APPENDIX 3.6

DETAILED CALCULATION OF MARINE EMISSIONS

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Vessel Grouping

Vessel Group ID	Vessel Type
A	Lighter/Barge/Cargo Junk (Barge)
B	Conventional Cargo Vessel (CCV), Fully Cellular Container Vessel (FCCV)
C	Tugboat (Tug)
D	Passenger Vessel (PaV)
E	Pleasure Vessel (PV)
F	Others (Fast Launch) (FL) [(1)]

Marine Routes within Study Areas

Route/Location ID	Description	Vessel Types
M1	Route To/From Public Cargo Working Area	Lighter/Barge/Cargo Junk, Conventional Cargo Vessel, Fully Cellular Container Vessel, Tug
M2	Route To/From Public Pier (North Route)	Tug, Passenger Vessel, Pleasure Vessel, Fast Launch
M3	Route To/From Public Pier (South Route)	Tug, Passenger Vessel, Pleasure Vessel, Fast Launch
M4	Route To/From Floating Jetty	Pleasure Vessel, Fast Launch
H1	Berthing at Public Cargo Working Area	Lighter/Barge/Cargo Junk, Conventional Cargo Vessel, Fully Cellular Container Vessel
H2	Berthing at Public Cargo Working Area	Lighter/Barge/Cargo Junk, Conventional Cargo Vessel, Fully Cellular Container Vessel
H3	Berthing at Public Cargo Working Area	Lighter/Barge/Cargo Junk, Conventional Cargo Vessel, Fully Cellular Container Vessel
H4	Berthing at Public Cargo Working Area	Lighter/Barge/Cargo Junk, Conventional Cargo Vessel, Fully Cellular Container Vessel
H5	Berthing at Public Pier	Tug, Passenger Vessel, Pleasure Vessel, Fast Launch [(2)]
H6	Berthing at Floating Jetty	Pleasure Vessel, Fast Launch [(2)]

Notes:

(1) Based on observation during survey, Fast Launch (FL) is the most typical vessel for marine vessels other than those in vessel group A to E.

(2) Emission due to berthing of FL at H5 and H6 is excluded since it is assumed that the main engine of FL is shut down when berthing and it does not have auxillary engine.

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Stack Parameters of Vessels

Vessel Group ID	Vessel Type	Stack Height (mAG) [1]	Exit Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	Exhaust Direction
A	Barge [2]	11	588.0	8	0.2	Vertical
B	CCV, FCCV [3]	11	555.0	25	0.8	Vertical
C	Tug [3]	4	694.7	8	0.3	Horizontal
D	PaV [4]	8	555.0	8	0.8	Vertical
E	PV [5]	0.5	773.0	8	0.3	Horizontal
F	FL [5]	0.5	773.0	8	0.3	Horizontal

Notes:

(1) Stack Height is based on observation during survey.

(2) Exit temperature, exit velocity, stack diameter and exhaust direction of Barge are made reference from the Barge stack parameters identified in the approved Lei Yue Mun Waterfront Enhancement Project EIA Report (Appendix 3.5).

(3) Exit temperature, exit velocity, stack diameter and exhaust direction of CCV, FFCV are made reference from the Chinese Trading Vessels identified in the approved Lei Yue Mun Waterfront Enhancement Project EIA Report (Appendix 3.5).

(3) Exit temperature, exit velocity, stack diameter and exhaust direction of Tug are made reference from the Tugboat identified in the approved Lei Yue Mun Waterfront Enhancement Project EIA Report (Appendix 3.5).

(4) Exit temperature, stack diameter and exhaust direction of PaV are made reference from the Launches and Ferries identified in the approved Lei Yue Mun Waterfront Enhancement Project EIA Report (Appendix 3.5).

(5) Exit temperature, exit velocity and stack diameter of PV and FL are made reference from the Pleasure Vessels identified in the approved Lei Yue Mun Waterfront Enhancement Project EIA Report (Appendix 3.5).

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Main Engine (ME) Emissions

Vessel Group ID	Vessel Type	Operation Mode [1]	Speed Range [1]	Fuel Type [2]	ME Power Rating (kW)	ME Load Factor	ME Emission Factor (g/kWh/vessel)			Effective ME Emission Factor (g/hr/vessel) [3]		
							NOx	RSP	FSP	NOx	RSP	FSP
A [4]	Barge	Maneuvering	-	-	-	-	-	-	-	-	-	-
B [5]	CCV, FCCV	Maneuvering	1 to below 8	MGO	485	0.300	10.00	0.30	0.29	1455.00	43.65	42.20
C [6]	Tug	Maneuvering	1 to below 8	MGO	625	0.300	13.20	0.72	0.70	2475.00	135.00	131.25
D [7]	PaV	Maneuvering	1 to below 8	MGO	786	0.020	13.20	0.31	0.29	207.50	4.87	4.56
E [7]	PV	Maneuvering	1 to below 8	MGO	786	0.020	13.20	0.31	0.29	207.50	4.87	4.56
F [7]	FL	Maneuvering	1 to below 8	MGO	786	0.020	13.20	0.31	0.29	207.50	4.87	4.56

