_163	POINTHOR	823097.1	823159	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_164	POINTHOR	823049.7	823176.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_165	POINTHOR	823002.3	823193.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_166	POINTHOR	822954.8	823210.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_167	POINTHOR	822907.2	823227.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_168	POINTHOR	822857.8	823236.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_169	POINTHOR	822808.5	823245.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_170	POINTHOR	822759.2	823254.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_171	POINTHOR	822709.8	823264.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_172	POINTHOR	822661.7	823253.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_173	POINTHOR	822613.9	823237.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_174	POINTHOR	822566.1	823221.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_175	POINTHOR	822518.3	823205.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_176	POINTHOR	822470.5	823189	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_177	POINTHOR	822422.7	823172.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_178	POINTHOR	822377.5	823150	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_179	POINTHOR	822333.1	823125.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_180	POINTHOR	822288.7	823100.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_181	POINTHOR	822244.2	823075.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_182	POINTHOR	822199.8	823050.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_183	POINTHOR	822155.4	823025.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_184	POINTHOR	822111	823000.9	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_185	POINTHOR	822066.5	822976	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_186	POINTHOR	822022.1	822951.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_187	POINTHOR	821977.7	822926.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_188	POINTHOR	821933.2	822901.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_189	POINTHOR	821888.8	822876.6	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_190	POINTHOR	821844.4	822851.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_191	POINTHOR	821800	822826.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_192	POINTHOR	821755.5	822802	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_193	POINTHOR	821711.1	822777.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_194	POINTHOR	821666.7	822752.3	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-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)
3	1	G3_FL1_195	POINTHOR	821622.2	822727.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_196	POINTHOR	821577.8	822702.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_197	POINTHOR	821533.4	822677.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_198	POINTHOR	821489	822652.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_199	POINTHOR	821444.5	822628	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_200	POINTHOR	821400.1	822603.1	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_201	POINTHOR	821355.7	822578.2	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_202	POINTHOR	821311.2	822553.4	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_203	POINTHOR	821266.8	822528.5	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_204	POINTHOR	821222.4	822503.7	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_205	POINTHOR	821178	822478.8	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05
3	1	G3_FL1_206	POINTHOR	821133.5	822454	0	6	773	8	0.7	1.60E-03	4.46E-05	4.46E-05

Notes:

[1] Modelling parameters are referred to 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**

Marine Gate	Monthly Vessel Count in Dec ^[1]
Gate 3	485

Notes:

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

Monthly Profile of Marine Traffic for Year 2019

Month	Monthly Multiplying Factor
Jan-19	1.00
Feb-19	0.90
Mar-19	1.00
Apr-19	0.97
May-19	1.00
Jun-19	0.97
Jul-19	1.00
Aug-19	1.00
Sep-19	0.97
Oct-19	1.00
Nov-19	0.97
Dec-19	1.00

Notes:

[1] No monthly profile is available from Marine Traffic Consultant and port statistics. Same number of vessel count each day is assumed.

