Appendix 3-3

Calculation of RSP Emission Rates of this Project

Calculation of Emission Factors During Filling/ Excavation Works

Appendix 3-3A Summary Table of Calculated RSP Emissions Modeling Input Data During Filling/ Excavation Works (Unmitigated Scenario)

For both the unmitigated scenario and mitigated scenarios, since there will be no construction activities during restricted hours, and on Sundays and general holidays, the calculated emission rates have been applied to day-time hours during general weekdays only (i.e. 0800 to 1800 hours). While from 1800 to 0800 hours during general workdays, and on Sunday and general holidays (whole day) are adopted for impact assessment of wind erosion on the site.

Cut and Cover (day-time only)

| Project Site | Ref. ID | X coordiante | Y coordinate | Elevation, m | Release Height, m | Umitigated * | |
						Emission rate, g/m²/s	Int. Vert. Dim.
Yau Mei	B1	823791.7	837839.3	2	0	8.19E-05	0
Yau Mei	C1	823674.3	837936.5	2	0	8.19E-05	0
Yau Mei	C2	823611.3	837992.5	2	0	8.19E-05	0
Yau Mei	D1	823556.8	837822.6	2	0	8.19E-05	0
Yau Mei	D2	823530.8	837837.1	2	0	8.19E-05	0

Wind Erosion

| Project Site | Ref. ID | X coordiante | Y coordinate | Elevation, m | Release Height, m | Night-time only * | | Day-time only * |
						Emission rate, g/m²/s	Int. Vert. Dim.	Emission rate, g/m²/s
Yau Mei	B1	823791.7	837839.3	2	0	1.37E-06	0	1.37E-06
Yau Mei	C1	823674.3	837936.5	2	0	1.37E-06	0	1.37E-06
Yau Mei	C2	823611.3	837992.5	2	0	1.37E-06	0	1.37E-06
Yau Mei	D1	823556.8	837822.6	2	0	1.37E-06	0	1.37E-06
Yau Mei	D2	823530.8	837837.1	2	0	1.37E-06	0	1.37E-06

Travelling on Haul Road (unpaved) (day-time only)

| Project Site | Road Segment ID | X coordiante | Y coordinate | Ground mPD level, m | X Length, m | Y Length, m | Emission Height, m | Angle, degree | Unmitigated * | | | Int. Vert. Dim. |
| | | | | | | | | | Calculated emission rate, g/m/s | Total emission, g/s | Emission rate, g/m²/s | |
					B	C			A	= (A*B)	= (A*B) /(B*C)	
Yau Mei	HR34	823606.25	837783.42	2	21	6	0.5	-107	3.22E-04	6.75E-03	5.36E-05	0
Yau Mei	HR35	823600.55	837800.67	2	10	6	0.5	-31	3.22E-04	3.22E-03	5.36E-05	0
Yau Mei	HR36	823609.29	837806.18	2	35	6	0.5	-29	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR37	823639.8	837823.3	2	35	6	0.5	-11	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR38	823674.9	837829.9	2	10	6	0.5	-27	3.22E-04	3.22E-03	5.36E-05	0
Yau Mei	HR39	823684.2	837835.1	2	35	6	0.5	-43	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR40	823711.5	837860.7	2	14	6	0.5	-83	3.22E-04	4.50E-03	5.36E-05	0
Yau Mei	HR41	823715.49	837876.74	2	21	6	0.5	-141	3.22E-04	6.75E-03	5.36E-05	0
Yau Mei	HR42	823699.06	837890.03	2	35	6	0.5	-157	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR43	823665.74	837904.45	2	35	6	0.5	-169	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR44	823632.84	837910.8	2	35	6	0.5	-152	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR45	823602.58	837926.84	2	35	6	0.5	-143	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR46	823574.8	837948.13	2	20	6	0.5	-143	3.22E-04	6.43E-03	5.36E-05	0

Remark: * Please refer to Appendix 3-3C for the calculation of emission factors.

Appendix 3-3B   Summary Table of Calculated RSP Emissions Modeling Input Data During Filling/ Excavation Works (Mitigated Scenario)

For both the unmitigated scenario and mitigated scenarios, since there will be no construction activities during restricted hours, and on Sundays and general holidays, the calculated emission rates have been applied to day-time hours during general weekdays only (i.e. 0800 to 1800 hours). While from 1800 to 0800 hours during general workdays, and on Sunday and general holidays (whole day) are adopted for impact assessment of wind erosion on the site.

