APPENDIX 3.2

Details of Dust Emission Sources Calculation

Details of Dust Emission Sources for 1-hour TSP Assessment (Tier 1)

Appendix 3.2- Details of Dust Emission Sources for 1-hour TSP Assessment (Tier 1)

Ocean Park - Tai Shue Wan

Works Area	Sources	Parameter		Remarks
Ocean Park	Heavy construction Source ID: A1 - A19	Percentage active area, p	100 %	Assume 100% works area for heavy construction
		Mitigation efficiency	91.7 %	Water suppression 4 times a day
		No. of working days per month, d	26 days	
		No. of working hours per day, h	10 hour	From 8:00 to 18:00
		Emission Factor	2.69 Mg/hectare/month of activity	AP42, Section 13.2.3.3
		Emission Rate	2.87393E-04 g/m²/s (unmitigated)	=2.69*1000000/(10000*d*h*60*60)*p/100
			2.38536E-05 g/m²/s (mitigated)	
	Wind Erosion for Working Hours Source ID: A1 - A19	Percentage active area, p	100 %	
		Mitigation efficiency	91.7 %	Water suppression 4 times a day
		Emission Factor	0.85 Mg/hectare/year	AP42, Table 11.9-4
		Emission Rate	2.69533E-06 g/m²/s (unmitigated)	=0.85*1000000/(10000*365*24*60*60)*p/100
			2.23713E-07 g/m²/s (mitigated)	
	Wind Erosion for Non-Working Hours Source ID: A1 - A19	Percentage active area, p	100 %	
		Emission Factor	0.85 Mg/hectare/year	AP42, Table 11.9-4
		Emission Rate	2.69533E-06 g/m²/s (unmitigated)	=0.85*1000000/(10000*365*24*60*60)*p/100

Appendix 3.2 - Details of Dust Emission Sources for 1-hour TSP Assessment (Tier 1)

Ocean Park - Tai Shue Wan

Works Area	Sources	Parameter		Remarks
Haul Road	Paved haul road within project site For **Laden** Vehicle Source ID: L1 to L8 and L10 to L26	Particle size multiplier, k	3.23 g/VKT	AP-42, Section 13.2.1, Table 13.2.1-1, 01/11 ed.
		Road surface silt loading, sL	12 g/m2	AP-42, Section 13.2.1, Table 13.2.1-3, 01/11 ed.
		Average truck weight, W	38 tons	Full loading of Dump Truck
		Emission height	0.5 m	
		TSP emission factor, E		$E = k \times (sL)^{0.91} \times (W)^{1.02}$ (AP-42, section 13.2.1, 01/11 ed.)
			1267 g/VKT	
		No. of truck trips per day	15 trips/hr	From engineer
		No. of operation hour	10 hr	From 8:00 to 18:00
		% of dust suppression	97.5 %	Assume as the same as Express Rail Link and Extracted from SP License of XRL (Appendix C).
		Emission Rate	1.32E-04 g/m/s (mitigated)	
	Paved haul road within project site For **Unladen** Vehicle Source ID: L27 to L34 and L36 to L52	Particle size multiplier, k	3.23 g/VKT	AP-42, Section 13.2.1, Table 13.2.1-1, 01/11 ed.
		Road surface silt loading, sL	12 g/m2	AP-42, Section 13.2.1, Table 13.2.1-3, 01/11 ed.
		Average truck weight, W	5 tons	Unladen Dump Truck
		Emission height	0.5 m	
		TSP emission factor, E		$E = k \times (sL)^{0.91} \times (W)^{1.02}$ (AP-42, section 13.2.1, 01/11 ed.)
			160 g/VKT	
		No. of truck trips per day	15 trips/hr	From engineer
		No. of operation hour	10 hr	From 8:00 to 18:00
		% of dust suppression	97.5 %	Assume as the same as Express Rail Link and Extracted from SP License of XRL (Appendix C).
		Emission Rate	1.7E-05 g/m/s (mitigated)	

Appendix 3.2 - Details of Dust Emission Sources for 1-hour TSP Assessment (Tier 1)