Hourly Multiplying Factor derived from Marine Traffic in December 2048

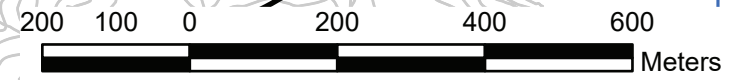
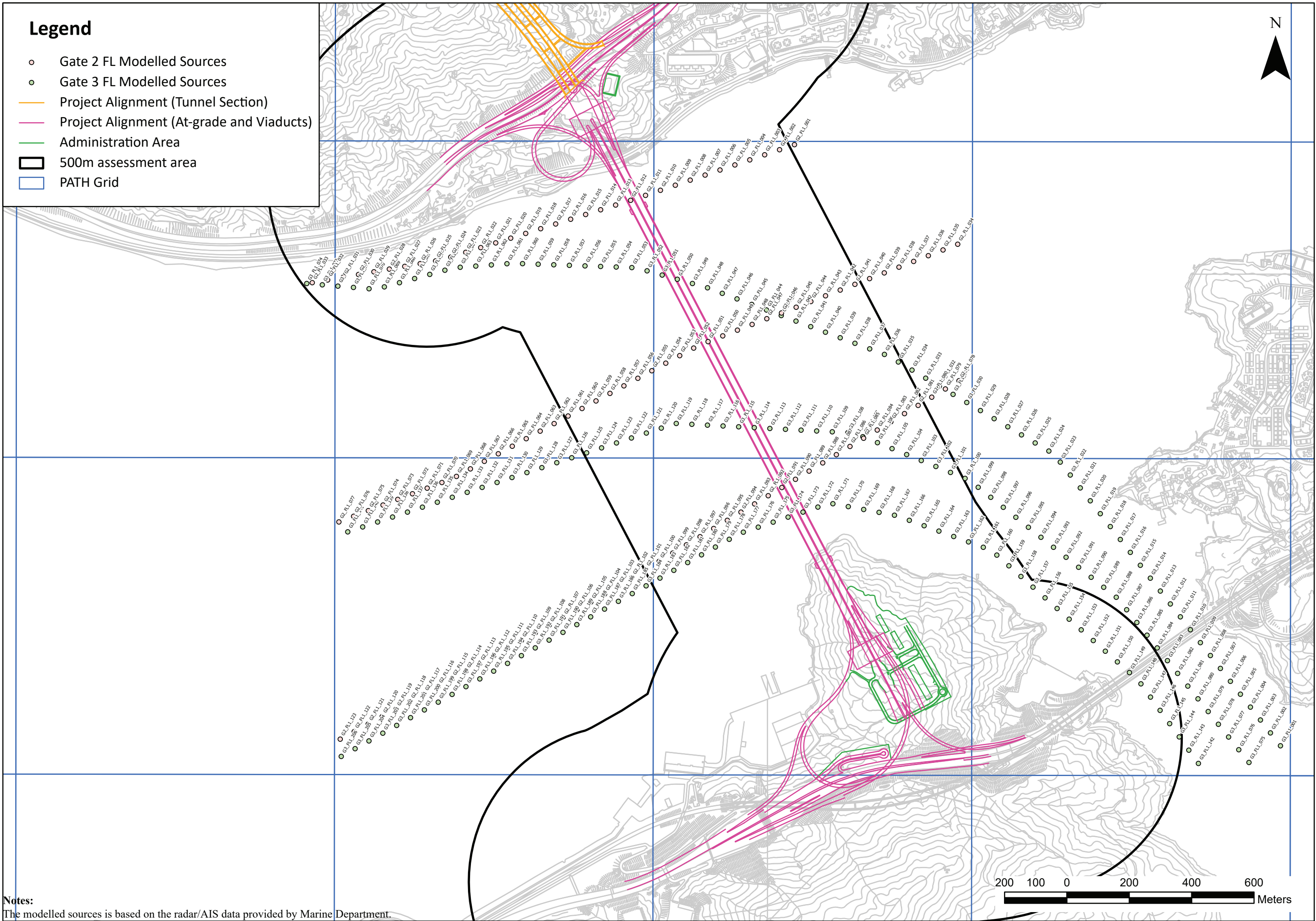
Hour		Gate 3	
Start	End	No. of Marine Vessels ^[1]	Hourly Multiplying Factor
0	1	12	2.5%
1	2	23	4.7%
2	3	23	4.7%
3	4	6	1.2%
4	5	26	5.4%
5	6	15	3.1%
6	7	32	6.6%
7	8	29	6.0%
8	9	14	2.9%
9	10	18	3.7%
10	11	26	5.4%
11	12	30	6.2%
12	13	18	3.7%
13	14	24	4.9%
14	15	26	5.4%
15	16	23	4.7%
16	17	14	2.9%
17	18	24	4.9%
18	19	17	3.5%
19	20	21	4.3%
20	21	18	3.7%
21	22	15	3.1%
22	23	20	4.1%
23	24	11	2.3%

Notes:

[1] The number of hourly marine vessels for Dec 2048 is provided by Marine Traffic Consultant. It contains the total number of marine vessels for the 31 days in December in Year 2048 for each hour. For example, from Hour 0 to Hour 1 (i.e. first hour of 1 Dec + first hour of 2 Dec, 1st hour of 31 Dec), there are total 12 marine vessels for the first hour during the whole December.