Cut and Cover (day-time only)

						Mitigated *	
Project Site	Ref. ID	X coordiante	Y coordinate	Elevation,m	Release Height, m	Emission rate, g/m^2/s	Int. Vert. Dim.
Yau Mei	Y01	823716	837918	2	0	8.19E-06	0
Yau Mei	Y02	823762.638	837885.693	2	0	8.19E-06	0
Yau Mei	Y03	823791.862	837841.201	2	0	8.19E-06	0
Yau Mei	Y04	823736.167	837827.063	2	0	8.19E-06	0
Yau Mei	Y05	823630.998	837877.023	2	0	8.19E-06	0
Yau Mei	Y06	823631	837877	2	0	8.19E-06	0
Yau Mei	Y07	823661.372	837860.749	2	0	8.19E-06	0
Yau Mei	Y08	823577.758	838018.797	2	0	8.19E-06	0
Yau Mei	Y09	823471.666	838003.9	2	0	8.19E-06	0
Yau Mei	Y10	823509.885	837938.972	2	0	8.19E-06	0
Yau Mei	Y11	823610.592	837970.06	2	0	8.19E-06	0
Yau Mei	Y12	823652.24	837942.697	2	0	8.19E-06	0
Yau Mei	Y13	823604.809	837915.329	2	0	8.19E-06	0
Yau Mei	Y14	823576.077	837875.705	2	0	8.19E-06	0
Yau Mei	Y15	823505.176	837857.374	2	0	8.19E-06	0
Yau Mei	Y16	823473.021	837825.291	2	0	8.19E-06	0
Yau Mei	Y17	823525.379	837798.17	2	0	8.19E-06	0
Yau Mei	Y18	823540.631	837900.732	2	0	8.19E-06	0
Yau Mei	Y19	823577.386	837822.631	2	0	8.19E-06	0
Yau Mei	Y20	823638.814	837832.11	2	0	8.19E-06	0
Yau Mei	Y21	823594.362	837784.138	2	0	8.19E-06	0

Wind Erosion

						Night-time only *		Day-time only *
Project Site	Ref. ID	X coordiante	Y coordinate	Elevation,m	Release Height, m	Emission rate, g/m^2/s	Int. Vert. Dim.	Emission rate, g/m^2/s
Yau Mei	Y01	823716	837918	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y02	823762.638	837885.693	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y03	823791.862	837841.201	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y04	823736.167	837827.063	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y05	823630.998	837877.023	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y06	823631	837877	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y07	823661.372	837860.749	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y08	823577.758	838018.797	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y09	823471.666	838003.9	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y10	823509.885	837938.972	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y11	823610.592	837970.06	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y12	823652.24	837942.697	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y13	823604.809	837915.329	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y14	823576.077	837875.705	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y15	823505.176	837857.374	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y16	823473.021	837825.291	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y17	823525.379	837798.17	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y18	823540.631	837900.732	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y19	823577.386	837822.631	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y20	823638.814	837832.11	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y21	823594.362	837784.138	2	0	1.37E-06	0	1.37E-06

Inputs to the ISCST Model:

		Calculated Emission Rate *	Emission Rate Factor **
General Workdays	Day-time (A)	8.19E-06	
	Night-time (B)	1.37E-06	0.16730 =B/A

Remark: * Please refer to Appendices 3-3C for the calculation of emission factors.

** For general workdays, in order to simulate calculated emission rate due to wind erosion during nightime period, the "Emission Rate Factor" is applied from 1800 to 0800 hours in the ISCST model. Similarly, for Sundays and Holidays, the calculated emission rate due to wind erosion during day-time period is simulated by adopting the "Emission Rate Factor" from 0800 to 1800 hours in the ISCST model.