Auxillary Engine (AE) Emissions

Vessel Group ID	Vessel Type	Operation Mode [1]	Speed Range [1]	Fuel Type [2]	AE Power Rating (kW)	AE Load Factor	AE Emission Factor (g/kWh/vessel)			Effective AE Emission Factor (g/hr/vessel) [3]		
							NOx	RSP	FSP	NOx	RSP	FSP
A [4]	Barge	Maneuvering	1 to below 8	MGO	116	0.430	10.00	0.40	0.39	498.80	19.95	19.45
A [4]	Barge	Hotelling	-	MGO	116	0.430	10.00	0.40	0.39	498.80	19.95	19.45
B [5]	CCV, FCCV	Maneuvering	1 to below 8	MGO	74	0.430	10.00	0.30	0.29	318.20	9.55	9.23
B [5]	CCV, FCCV	Hotelling	-	MGO	74	0.430	10.00	0.40	0.39	318.20	12.73	12.41
C [6]	Tug	Maneuvering	1 to below 8	MGO	33	0.430	10.00	0.40	0.39	141.90	5.68	5.53
C [6]	Tug	Hotelling	-	MGO	33	0.430	10.00	0.40	0.39	141.90	5.68	5.53
D [7]	PaV	Maneuvering	1 to below 8	MGO	60	0.320	13.90	0.49	0.45	266.88	9.41	8.64
D [7]	PaV	Hotelling	-	MGO	60	0.320	13.90	0.39	0.45	266.88	7.49	8.64
E [7]	PV	Maneuvering	1 to below 8	MGO	60	0.320	13.90	0.49	0.45	266.88	9.41	8.64
E [7]	PV	Hotelling	-	MGO	60	0.320	13.90	0.39	0.45	266.88	7.49	8.64
F [7]	FL	Maneuvering	-	-	-	-	-	-	-	-	-	-
F [7]	FL	Hotelling	-	-	-	-	-	-	-	-	-	-

Notes:

(1) Operation mode and the corresponding speed range were made reference to Table 3-24 of Study on Marine Vessels Emission Inventory (MVEIS).

(2) MGO refers to Marine Gas Oil. According to the Air Pollution Control (Marine Light Diesel) Regulation, local vessel in Hong Kong should use marine light diesel with sulphur content of 0.05%.

(3) Effective Emission Factor is calculated by: Emission Factor * Power Rating * Loading Factor.

(4) The above AE power rating, load factor and emission factors of Vessel Group A are adopted based on the following:

> Lighter, Barge, Cargo Junk are assumed to have no ME, in accordance with Section 3.2.6 of MVEIS.

> The AE power rating and load factor of Lighter/Barge/Cargo Junk are adopted from those in Table 4-6 and Table 4-10 of MVEIS.

> AE emission factors are adopted from Table 4-16 of MVEIS.

(5) The above ME/AE power ratings, load factors and emission factors of Vessel Group B are adopted based on the following:

> ME/AE power ratings are adopted from those for Fully Cellular Container Vessel (FCCV) with GRT 500-999 in Table 4-5 and Table 4-6 of MVEIS since:

- FCCV has higher ME/AE power ratings than Conventional Cargon Vessel (CCV). Thus, as a conservative approach, power ratings of FCCV are adopted.
- The majority of CCV and FCCV in River Trade Vessels (RTV) has a GRT of 500-999 according to Table 4-4 of MVEIS. Thus, assuming typical CCV and FCCV, the power ratings of GRT 500-999 are adopted.

> ME/AE load factors are adopted from Table 4-7 and Table 4-10.

> ME/AE emission factors are adopted from Table 4-16 of MVEIS.

(6) The above ME/AE power ratings, load factors and emission factors of Vessel Group C are adopted based on the following:

> ME/AE power ratings of Tug are adopted from those for Tug with GRT 0-499 in Table 4-5 and Table 4-6 of MVEIS since:

- The majority of Tug in RTV has a GRT of 0-499 according to Table 4-4 of MVEIS. Thus, assuming typical Tug, the power ratings of GRT 0-499 are adopted.

> ME/AE load factors are adopted from Table 4-7 and Table 4-10.

> ME/AE emission factors are adopted from Table 4-16 of MVEIS.

(7) The above ME/AE power ratings, load factors and emission factors of Vessel Groups D, E and F are adopted based on the following:

> Vessels are assumed to be similar to Pleasure Vessel (PV) in MVEIS.

> No AE is assumed in FL.

> ME/AE power ratings of are adopted from PV in Table 3-15 and Table 3-20 of MVEIS.

> ME/AE load factors are adopted from Table 3-18 and Table 3-21 of MVEIS.

> ME/AE emission factors are adopted from those for the Medium Speed Diesel (MSV) engine type with MGO in Table 3-27 and Table 3-28 of MVEIS.