Legend

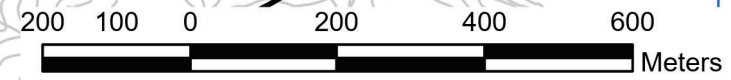
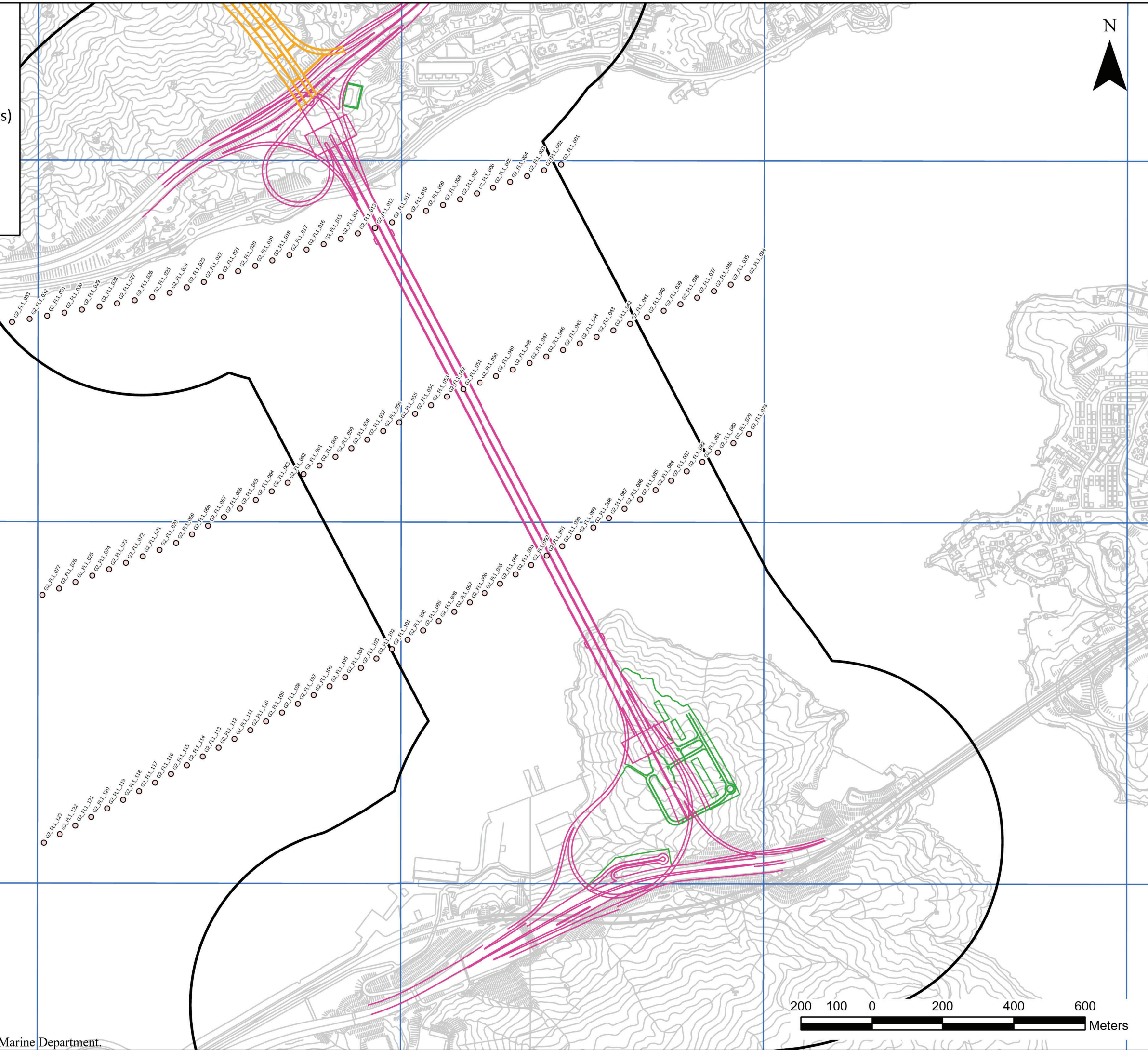
- Gate 2 FL Modelled Sources
- Gate 3 FL Modelled Sources
- Project Alignment (Tunnel Section)
- Project Alignment (At-grade and Viaducts)
- Administration Area
- ▭ 500m assessment area
- ▭ PATH Grid