Travelling on Haul Road (paved) (day-time only)

Project Site	Road Segment ID	X coordiante	Y coordinate	Ground mPD level, m	X Length, m	Y Length, m	Emission Height, m	Angle, degree	Mitigated * Calculated emission rate, g/m/s	Total emission, g/s	Emission rate, g/m²/s	Int. Vert. Dim.
					B	C			D	= (D*B)	=(D*B)/ (B*C)	
Yau Mei	HR34	823606.25	837783.42	2	21	6	0.5	-107	3.22E-05	6.75E-04	5.36E-06	0
Yau Mei	HR35	823600.55	837800.67	2	10	6	0.5	-31	3.22E-05	3.22E-04	5.36E-06	0
Yau Mei	HR36	823609.29	837806.18	2	35	6	0.5	-29	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR37	823639.8	837823.3	2	35	6	0.5	-11	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR38	823674.9	837829.9	2	10	6	0.5	-27	3.22E-05	3.22E-04	5.36E-06	0
Yau Mei	HR39	823684.2	837835.1	2	35	6	0.5	-43	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR40	823711.5	837860.7	2	14	6	0.5	-83	3.22E-05	4.50E-04	5.36E-06	0
Yau Mei	HR41	823715.49	837876.74	2	21	6	0.5	-141	3.22E-05	6.75E-04	5.36E-06	0
Yau Mei	HR42	823699.06	837890.03	2	35	6	0.5	-157	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR43	823665.74	837904.45	2	35	6	0.5	-169	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR44	823632.84	837910.8	2	35	6	0.5	-152	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR45	823602.58	837926.84	2	35	6	0.5	-143	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR46	823574.8	837948.13	2	20	6	0.5	-143	3.22E-05	6.43E-04	5.36E-06	0

Remark: * Please refer to Appendix 3-3C for the calculation of emission factors.

Appendix 3-3C   Calculation of <u>RSP Emission Rates</u> of the Project Site <u>During Filling/ Excavation Works</u> (Both Unmitigated and Mitigated Scenarios)

Type of Work	Type of Emission Source	Parameter		Remark
Wind Erosion on Exposed Ground	(1) Wind Erosion (day-time)	TSP emission factor (Mg/hectare/year)	0.85	USEPA AP-42, S11.9, Table 11.9-4, 7/98 ed.
		Calculated RSP emission factor (Mg/hectare/year)	0.43	Converted from the above TSP emission factor based on a ratio of 0.51 for RSP/TSP. [@]
		Emission rate, g/m²/s (unmitigated)	1.37E-06	={(0.43*1000000)/10000m²/(365*24*60*60)}
		% of dust supression [#]	90.0%	for watering 8 times per day [#]
		Emission rate, g/m²/s (mitigated)	1.37E-07	
	(1) Wind Erosion (night-time)	TSP emission factor (Mg/hectare/year)	0.85	USEPA AP-42, S11.9, Table 11.9-4, 7/98 ed.
		Calculated RSP emission factor (Mg/hectare/year)	0.43	Converted from the above TSP emission factor based on a ratio of 0.51 for RSP/TSP. [@]
		Emission rate, g/m²/s (unmitigated)	1.37E-06	={(0.43*1000000)/10000m²/(365*24*60*60)}
Cut and Cover Activites	(2) Bulldozing & Surface Compacting (day-time only)	Eqn.: $E = (0.45 (s)^{1.5} / (M)^{1.4}) \times 0.75$		USEPA AP-42, S11.9, Table 11.9-2, 7/98 ed. (Based on the eqn. of particle size <= 15 µm. According to Table 11.9-2 of the AP-42, a scaling factor of 0.75 has been applied to the equation in order to represent RSP emission factor) *
		Material moisture content (%), M	2.2	To represent the worst case scenario, the lowest moisture content within the range specified for overburden in the USEPA AP-42, S11.9, Table 11.9-3, 7/98 ed., is adopted
		Material silt content (%), s	15.1	To represent the worst case scenario, the highest silt content within the range specified for overburden in the USEPA AP-42, S11.9, Table 11.9-3, 7/98 ed., is adopted
		Calculated Emission Factor (kg/hr), E	6.57E+00	
		Site Area (m²), A ***	44000	-
		Calculated emission rate (unmitigated) (g/m²/s)	4.15E-05	= (E*1000)/A/(60*60)
		% of dust supression [#]	90.0%	for watering 8 times per day [#]
		Calculated emission rate, g/m²/s (mitigated)	4.15E-06	Due to % of dust supression.
	(3) Removal/ unloading soil materials by excavators (day-time only)	Emission Factor of excavator unloading topsoil (kg/Mg), E1	0.02	USEPA AP-42, S11.9, Table 11.9-4, 7/98 ed. (scraper unloading topsoil is adopted). *
		Topsoil removal by excavator (kg/Mg), E2	0.029	USEPA AP-42, S11.9, Table 11.9-4, 7/98 ed. (Topsoil removal by scraper is adopted). *
		Total Emission by excavator (kg/Mg), E1+E2	4.90E-02	
		Calculated RSP Emission by excavator (kg/Mg), E = (E1+E2) x0.51)	2.50E-02	Converted from the above TSP emission factor based on a ratio of 0.51 for RSP/TSP. [@]
		Total quantity of materials involved (m³), Q	277500	The total amount of concerned excavated materials and imported fill materials as provided by Engineer
		No. of months for site formation (Phase B to D), m	11	Total duration of "excavation and filling works" of concerned site formation works.
		No. of working days per month, d	25	From Project Engineer
		No. of working hours per day, h	10	From Project Engineer (working hours = 0800 hr to 1800 hr)
		Average hourly output (m³/hr), O1	100.91	= Q/(m*d*h)
		Average hourly output (Mg/hr), O2	252.27	= O1 x 2.5Mg/m³. Assuming the truck capacity of 6m3 and 15 tons (i.e. soil density of 2.5 Mg/m3).
		Site Area (m²), A ***	44000	-
		Calculated emission rate (unmitigated) (g/m²/s)	3.98E-05	= (O2 x (E x 1000)/ A)/(60*60)
		% of dust supression [#]	90.0%	for watering 8 times per day [#]
		Calculated emission rate (mitigated) (g/m²/s)	3.98E-06	