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Emission Rates

Route/ Location ID	Vessel Group ID	Vessel Type	Operation Mode	Speed [1]	Distance Travelled within 500m Study Area	Time-in-mode [2]	Daily Flow [3]	ME Emission Rate (g/day) [4]			AE Emission Rate (g/day) [4]			Total Emission Rate (g/day) [5]		
				(knot)	(m)	(hour)	(#)	NOx	RSP	FSP	NOx	RSP	FSP	NOx	RSP	FSP
M1	B	CCV, FCCV	Maneuvering	5	248	0.0268	24	935.22	28.06	27.12	204.53	6.14	5.93	1139.75	34.19	33.05
M1	C	Tug	Maneuvering	5	248	0.0268	24	1590.84	86.77	84.36	91.21	3.65	3.56	1682.05	90.42	87.92
M2	C	Tug	Maneuvering	5	448	0.0484	48	5747.56	313.50	304.79	329.53	13.18	12.85	6077.09	326.68	317.65
M2	D	PaV	Maneuvering	5	448	0.0484	48	481.88	11.32	10.59	619.76	21.85	20.06	1101.64	33.16	30.65
M2	E	PV	Maneuvering	5	448	0.0484	48	481.88	11.32	10.59	619.76	21.85	20.06	1101.64	33.16	30.65
M2	F	FL	Maneuvering	5	448	0.0484	96	963.75	22.63	21.17	- [6]	- [6]	- [6]	963.75	22.63	21.17
M3	C	Tug	Maneuvering	5	303	0.0327	96	7774.60	424.07	412.29	445.74	17.83	17.38	8220.34	441.90	429.67
M3	D	PaV	Maneuvering	5	303	0.0327	575	3904.15	91.69	85.77	5021.29	177.01	162.56	8925.44	268.70	248.33
M3	E	PV	Maneuvering	5	303	0.0327	623	4230.06	99.34	92.93	5440.46	191.79	176.13	9670.52	291.13	269.06
M3	F	FL	Maneuvering	5	303	0.0327	288	1955.47	45.92	42.96	- [6]	- [6]	- [6]	1955.47	45.92	42.96
M4	E	PV	Maneuvering	5	288	0.0311	24	154.89	3.64	3.40	199.21	7.02	6.45	354.10	10.66	9.85
M4	F	FL	Maneuvering	5	288	0.0311	260	1677.96	39.41	36.86	- [6]	- [6]	- [6]	1677.96	39.41	36.86
H1	A	Barge	Hotelling	-	-	0.5000	12	-	-	-	2992.80	119.71	116.72	2992.80	119.71	116.72
H1	B	CCV, FCCV	Hotelling	-	-	0.5000	12	-	-	-	1909.20	76.37	74.46	1909.20	76.37	74.46
H2	A	Barge	Hotelling	-	-	0.5000	12	-	-	-	2992.80	119.71	116.72	2992.80	119.71	116.72
H2	B	CCV, FCCV	Hotelling	-	-	0.5000	12	-	-	-	1909.20	76.37	74.46	1909.20	76.37	74.46
H3	A	Barge	Hotelling	-	-	0.5000	12	-	-	-	2992.80	119.71	116.72	2992.80	119.71	116.72
H3	B	CCV, FCCV	Hotelling	-	-	0.5000	12	-	-	-	1909.20	76.37	74.46	1909.20	76.37	74.46
H4	A	Barge	Hotelling	-	-	0.5000	12	-	-	-	2992.80	119.71	116.72	2992.80	119.71	116.72
H4	B	CCV, FCCV	Hotelling	-	-	0.5000	12	-	-	-	1909.20	76.37	74.46	1909.20	76.37	74.46
H5	C	Tug	Hotelling	-	-	0.0097	72	-	-	-	99.33	3.97	3.87	99.33	3.97	3.87
H5	D	PaV	Hotelling	-	-	0.0097	312	-	-	-	809.54	22.71	26.21	809.54	22.71	26.21
H5	E	PV	Hotelling	-	-	0.0097	336	-	-	-	871.81	24.46	28.22	871.81	24.46	28.22
H6	E	PV	Hotelling	-	-	0.0097	12	-	-	-	31.14	0.87	1.01	31.14	0.87	1.01

Notes:

(1) For route within typhoon shelter area, speed is assumed to be 5 knots, the maximum permitted speed of 5 knots according to the Shipping and Port Control Regulations (Cap.313A).

(2) Time-in-mode is estimated based on:

> For maneuvering, the distance travelled within the 500m study area and a maneuvering speed of 5 knots.

> For berthing at H1 to H4,

- Hotelling time is assumed to be 1 hour as a conservative approach.
- Based on observation during survey, there were loading/unloading operations of one Barge or one CCV, FFCV at a time at H1 to H4. Thus, it is assumed the time-in-mode of each vessel type to be 0.5 hour.

> For berthing at H5 and H6, the average berthing time measured during survey (35 seconds) is adopted.

(3) Daily flow is based on:

> For M1, no. of marine vessels recorded in each route (2-way) during the survey in 2022. M1 represents the marine activities at Tuen Mun Public Cargo Working Areas (TMPCWA), in which the dominant activity is cargo operation of river vessels. Reference has been made to Marine Department (MD)'s past statistic data in "Vessel Arrivals by Ship Type and Ocean/River" (Link: https://www.mardep.gov.hk/en/fact/pdf/portstat_2_y_a2.pdf) for the trend of the river vessel activity, and the data suggest that there is a declining trend of the river vessel arrival in the past 15 years. The number of river vessels from 2022 to 2031 is therefore not expected to be increase. Hence, the emission calculation of M1 based on the vessel flow survey conducted in 2022 is considered conservative and representative of the situation in 2031.

> For M2 to M4, the projected daily flow in 2046 is adopted as a conservative assessment, based on the no. of marine vessels recorded in each route (2-way) during the survey in 2022, with an annual growth rate of 2.92% from 2022 to 2046.
Such annual growth rate is derived based on the following rationale: M2 to M4 represents the marine activities at Tuen Mun Typhoon Shelter (TMTS), in which the dominant activity is for the vessels to pick-up and drop-off passengers. Reference has been made to Marine Department (MD)'s past statistic data in "Hong Kong Licensed Vessels" (Link: https://www.mardep.gov.hk/en/fact/pdf/portstat_2_y_e3.pdf) for the trend of the total number of licenced vessels in Hong Kong, and the data suggest that there is an increasing trend of the licensed vessel in the past 15 years (2008 to 2022), with an average annual increase of about 2.92%. It is therefore assumed that there would be a similar trend of increase for the number of licensed vessels from 2022 to 2031, and that such trend of increase is also applicable to TMTS.