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

Legend

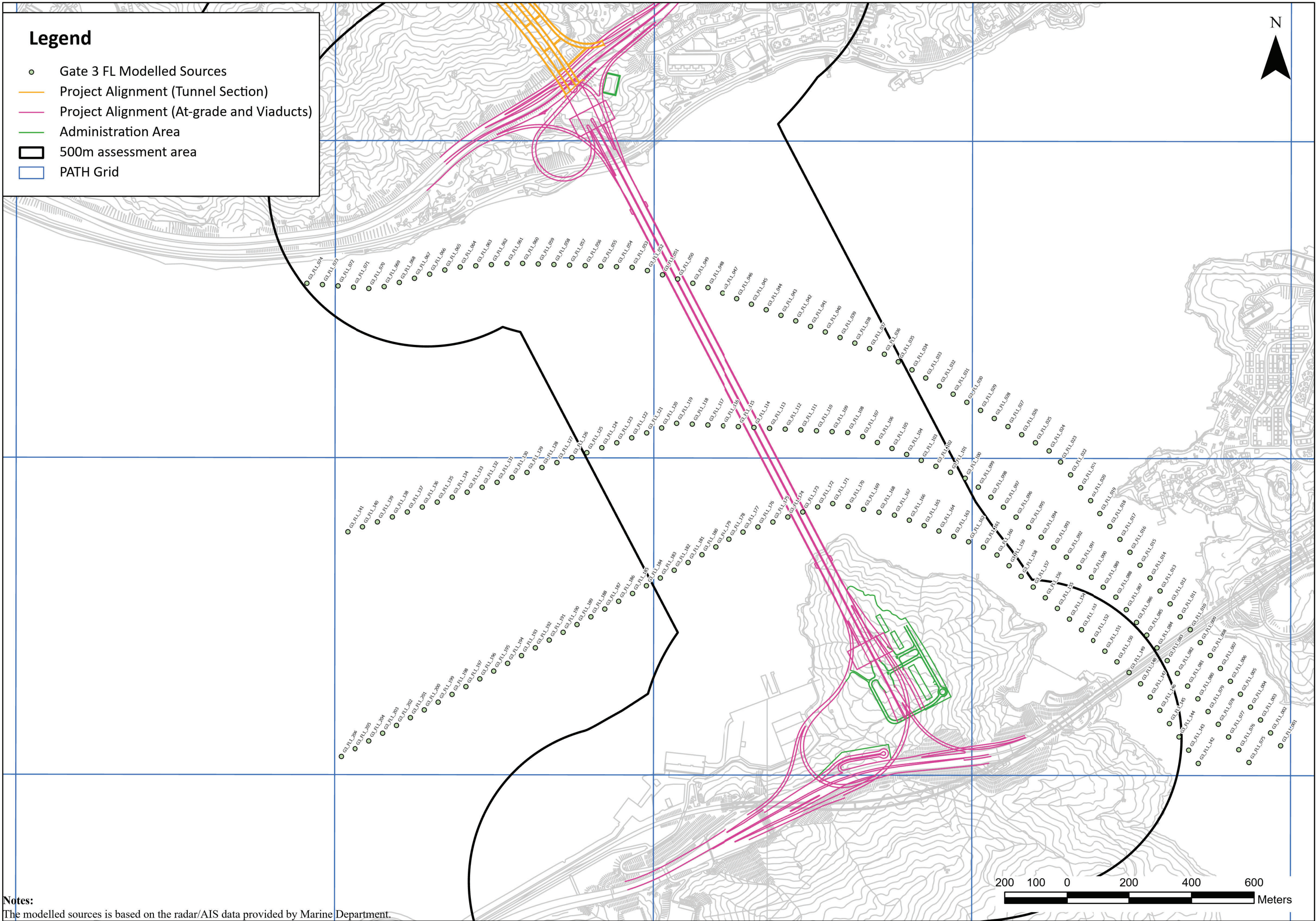
- Gate 2 FL Modelled Sources
- Project Alignment (Tunnel Section)
- Project Alignment (At-grade and Viaducts)
- Administration Area
- ▭ 500m assessment area
- ▭ PATH Grid
- basemap - 5k-Polyline



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

Legend

- Gate 3 FL Modelled Sources
- Project Alignment (Tunnel Section)
- Project Alignment (At-grade and Viaducts)
- Administration Area
- ▭ 500m assessment area
- ▭ PATH Grid



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