Type of Work	Type of Emission Source	Parameter		Remark
	(4) Earth Handling/ Loading, Unloading, and stockpiling (day-time only)	Eqn.: $E = k \times (0.0016) \times ((U/2.2)^{1.3} / (M/2)^{1.4}$		USEPA AP-42, S13.2.4, 11/06 ed. *
		Particle size multiplier, k	0.35	particle size multiplier for particle size of 10 μm
		Mean wind speed (m/s), U	1.85	Based on year 2010 average wind speed recorded at Wetland Park Station of Hong Kong Observatory.
		Material moisture content (%), M	2.2	Pls. refer to Works Item no. 2 above
		Calculated Emission Factor (kg/Mg), E	0.00039	$E = k \times (0.0016) \times ((U/2.2)^{1.3} / (M/2)^{1.4}$
		Total quantity of materials involved (m³), Q	277500	The total amount of concerned excavated materials and imported fill materials as provided by Engineer
		No. of months for site formation, m	11	Total duration of "excavation and filling works" of concerned site formation works.
		No. of working days per month, d	25	From Project Engineer
		No. of working hours per day, h	10	From Project Engineer (working hours = 0800 hr to 1800 hr)
		Average hourly output (m³/hr), O1	100.91	= Q/(m*d*h)
		Average hourly output (Mg/hr), O2	252.27	= O1 x 2.5Mg/m³. Assuming the truck capacity of 6m3 and 15 tons (i.e. soil density of 2.5 Mg/m3).
		Site Area (m²), A ***	44000	-
		Calculated emission rate (unmitigated) (g/m²/s)	6.21E-07	= (O2 x (E x 1000)/ A)/(60*60)
		% of dust supression #	90.0%	for watering 8 times per day #
		Calculated emission rate (mitigated) (g/m²/s)	6.21E-08	
	Total Emission for "Cut and Cover" (= (2) + (3) + (4))	Total Emission rate, g/m²/s (Unmitigated) (day-time only)	8.19E-05	Calculated total emission factor for "Cut and Cover".
		Total Emission rate, g/m²/s (mitigated) (day-time only)	8.19E-06	Calculated total emission factor for "Cut and Cover" ##.
Vehicle movement on Haul Road	(5) Paved Haul Road (day-time only)	Eqn.: $E = k \times (sL)^{0.91} \times (W)^{1.02}$		USEPA AP-42, S13.2.1, 11/06 ed.
		Particle size multiplier (g/VKT), k	0.62	USEPA AP-42, S13.2.1, 11/06 ed., Table 13.2.1-1 for PM-10.
		Road surface silt loading (g/m²), sL	14	To represent the worst case scenario, the highest silt loading within the range of typical values specified for quarry operation in the USEPA AP-42, S13.2.1, 1/11 ed., Table 13.2.1-3, is adopted. **
		Mean vehicle weight (tons), W	16	The average weight of the empty truck and full load truck.
		Calculated Emission Factor (g/VKT), E1	115.76	$E = k \times (sL)^{0.91} \times (W)^{1.02}$
		Calculated emission factor (g/v-m), E2	0.116	= E1/1000
		Average no. of trucks (veh./hr), T	10	Estimated maximum no. of trucks per hour from Engineer
		Calculated emission rate (unmitigated), g/m/s	3.22E-04	= E2*(T/60*60)
		% of dust supression #	90.0%	for watering 8 times per day #
		Calculated emission rate (mitigated), g/m/s	3.22E-05	

Remark:

Please refer to Appendix 3-9 for calculation of dust supression efficiency.