> For H1 to H4, one Barge or one CCV, FFCV berthing for loading/unloading at anytime throughout the working hours (7am to 7pm) based on site observation. The worst-case scenario is presented as each berthing spot is at its maximum capacity (maximum 1 at a time during the working hours (0700-1900)). For conservative approach, an assumption of 1 Barge and 1 CCV, FCCV in each working hours is made (i.e. assumed as 0.5hr for 1 Barge and 0.5hr for 1 CVV/FCCV in each working hour).

> For H5 to H6, the projected daily flow in 2046 is adopted as a conservative assessment, based on the no. of marine vessels recorded to be berthing during the survey in 2022, with an annual growth rate of 2.92%* from 2022 to 2046.
Such annual growth rate is derived based on the following rationale: H5 to H6 represents the marine activities at Tuen Mun, in which the dominant activity is for the vessels to pick-up and drop-off passengers. Reference has been made to Marine Department (MD)'s past statistic data in "Hong Kong Licensed Vessels" (Link: https://www.mardep.gov.hk/en/fact/pdf/portstat_2_y_e3.pdf) for the trend of the total number of licenced vessels in Hong Kong, and the data suggest that there is an increasing trend of the licensed vessel in the past 15 years (2008 to 2022), with an average annual increase of about 2.92%. It is therefore assumed that there would be a similar trend of increase for the number of licensed vessels from 2022 to 2031, and that such trend of increase is also applicable to H5 and H6.

(4) ME Emission Rates and AE Emission Rates are calculated by: Effective Emission Factor * Time-in-mode * Daily Flow.

(5) Assuming ME and AE both are in operation when maneuvering (except for FL), and only AE is in operation when hotelling. Total Emission Rate = ME Emission Rate + AE Emission Rate.

(6) FL is assumed to have no AE.

(7) All vessels (except Lighter, Barge, Cargo Junk which are assumed to have no ME in accordance with Section 3.2.6 of MVEIS) will have emissions during maneuvering in the Assessment Area. All vessels with AE (except FL) will have emissions during hotelling in the Assessment Area.

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Hourly Flow Profile

Route/ Location ID	Vessel Group ID	Vessel Type	Hour																						Total Daily Flow
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
M1	B	CCV, FCCV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	24
M1	C	Tug	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	24
M2	C	Tug	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	48
M2	D	PaV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	48
M2	E	PV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	48
M2	F	FL	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	96
M3	C	Tug	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	96
M3	D	PaV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	575
M3	E	PV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	623
M3	F	FL	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	288
M4	E	PV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	24
M4	F	FL	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	260
H1	A	Barge	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12
H1	B	CCV, FCCV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12
H2	A	Barge	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12
H2	B	CCV, FCCV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12
H3	A	Barge	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12
H3	B	CCV, FCCV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12
H4	A	Barge	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12
H4	B	CCV, FCCV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12
H5	C	Tug	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	72
H5	D	PaV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	312
H5	E	PV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	336
H6	E	PV	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	0%	0%	0%	12

Notes:

(1) Due to unknown schedule of the vessels, the hourly profile is assumed to be evenly distributed throughout the working hours (0700 - 1900).

(2) The total daily flow and hourly profile is based on the site survey dated 14 April 2022.