Ocean Park - Tai Shue Wan

Description	Sources	Parameter	Emission Rate		Remarks
Stockpile of Inert C&D material to be reused on-site	Material handling and storage piles Source ID: S1	Percentage open stockpile area, p	20	%	80% stockpiling area is covered by impervious sheets and all dusty k (particle size < 30μm)
		Particle size multiplier, k	0.74		
		Moisture content, M	5	%	Assume worst case scenario
		Average wind speed, U	3	m/s	from PATH mm5 data grid (28,22) annual average wind speed
		Emission Factor, E	0.000491297	kg/Mg	$E = k*0.0016*[(U/2.2)^{1.3}/(M/2)^{1.4}]$
		Monthly output	752	m3/month	From engineer (email on 20140213)
		Maximum hourly output, op	2.9	m3/hr	26 days per month, 10 working hours per day (from 8:00 to 18:00)
			7.2	Mg/hr	Assume capacity of dump truck is 6m^3 and 15 tons
		Area of the Asphalt stockpile, A	430	m^2	
		Emission Rate	2.29326E-06	g/m²/s (unmitigated)	Unmitigated Emission Rate=E*1000*op/(A*60*60)
			4.58652E-07	g/m²/s (mitigated)	Mitigated Emission Rate'=E*1000*op/(A*60*60)*p/100
	Wind erosion Source ID: As above	Percentage open stockpile area, p	100	% (unmitigated)	
			20	% (mitigated)	80% stockpiling area is covered by impervious sheets
		Emission Factor	0.85	Mg/hectare/year	AP42, Section 11.9.4
		Emission Rate	2.69533E-06	g/m²/s (unmitigated)	=0.85*1000000/(10000*365*24*60*60)*p/100
			5.39066E-07	g/m²/s (mitigated)	

Details of Dust Emission Sources for 1-hour RSP Assessment (Tier 1)

Appendix 3.2 - Details of Dust Emission Sources for 1-hour RSP Assessment (Tier 1)

Ocean Park - Tai Shue Wan

Works Area	Sources	Parameter		Remarks
Ocean Park	Heavy construction Source ID: A1 - A19	Percentage active area, p	100 %	Assume 100% works area for heavy construction
		Mitigation efficiency	91.7 %	Water suppression 4 times a day
		No. of working days per month, d	26 days	
		No. of working hours per day, h	10 hour	From 8:00 to 18:00
		Emission Factor for TSP	2.69 Mg/hectare/month of activity	AP42, Section 13.2.3.3
		% content of RSP	30 % of TSP	
		Emission Factor for RSP	0.81 Mg/hectare/month of activity	
		Emission Rate for RSP	8.62179E-05 g/m²/s (unmitigated)	=2.69*0.3*1000000/(10000*d*h*60*60)*p/100
			7.15609E-06 g/m²/s (mitigated)	
	Wind Erosion for Working Hours Source ID: A1 - A19	Percentage active area, p	100 %	
		Mitigation efficiency	91.7 %	Water suppression 4 times a day
		Emission Factor for TSP	0.85 Mg/hectare/year	AP42, Table 11.9-4
		% content of RSP	30 % of TSP	
		Emission Factor for RSP	0.26 Mg/hectare/year	
		Emission Rate for RSP	8.086E-07 g/m²/s (unmitigated)	=0.85*0.3*1000000/(10000*365*24*60*60)*p/100
			6.71138E-08 g/m²/s (mitigated)	
	Wind Erosion for Non-Working Hours Source ID: A1 - A19	Percentage active area, p	100 %	
		Emission Factor for TSP	0.85 Mg/hectare/year	AP42, Table 11.9-4
		% content of RSP	30 % of TSP	
		Emission Factor for RSP	0.26 Mg/hectare/year	
		Emission Rate	8.086E-07 g/m²/s (unmitigated)	=0.85*0.3*1000000/(10000*365*24*60*60)*p/100

Appendix 3.2 - Details of Dust Emission Sources for 1-hour RSP Assessment (Tier 1)

