

Appendix 3.3 Calculation of Emissions from Marine Vessels

		North Lantau vessels	Remark
Cruising speed (knots)		10	Made reference to EIA Report for WENT Landfill Extension
Number of trip per day		2	Provided by NLRTS operator
Maneuvering period at NLRTS berth for 1st		06:00-07:00	
1st trip - Exact time leaving NLRTS after maneuvering		07:00	
1st trip - Exact time back to NLRTS		12:00	
Maneuvering period at NLRTS berth for 2nd		13:00-14:00	
2nd trip - Exact time leaving NLRTS after maneuvering		14:00	
2nd trip - Exact time back to NLRTS		19:00	
Engine Power	Propulsion Engine	500kW x 2	Made reference to EIA Report for WENT Landfill Extension
	Auxiliary Engine	431kW, 95kW	Made reference to EIA Report for WENT Landfill Extension
Load Factor during Cruising (%)	Propulsion Engine	80%	Made reference to EIA Report for WENT Landfill Extension
	Auxiliary Engine	65%, 60%	Made reference to EIA Report for WENT Landfill Extension
Load Factor during Manoeuvring at NLRTS berth (%)	Propulsion Engine	N/A	Made reference to EIA Report for WENT Landfill Extension
	Auxiliary Engine	65%	Made reference to EIA Report for WENT Landfill Extension
Release height above sea level (m)	Propulsion Engine	11	Made reference to EIA Report for WENT Landfill Extension
	Auxiliary Engine	11	Made reference to EIA Report for WENT Landfill Extension
Exit temperature (°C)	Propulsion Engine	426	Made reference to EIA Report for WENT Landfill Extension
	Auxiliary Engine	315	Made reference to EIA Report for WENT Landfill Extension
Diameter of vent pipe (m)	Propulsion Engine	0.2	Made reference to EIA Report for WENT Landfill Extension
	Auxiliary Engine	0.2	Made reference to EIA Report for WENT Landfill Extension
Exit velocity (m/s)	Propulsion Engine	8	Made reference to EIA Report for Sludge Treatment Facilities
	Auxiliary Engine	8	Made reference to EIA Report for Sludge Treatment Facilities

According to *Current Methodologies and Best Practices in Preparing Port Emission Inventories*,

$$\text{Emission (g/hr)} = \text{Engine Power (kW)} \times \text{Loading Factor} \times \text{Emission Factor (g/kWh)}$$

	Emission Factor using fuel sulfur content of 1.5% (g/kWh)	Adjusted emission factors using fuel with average 0.3% sulphur content (g/kWh)
NO _x	13.2	13.2
SO ₂ #	0.63	0.126
PM ₁₀ #	0.72	0.144

note: # SO₂ emissions listed in *Current Methodologies and Best Practices in Preparing Port Emission Inventories* are based on fuel sulfur content of 1.5 percent and should be scaled up or down based on actual fuel sulfur content used for the vessel. PM emissions also may change based upon sulfur level and also should be scaled. Therefore, Adjusted emission factor = (0.3/1.5) x Emission factor

North Lantau vessels

			Total emission/vessel (g/s)	Travel Distance (m)	Travel Time (min)	Total emission per source location in model taking into account actual travelling time (g/s) *
EF of Nox / vessel	During Cruising	Propulsion Engine	2.9333	630	2.04	6.65E-03
		Auxiliary Engine	1.2362			
EF of SO ₂ / vessel	During Maneuvering	Propulsion Engine	1.2536	630	2.04	1.25E+00
		Auxiliary Engine	0.0280			
EF of RSP / vessel	During Cruising	Propulsion Engine	0.0118	630	2.04	6.35E-05
		Auxiliary Engine	0.0120			
	During Maneuvering	Propulsion Engine	0.0320	630	2.04	7.25E-05
		Auxiliary Engine	0.0135			
			0.0137			3.06E-05
						1.37E-02

note: * total emission used in model (g/s) = total emission per vessel (g/s) x travel time / 1-hour / number of source points during travelling

Appendix 3.3 Calculation of Emissions from Marine Vessels

Lantau Logistics Park

Cruising speed (m/s)	4.7
Release height above sea level (m)	10
Exit temperature of vent pipe (°C)	250
Diameter of vent pipe (m)	1.7
Exit velocity (m/s)	1

		Total emission/vessel (g/hr) [^]	Total emission/vessel (g/s)	Travel Distance (m)	Travelling Time / Maneuvering Time (s)	Total emission per source location in model taking into account actual travelling time / maneuvering time (g/s) *
EF of Nox / vessel	During Cruising	7766	2.1572	135	28.72	4.30E-03
	During Maneuvering	5570	1.5472		1800	7.74E-01
EF of SO ₂ / vessel #	During Cruising	8082	2.2450	135	28.72	4.48E-03
	During Maneuvering	5898	1.6383		1800	8.19E-01
EF of RSP / vessel	During Cruising	198	0.0550	135	28.72	1.10E-04
	During Maneuvering	148	0.0411		1800	2.06E-02

note: * total emission used in model (g/s) = total emission per vessel (g/s) x travel time / 1-hour / number of source points during travelling

Based on reasonable assumption of 2% sulphur content

[^] Values are provided by Civil Engineering and Development Department