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Hourly Emission Rate

					Hour																							
Pollutant	**Route ID**	**Operation Mode**	**Vessel Group ID**	**Vessel Type**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
NOx	M1	Maneuvering	B	CCV, FCCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M1	Maneuvering	C	CCV, FCCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	F	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-02	2.23E-02	2.23E-02	2.23E-02	2.23E-02	2.23E-02	2.23E-02	2.23E-02	2.23E-02	2.23E-02	2.23E-02	2.23E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-01	2.24E-01	2.24E-01	2.24E-01	2.24E-01	2.24E-01	2.24E-01	2.24E-01	2.24E-01	2.24E-01	2.24E-01	2.24E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	F	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.53E-02	4.53E-02	4.53E-02	4.53E-02	4.53E-02	4.53E-02	4.53E-02	4.53E-02	4.53E-02	4.53E-02	4.53E-02	4.53E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M4	Maneuvering	E	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E-03	8.20E-03	8.20E-03	8.20E-03	8.20E-03	8.20E-03	8.20E-03	8.20E-03	8.20E-03	8.20E-03	8.20E-03	8.20E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M4	Maneuvering	F	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H1	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H1	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H2	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H2	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H3	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H3	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H4	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	6.93E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H4	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H6	Hotelling	E	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.21E-04	7.21E-04	7.21E-04	7.21E-04	7.21E-04	7.21E-04	7.21E-04	7.21E-04	7.21E-04	7.21E-04	7.21E-04	7.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSP	M1	Maneuvering	B	CCV, FCCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-04	7.91E-04	7.91E-04	7.91E-04	7.91E-04	7.91E-04	7.91E-04	7.91E-04	7.91E-04	7.91E-04	7.91E-04	7.91E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M1	Maneuvering	C	CCV, FCCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	F	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-04	5.24E-04	5.24E-04	5.24E-04	5.24E-04	5.24E-04	5.24E-04	5.24E-04	5.24E-04	5.24E-04	5.24E-04	5.24E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.22E-03	6.22E-03	6.22E-03	6.22E-03	6.22E-03	6.22E-03	6.22E-03	6.22E-03	6.22E-03	6.22E-03	6.22E-03	6.22E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	F	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M4	Maneuvering	E	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M4	Maneuvering	F	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.12E-04	9.12E-04	9.12E-04	9.12E-04	9.12E-04	9.12E-04	9.12E-04	9.12E-04	9.12E-04	9.12E-04	9.12E-04	9.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H1	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H1	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H2	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H2	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H3	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H3	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H4	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H4	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E-05	9.20E-05	9.20E-05	9.20E-05	9.20E-05	9.20E-05	9.20E-05	9.20E-05	9.20E-05	9.20E-05	9.20E-05	9.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.66E-04	5.66E-04	5.66E-04	5.66E-04	5.66E-04	5.66E-04	5.66E-04	5.66E-04	5.66E-04	5.66E-04	5.66E-04	5.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H6	Hotelling	E	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-05	2.02E-05	2.02E-05	2.02E-05	2.02E-05	2.02E-05	2.02E-05	2.02E-05	2.02E-05	2.02E-05	2.02E-05	2.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FSP	M1	Maneuvering	B	CCV, FCCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-04	7.65E-04	7.65E-04	7.65E-04	7.65E-04	7.65E-04	7.65E-04	7.65E-04	7.65E-04	7.65E-04	7.65E-04	7.65E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M1	Maneuvering	C	CCV, FCCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.35E-03	7.35E-03	7.35E-03	7.35E-03	7.35E-03	7.35E-03	7.35E-03	7.35E-03	7.35E-03	7.35E-03	7.35E-03	7.35E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	7.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M2	Maneuvering	F	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-03	6.23E-03	6.23E-03	6.23E-03	6.23E-03	6.23E-03	6.23E-03	6.23E-03	6.23E-03	6.23E-03	6.23E-03	6.23E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M3	Maneuvering	F	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.94E-04	9.94E-04	9.94E-04	9.94E-04	9.94E-04	9.94E-04	9.94E-04	9.94E-04	9.94E-04	9.94E-04	9.94E-04	9.94E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M4	Maneuvering	E	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	M4	Maneuvering	F	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.53E-04	8.53E-04	8.53E-04	8.53E-04	8.53E-04	8.53E-04	8.53E-04	8.53E-04	8.53E-04	8.53E-04	8.53E-04	8.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H1	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H1	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H2	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H2	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H3	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H3	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H4	Hotelling	A	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H4	Hotelling	B	Barge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	1.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	C	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.97E-05	8.97E-05	8.97E-05	8.97E-05	8.97E-05	8.97E-05	8.97E-05	8.97E-05	8.97E-05	8.97E-05	8.97E-05	8.97E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	D	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.07E-04	6.07E-04	6.07E-04	6.07E-04	6.07E-04	6.07E-04	6.07E-04	6.07E-04	6.07E-04	6.07E-04	6.07E-04	6.07E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H5	Hotelling	E	Tug	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.53E-04	6.53E-04	6.53E-04	6.53E-04	6.53E-04	6.53E-04	6.53E-04	6.53E-04	6.53E-04	6.53E-04	6.53E-04	6.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	H6	Hotelling	E	PV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-05	2.33E-05	2.33E-05	2.33E-05	2.33E-05	2.33E-05	2.33E-05	2.33E-05	2.33E-05	2.33E-05	2.33E-05	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Emission Inventory