Ocean Park - Tai Shue Wan

Works Area	Sources	Parameter			Remarks
Haul Road	Paved haul road within project site For **Laden** Vehicle Source ID: L1 to L8 and L10 to L26	Particle size multiplier, k Road surface silt loading, sL Average truck weight, W Emission height TSP emission factor, E	0.62 12 38 0.5 243	g/VKT g/m2 tons m g/VKT	AP-42, Section 13.2.1, Table 13.2.1-1, 01/11 ed. AP-42, Section 13.2.1, Table 13.2.1-3, 01/11 ed. Full loading of Dump Truck E=k x (sL)^0.91x (W)^1.02 (AP-42, section 13.2.1, 01/11 ed.)
		No. of truck trips per day No. of operation hour % of dust suppression	15 10 97.5	trips/hr hr %	From engineer From 8:00 to 18:00 Assume as the same as Express Rail Link and Extracted from SP License of XRL (Appendix C).
		Emission Rate	2.53E-05	g/m/s (mitigated)	
	Paved haul road within project site For **Unladen** Vehicle Source ID: L27 to L34 and L36 to L52	Particle size multiplier, k Road surface silt loading, sL Average truck weight, W Emission height TSP emission factor, E	0.62 12 5 0.5 31	g/VKT g/m2 tons m g/VKT	AP-42, Section 13.2.1, Table 13.2.1-1, 01/11 ed. AP-42, Section 13.2.1, Table 13.2.1-3, 01/11 ed. Unladen Dump Truck E=k x (sL)^0.91x (W)^1.02 (AP-42, section 13.2.1, 01/11 ed.)
		No. of truck trips per day No. of operation hour % of dust suppression	15 10 97.5	trips/hr hr %	From engineer From 8:00 to 18:00 Assume as the same as Express Rail Link and Extracted from SP License of XRL (Appendix C).
		Emission Rate	3.2E-06	g/m/s (mitigated)	

Ocean Park - Tai Shue Wan

Description	Sources	Parameter	Emission Rate		Remarks
Stockpile of Inert C&D material to be reused on-site	Material handling and storage piles Source ID: S1	Percentage open stockpile area, p	20	%	80% stockpiling area is covered by impervious sheets and all dusty
		Particle size multiplier, k	0.35		k (particle size < 30μm)
		Moisture content, M	5	%	Assume worst case scenario
		Average wind speed, U	3	m/s	from PATH mm5 data grid (28,22) annual average wind speed
		Emission Factor, E	0.00023237	kg/Mg	$E=k*0.0016*[(U/2.2)^{1.3}/(M/2)^{1.4}]$
		Monthly output	752	m3/month	From engineer
					(email on 20140213)
		Maximum hourly output, op	2.9	m3/hr	26 days per month, 10 working hours per day (from 8:00 to 18:00)
			7.2	Mg/hr	Assume capacity of dump truck is 6m^3 and 15 tons
		Area of the Asphalt stockpile, A	430	m^2	
		Emission Rate	1.08465E-06	g/m²/s (unmitigated)	Unmitigated Emission Rate=E*1000*op/(A*60*60)
			2.1693E-07	g/m²/s (mitigated)	Mitigated Emission Rate'=E*1000*op/(A*60*60)*p/100
	Wind erosion Source ID: As above	Percentage open stockpile area, p	100	% (unmitigated)	
			20	% (mitigated)	80% stockpiling area is covered by impervious sheets
		Emission Factor	0.85	Mg/hectare/year	AP42, Section 11.9.4
		Emission Rate	2.69533E-06	g/m²/s (unmitigated)	=0.85*1000000/(10000*365*24*60*60)*p/100
			5.39066E-07	g/m²/s (mitigated)	

Details of Dust Emission Sources for 1-hour FSP Assessment (Tier 1)

Appendix 3.2 - Details of Dust Emission Sources for 1-hour FSP Assessment (Tier 1)

Ocean Park

Works Area	Sources	Parameter		Remarks
Ocean Park	Heavy construction Source ID: A1 - A19	Percentage active area, p	100 %	Assume 100% works area for heavy construction
		Mitigation efficiency	91.7 %	Water suppression 4 times a day
		No. of working days per month, d	26 days	
		No. of working hours per day, h	10 hour	From 8:00 to 18:00
		Emission Factor for TSP	2.69 Mg/hectare/month of activity	AP42, Section 13.2.3.3
		% content of FSP	3 % of TSP	
		Emission Factor for FSP	0.08 Mg/hectare/month of activity	
		Emission Rate for FSP	8.62179E-06 g/m²/s (unmitigated)	=2.69*0.03*1000000/(10000*d*h*60*60)*p/100
			7.15609E-07 g/m²/s (mitigated)	
	Wind Erosion for Working Hours Source ID: A1 - A19	Percentage active area, p	100 %	
		Mitigation efficiency	91.7 %	Water suppression 4 times a day
		Emission Factor for TSP	0.85 Mg/hectare/year	AP42, Table 11.9-4
		% content of FSP	3 % of TSP	
		Emission Factor for FSP	0.03 Mg/hectare/year	
		Emission Rate for FSP	8.086E-08 g/m²/s (unmitigated)	=0.85*0.03*1000000/(10000*365*24*60*60)*p/100
			6.71138E-09 g/m²/s (mitigated)	
	Wind Erosion for Non-Working Hours Source ID: A1 - A19	Percentage active area, p	100 %	
		Emission Factor for TSP	0.85 Mg/hectare/year	AP42, Table 11.9-4
		% content of FSP	3 % of TSP	
		Emission Factor for FSP	0.03 Mg/hectare/year	
		Emission Rate	8.086E-08 g/m²/s (unmitigated)	=0.85*0.03*1000000/(10000*365*24*60*60)*p/100