Source ID	Route/Location Description	Vessel Type	Operation Mode	X-Coor	Y-Coor	Exhaust Direction	Height	Exit Temperature	Exit Velocity	Stack Diameter	Maximum Emission Rate (g/s)		
(ID)	(Description)	(Type)	(Mode)	(HK1980)	(HK1980)	(Direction)	(mAG)	(K)	(m/s)	(m)	NO_X	RSP	FSP
M1_B_1	Route To/From Public Cargo Working Area	CCV, FCCV	Maneuvering	815498.75	826839.36	Vertical	11.0	555.0	25	0.8	6.596E-03	1.979E-04	1.913E-04
M1_B_2	Route To/From Public Cargo Working Area	CCV, FCCV	Maneuvering	815467.70	826800.90	Vertical	11.0	555.0	25	0.8	6.596E-03	1.979E-04	1.913E-04
M1_B_3	Route To/From Public Cargo Working Area	CCV, FCCV	Maneuvering	815423.43	826778.20	Vertical	11.0	555.0	25	0.8	6.596E-03	1.979E-04	1.913E-04
M1_B_4	Route To/From Public Cargo Working Area	CCV, FCCV	Maneuvering	815378.17	826756.94	Vertical	11.0	555.0	25	0.8	6.596E-03	1.979E-04	1.913E-04
M1_C_1	Route To/From Public Cargo Working Area	Tug	Maneuvering	815498.75	826839.36	Horizontal	4.0	694.7	8	0.3	9.734E-03	5.233E-04	5.088E-04
M1_C_2	Route To/From Public Cargo Working Area	Tug	Maneuvering	815467.70	826800.90	Horizontal	4.0	694.7	8	0.3	9.734E-03	5.233E-04	5.088E-04
M1_C_3	Route To/From Public Cargo Working Area	Tug	Maneuvering	815423.43	826778.20	Horizontal	4.0	694.7	8	0.3	9.734E-03	5.233E-04	5.088E-04
M1_C_4	Route To/From Public Cargo Working Area	Tug	Maneuvering	815378.17	826756.94	Horizontal	4.0	694.7	8	0.3	9.734E-03	5.233E-04	5.088E-04
M2_C_1	Route To/From Public Pier (North Route)	Tug	Maneuvering	815689.52	826772.48	Horizontal	4.0	694.7	8	0.3	1.758E-02	9.453E-04	9.191E-04
M2_C_2	Route To/From Public Pier (North Route)	Tug	Maneuvering	815644.36	826788.44	Horizontal	4.0	694.7	8	0.3	1.758E-02	9.453E-04	9.191E-04
M2_C_3	Route To/From Public Pier (North Route)	Tug	Maneuvering	815607.24	826821.76	Horizontal	4.0	694.7	8	0.3	1.758E-02	9.453E-04	9.191E-04
M2_C_4	Route To/From Public Pier (North Route)	Tug	Maneuvering	815561.14	826836.36	Horizontal	4.0	694.7	8	0.3	1.758E-02	9.453E-04	9.191E-04
M2_C_5	Route To/From Public Pier (North Route)	Tug	Maneuvering	815514.06	826820.78	Horizontal	4.0	694.7	8	0.3	1.758E-02	9.453E-04	9.191E-04
M2_C_6	Route To/From Public Pier (North Route)	Tug	Maneuvering	815468.81	826799.52	Horizontal	4.0	694.7	8	0.3	1.758E-02	9.453E-04	9.191E-04
M2_C_7	Route To/From Public Pier (North Route)	Tug	Maneuvering	815423.55	826778.26	Horizontal	4.0	694.7	8	0.3	1.758E-02	9.453E-04	9.191E-04
M2_C_8	Route To/From Public Pier (North Route)	Tug	Maneuvering	815378.30	826757.00	Horizontal	4.0	694.7	8	0.3	1.758E-02	9.453E-04	9.191E-04
M2_D_1	Route To/From Public Pier (North Route)	PaV	Maneuvering	815689.52	826772.48	Vertical	8.0	555.0	8	0.8	3.188E-03	9.596E-05	8.869E-05
M2_D_2	Route To/From Public Pier (North Route)	PaV	Maneuvering	815644.36	826788.44	Vertical	8.0	555.0	8	0.8	3.188E-03	9.596E-05	8.869E-05
M2_D_3	Route To/From Public Pier (North Route)	PaV	Maneuvering	815607.24	826821.76	Vertical	8.0	555.0	8	0.8	3.188E-03	9.596E-05	8.869E-05
M2_D_4	Route To/From Public Pier (North Route)	PaV	Maneuvering	815561.14	826836.36	Vertical	8.0	555.0	8	0.8	3.188E-03	9.596E-05	8.869E-05
M2_D_5	Route To/From Public Pier (North Route)	PaV	Maneuvering	815514.06	826820.78	Vertical	8.0	555.0	8	0.8	3.188E-03	9.596E-05	8.869E-05
M2_D_6	Route To/From Public Pier (North Route)	PaV	Maneuvering	815468.81	826799.52	Vertical	8.0	555.0	8	0.8	3.188E-03	9.596E-05	8.869E-05
M2_D_7	Route To/From Public Pier (North Route)	PaV	Maneuvering	815423.55	826778.26	Vertical	8.0	555.0	8	0.8	3.188E-03	9.596E-05	8.869E-05
M2_D_8	Route To/From Public Pier (North Route)	PaV	Maneuvering	815378.30	826757.00	Vertical	8.0	555.0	8	0.8	3.188E-03	9.596E-05	8.869E-05
M2_E_1	Route To/From Public Pier (North Route)	PV	Maneuvering	815689.52	826772.48	Horizontal	0.5	773.0	8	0.3	3.188E-03	9.596E-05	8.869E-05
M2_E_2	Route To/From Public Pier (North Route)	PV	Maneuvering	815644.36	826788.44	Horizontal	0.5	773.0	8	0.3	3.188E-03	9.596E-05	8.869E-05
M2_E_3	Route To/From Public Pier (North Route)	PV	Maneuvering	815607.24	826821.76	Horizontal	0.5	773.0	8	0.3	3.188E-03	9.596E-05	8.869E-05
M2_E_4	Route To/From Public Pier (North Route)	PV	Maneuvering	815561.14	826836.36	Horizontal	0.5	773.0	8	0.3	3.188E-03	9.596E-05	8.869E-05
M2_E_5	Route To/From Public Pier (North Route)	PV	Maneuvering	815514.06	826820.78	Horizontal	0.5	773.0	8	0.3	3.188E-03	9.596E-05	8.869E-05
M2_E_6	Route To/From Public Pier (North Route)	PV	Maneuvering	815468.81	826799.52	Horizontal	0.5	773.0	8	0.3	3.188E-03	9.596E-05	8.869E-05
M2_E_7	Route To/From Public Pier (North Route)	PV	Maneuvering	815423.55	826778.26	Horizontal	0.5	773.0	8	0.3	3.188E-03	9.596E-05	8.869E-05
M2_E_8	Route To/From Public Pier (North Route)	PV	Maneuvering	815378.30	826757.00	Horizontal	0.5	773.0	8	0.3	3.188E-03	9.596E-05	8.869E-05
M2_F_1	Route To/From Public Pier (North Route)	FL	Maneuvering	815689.52	826772.48	Horizontal	0.5	773.0	8	0.3	2.789E-03	6.549E-05	6.127E-05
M2_F_2	Route To/From Public Pier (North Route)	FL	Maneuvering	815644.36	826788.44	Horizontal	0.5	773.0	8	0.3	2.789E-03	6.549E-05	6.127E-05
M2_F_3	Route To/From Public Pier (North Route)	FL	Maneuvering	815607.24	826821.76	Horizontal	0.5	773.0	8	0.3	2.789E-03	6.549E-05	6.127E-05
M2_F_4	Route To/From Public Pier (North Route)	FL	Maneuvering	815561.14	826836.36	Horizontal	0.5	773.0	8	0.3	2.789E-03	6.549E-05	6.127E-05
M2_F_5	Route To/From Public Pier (North Route)	FL	Maneuvering	815514.06	826820.78	Horizontal	0.5	773.0	8	0.3	2.789E-03	6.549E-05	6.127E-05
M2_F_6	Route To/From Public Pier (North Route)	FL	Maneuvering	815468.81	826799.52	Horizontal	0.5	773.0	8	0.3	2.789E-03	6.549E-05	6.127E-05
M2_F_7	Route To/From Public Pier (North Route)	FL	Maneuvering	815423.55	826778.26	Horizontal	0.5	773.0	8	0.3	2.789E-03	6.549E-05	6.127E-05
M2_F_8	Route To/From Public Pier (North Route)	FL	Maneuvering	815378.30	826757.00	Horizontal	0.5	773.0	8	0.3	2.789E-03	6.549E-05	6.127E-05
M3_C_1	Route To/From Public Pier (South Route)	Tug	Maneuvering	815706.92	826745.06	Horizontal	4.0	694.7	8	0.3	3.171E-02	1.705E-03	1.658E-03

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Emission Inventory

Source ID	Route/Location Description	Vessel Type	Operation Mode	X-Coor	Y-Coor	Exhaust Direction	Height	Exit Temperature	Exit Velocity	Stack Diameter	Maximum Emission Rate (g/s)		
(ID)	(Description)	(Type)	(Mode)	(HK1980)	(HK1980)	(Direction)	(mAG)	(K)	(m/s)	(m)	NO_X	RSP	FSP
M3_C_2	Route To/From Public Pier (South Route)	Tug	Maneuvering	815676.15	826705.65	Horizontal	4.0	694.7	8	0.3	3.171E-02	1.705E-03	1.658E-03
M3_C_3	Route To/From Public Pier (South Route)	Tug	Maneuvering	815645.38	826666.24	Horizontal	4.0	694.7	8	0.3	3.171E-02	1.705E-03	1.658E-03
M3_C_4	Route To/From Public Pier (South Route)	Tug	Maneuvering	815614.60	826626.83	Horizontal	4.0	694.7	8	0.3	3.171E-02	1.705E-03	1.658E-03
M3_C_5	Route To/From Public Pier (South Route)	Tug	Maneuvering	815583.83	826587.42	Horizontal	4.0	694.7	8	0.3	3.171E-02	1.705E-03	1.658E-03
M3_C_6	Route To/From Public Pier (South Route)	Tug	Maneuvering	815553.06	826548.01	Horizontal	4.0	694.7	8	0.3	3.171E-02	1.705E-03	1.658E-03
M3_D_1	Route To/From Public Pier (South Route)	PaV	Maneuvering	815706.92	826745.06	Vertical	8.0	555.0	8	0.8	3.443E-02	1.037E-03	9.581E-04
M3_D_2	Route To/From Public Pier (South Route)	PaV	Maneuvering	815676.15	826705.65	Vertical	8.0	555.0	8	0.8	3.443E-02	1.037E-03	9.581E-04
M3_D_3	Route To/From Public Pier (South Route)	PaV	Maneuvering	815645.38	826666.24	Vertical	8.0	555.0	8	0.8	3.443E-02	1.037E-03	9.581E-04
M3_D_4	Route To/From Public Pier (South Route)	PaV	Maneuvering	815614.60	826626.83	Vertical	8.0	555.0	8	0.8	3.443E-02	1.037E-03	9.581E-04
M3_D_5	Route To/From Public Pier (South Route)	PaV	Maneuvering	815583.83	826587.42	Vertical	8.0	555.0	8	0.8	3.443E-02	1.037E-03	9.581E-04
M3_D_6	Route To/From Public Pier (South Route)	PaV	Maneuvering	815553.06	826548.01	Vertical	8.0	555.0	8	0.8	3.443E-02	1.037E-03	9.581E-04
M3_E_1	Route To/From Public Pier (South Route)	PV	Maneuvering	815706.92	826745.06	Horizontal	0.5	773.0	8	0.3	3.731E-02	1.123E-03	1.038E-03
M3_E_2	Route To/From Public Pier (South Route)	PV	Maneuvering	815676.15	826705.65	Horizontal	0.5	773.0	8	0.3	3.731E-02	1.123E-03	1.038E-03
M3_E_3	Route To/From Public Pier (South Route)	PV	Maneuvering	815645.38	826666.24	Horizontal	0.5	773.0	8	0.3	3.731E-02	1.123E-03	1.038E-03
M3_E_4	Route To/From Public Pier (South Route)	PV	Maneuvering	815614.60	826626.83	Horizontal	0.5	773.0	8	0.3	3.731E-02	1.123E-03	1.038E-03
M3_E_5	Route To/From Public Pier (South Route)	PV	Maneuvering	815583.83	826587.42	Horizontal	0.5	773.0	8	0.3	3.731E-02	1.123E-03	1.038E-03
M3_E_6	Route To/From Public Pier (South Route)	PV	Maneuvering	815553.06	826548.01	Horizontal	0.5	773.0	8	0.3	3.731E-02	1.123E-03	1.038E-03
M3_F_1	Route To/From Public Pier (South Route)	FL	Maneuvering	815706.92	826745.06	Horizontal	0.5	773.0	8	0.3	7.544E-03	1.772E-04	1.657E-04
M3_F_2	Route To/From Public Pier (South Route)	FL	Maneuvering	815676.15	826705.65	Horizontal	0.5	773.0	8	0.3	7.544E-03	1.772E-04	1.657E-04
M3_F_3	Route To/From Public Pier (South Route)	FL	Maneuvering	815645.38	826666.24	Horizontal	0.5	773.0	8	0.3	7.544E-03	1.772E-04	1.657E-04
M3_F_4	Route To/From Public Pier (South Route)	FL	Maneuvering	815614.60	826626.83	Horizontal	0.5	773.0	8	0.3	7.544E-03	1.772E-04	1.657E-04
M3_F_5	Route To/From Public Pier (South Route)	FL	Maneuvering	815583.83	826587.42	Horizontal	0.5	773.0	8	0.3	7.544E-03	1.772E-04	1.657E-04