Appendix 3.2 - Details of Dust Emission Sources for 1-hour FSP Assessment (Tier 1)

Ocean Park - Tai Shue Wan

Works Area	Sources	Parameter			Remarks
Haul Road	Paved haul road within project site For **Laden** Vehicle Source ID: L1 to L8 and L10 to L26	Particle size multiplier, k Road surface silt loading, sL Average truck weight, W Emission height TSP emission factor, E No. of truck trips per day No. of operation hour % of dust suppression Emission Rate	0.15 12 38 0.5 59 15 10 97.5 6.13E-06	g/VKT g/m2 tons m g/VKT trips/hr hr % g/m/s (mitigated)	AP-42, Section 13.2.1, Table 13.2.1-1, 01/11 ed. AP-42, Section 13.2.1, Table 13.2.1-3, 01/11 ed. Full loading of Dump Truck E=k x (sL)^0.91x (W)^1.02 (AP-42, section 13.2.1, 01/11 ed.) From engineer From 8:00 to 18:00 Assume as the same as Express Rail Link and Extracted from SP License of XRL (Appendix C).
	Paved haul road within project site For **Unladen** Vehicle Source ID: L27 to L34 and L36 to L52	Particle size multiplier, k Road surface silt loading, sL Average truck weight, W Emission height TSP emission factor, E No. of truck trips per day No. of operation hour % of dust suppression Emission Rate	0.15 12 5 0.5 7 15 10 97.5 7.7E-07	g/VKT g/m2 tons m g/VKT trips/hr hr % g/m/s (mitigated)	AP-42, Section 13.2.1, Table 13.2.1-1, 01/11 ed. AP-42, Section 13.2.1, Table 13.2.1-3, 01/11 ed. Unladen Dump Truck E=k x (sL)^0.91x (W)^1.02 (AP-42, section 13.2.1, 01/11 ed.) From engineer From 8:00 to 18:00 Assume as the same as Express Rail Link and Extracted from SP License of XRL (Appendix C).

Appendix 3.2 - Details of Dust Emission Sources for 1-hour FSP Assessment (Tier 1)

Ocean Park - Tai Shue Wan

Description	Sources	Parameter	Emission Rate		Remarks
Stockpile of Inert C&D material to be reused on-site	Material handling and storage piles Source ID: S1	Percentage open stockpile area, p	20	%	80% stockpiling area is covered by impervious sheets and all dusty
		Particle size multiplier, k	0.053		k (particle size < 30μm)
		Moisture content, M	5	%	Assume worst case scenario
		Average wind speed, U	3	m/s	from PATH mm5 data grid (28,22) annual average wind speed
		Emission Factor, E	3.51875E-05	kg/Mg	E=k*0.0016*[(U/2.2)^1.3/(M/2)^1.4]
		Monthly output	752	m3/month	From engineer
					(email on 20140213)
		Maximum hourly output, op	2.9	m3/hr	26 days per month, 10 working hours per day (from 8:00 to 18:00)
			7.2	Mg/hr	Assume capacity of dump truck is 6m^3 and 15 tons
		Area of the Asphalt stockpile, A	430	m^2	
		Emission Rate	1.64247E-07	g/m²/s (unmitigated)	Unmitigated Emission Rate=E*1000*op/(A*60*60)
			3.28494E-08	g/m²/s (mitigated)	Mitigated Emission Rate'=E*1000*op/(A*60*60)*p/100
	Wind erosion Source ID: As above	Percentage open stockpile area, p	100	% (unmitigated)	
			20	% (mitigated)	80% stockpiling area is covered by impervious sheets
		Emission Factor	0.85	Mg/hectare/year	AP42, Section 11.9.4
		Emission Rate	2.69533E-06	g/m²/s (unmitigated)	=0.85*1000000/(10000*365*24*60*60)*p/100
			5.39066E-07	g/m²/s (mitigated)	