M3_F_6	Route To/From Public Pier (South Route)	FL	Maneuvering	815553.06	826548.01	Horizontal	0.5	773.0	8	0.3	7.544E-03	1.772E-04	1.657E-04
M4_E_1	Route To/From Floating Jetty	PV	Maneuvering	815848.38	826653.85	Horizontal	0.5	773.0	8	0.3	1.639E-03	4.935E-05	4.561E-05
M4_E_2	Route To/From Floating Jetty	PV	Maneuvering	815865.44	826606.85	Horizontal	0.5	773.0	8	0.3	1.639E-03	4.935E-05	4.561E-05
M4_E_3	Route To/From Floating Jetty	PV	Maneuvering	815882.50	826559.85	Horizontal	0.5	773.0	8	0.3	1.639E-03	4.935E-05	4.561E-05
M4_E_4	Route To/From Floating Jetty	PV	Maneuvering	815888.25	826510.46	Horizontal	0.5	773.0	8	0.3	1.639E-03	4.935E-05	4.561E-05
M4_E_5	Route To/From Floating Jetty	PV	Maneuvering	815889.23	826460.48	Horizontal	0.5	773.0	8	0.3	1.639E-03	4.935E-05	4.561E-05
M4_F_1	Route To/From Floating Jetty	FL	Maneuvering	815848.38	826653.85	Horizontal	0.5	773.0	8	0.3	7.768E-03	1.824E-04	1.707E-04
M4_F_2	Route To/From Floating Jetty	FL	Maneuvering	815865.44	826606.85	Horizontal	0.5	773.0	8	0.3	7.768E-03	1.824E-04	1.707E-04
M4_F_3	Route To/From Floating Jetty	FL	Maneuvering	815882.50	826559.85	Horizontal	0.5	773.0	8	0.3	7.768E-03	1.824E-04	1.707E-04
M4_F_4	Route To/From Floating Jetty	FL	Maneuvering	815888.25	826510.46	Horizontal	0.5	773.0	8	0.3	7.768E-03	1.824E-04	1.707E-04
M4_F_5	Route To/From Floating Jetty	FL	Maneuvering	815889.23	826460.48	Horizontal	0.5	773.0	8	0.3	7.768E-03	1.824E-04	1.707E-04
H1_A_1	Berthing at Public Cargo Working Area	Barge	Hotelling	815302.29	826795.48	Vertical	11.0	588.0	8	0.2	6.928E-02	2.771E-03	2.702E-03
H1_B_1	Berthing at Public Cargo Working Area	CCV, FCCV	Hotelling	815302.29	826795.48	Vertical	11.0	555.0	25	0.8	4.419E-02	1.768E-03	1.724E-03
H2_A_1	Berthing at Public Cargo Working Area	Barge	Hotelling	815369.67	826825.92	Vertical	11.0	588.0	8	0.2	6.928E-02	2.771E-03	2.702E-03
H2_B_1	Berthing at Public Cargo Working Area	CCV, FCCV	Hotelling	815369.67	826825.92	Vertical	11.0	555.0	25	0.8	4.419E-02	1.768E-03	1.724E-03
H3_A_1	Berthing at Public Cargo Working Area	Barge	Hotelling	815436.87	826856.75	Vertical	11.0	588.0	8	0.2	6.928E-02	2.771E-03	2.702E-03
H3_B_1	Berthing at Public Cargo Working Area	CCV, FCCV	Hotelling	815436.87	826856.75	Vertical	11.0	555.0	25	0.8	4.419E-02	1.768E-03	1.724E-03
H4_A_1	Berthing at Public Cargo Working Area	Barge	Hotelling	815504.07	826887.59	Vertical	11.0	588.0	8	0.2	6.928E-02	2.771E-03	2.702E-03
H4_B_1	Berthing at Public Cargo Working Area	CCV, FCCV	Hotelling	815504.07	826887.59	Vertical	11.0	555.0	25	0.8	4.419E-02	1.768E-03	1.724E-03
H5_C_1	Berthing at Public Pier	Tug	Hotelling	815737.69	826784.47	Horizontal	4.0	694.7	8	0.3	2.299E-03	9.197E-05	8.967E-05

Appendix 3.6 - Marine Emission Rate Calculations, Assumptions and Emission Inventory

Emission Inventory

Source ID	Route/Location Description	Vessel Type	Operation Mode	X-Coor	Y-Coor	Exhaust Direction	Height	Exit Temperature	Exit Velocity	Stack Diameter	Maximum Emission Rate (g/s)		
(ID)	(Description)	(Type)	(Mode)	(HK1980)	(HK1980)	(Direction)	(mAG)	(K)	(m/s)	(m)	NO_X	RSP	FSP
H5_D_1	Berthing at Public Pier	PaV	Hotelling	815737.69	826784.47	Vertical	8.0	555.0	8	0.8	1.874E-02	5.258E-04	6.067E-04
H5_E_1	Berthing at Public Pier	PV	Hotelling	815737.69	826784.47	Horizontal	0.5	773.0	8	0.3	2.018E-02	5.662E-04	6.533E-04
H6_E_1	Berthing at Floating Jetty	PV	Hotelling	815831.32	826700.85	Horizontal	0.5	773.0	8	0.3	7.207E-04	2.022E-05	2.333E-05