Due to the phased construction area, only limited space and construction plants will be available for construction in any one time. Thus, the construction activities under the "Cut and Cover" category that would contribute to dust emissions will unlikely to operate at the same time. In fact, only one of the above activities will operate in any one time. However, to be conservative, air quality impacts due to simultaneous construction of these activities has been taken into account in the assessment.

* The equation recommended for concerned particular construction activity as per Section 13.2.3 of USEPA AP-42 regarding heavy construction operation.

** The concerned construction activity of this Project during site formation stage will involve earth movement activities and transportation of excavated/ fill materials, etc. The nature of these activities is similar to that of quarry operation. Thus, the typical silt loading within the range of typical values from quarry site, as stipulated in USEPA AP-42, Table 13.2.1-3, S13.2.1, 11/06 ed., is adopted in the above equation. The reported highest silt loading value has been used in this exercise for worst case scenario. It is noted that similar assumption has also been adopted for paved construction haul road in the approved EIA report, Appendix F of the "EIA-032/1999 - East Rail Extension Hung Hom to Tsim Sha Tsui - Environmental Impact Assessment".

*** Total site area of Phases B to D as well as buffer planting area along its edge in adjacent to the WRA, is taken as 4.4ha.

@ Based on conservative ratio reported in literature. Please refer to Appendix 3-10 for the justification.

Calculation of Emission Factors During Removal of Surcharge

Appendix 3-3D   Summary Table of Calculated RSP Emissions Modeling Input Data During Removal of Surcharge (Unmitigated Scenario)

For both the unmitigated scenario and mitigated scenarios, since there will be no construction activities during restricted hours, and on Sundays and general holidays, the calculated emission rates have been applied to day-time hours during general weekdays only (i.e. 0800 to 1800 hours). While from 1800 to 0800 hours during general workdays, and on Sunday and general holidays (whole day) are adopted for impact assessment of wind erosion on the site.

Cut and Cover (day-time only)

| | | | | | | Umitigated * | |
Project Site	Ref. ID	X coordiante	Y coordinate	Elevation, m	Release Height, m	Emission rate, g/m²/s	Int. Vert. Dim.
Yau Mei	B1	823791.7	837839.3	2	0	7.88E-05	0
Yau Mei	C1	823674.3	837936.5	2	0	7.88E-05	0
Yau Mei	C2	823611.3	837992.5	2	0	7.88E-05	0
Yau Mei	D1	823556.8	837822.6	2	0	7.88E-05	0
Yau Mei	D2	823530.8	837837.1	2	0	7.88E-05	0

Wind Erosion

| | | | | | | Night-time only * | | Day-time only * |
Project Site	Ref. ID	X coordiante	Y coordinate	Elevation, m	Release Height, m	Emission rate, g/m²/s	Int. Vert. Dim.	Emission rate, g/m²/s
Yau Mei	B1	823791.7	837839.3	2	0	1.37E-06	0	1.37E-06
Yau Mei	C1	823674.3	837936.5	2	0	1.37E-06	0	1.37E-06
Yau Mei	C2	823611.3	837992.5	2	0	1.37E-06	0	1.37E-06
Yau Mei	D1	823556.8	837822.6	2	0	1.37E-06	0	1.37E-06
Yau Mei	D2	823530.8	837837.1	2	0	1.37E-06	0	1.37E-06

Travelling on Haul Road (unpaved) (day-time only)

| | | | | | | | | | Unmitigated * | | | |
Project Site	Road Segment ID	X coordiante	Y coordinate	Ground mPD level, m	X Length, m	Y Length, m	Emission Height, m	Angle, degree	Calculated emission rate, g/m/s	Total emission, g/s	Emission rate, g/m²/s	Int. Vert. Dim.
					B	C			A	= (A*B)	= (A*B) /(B*C)	
Yau Mei	HR34	823606.25	837783.42	2	21	6	0.5	-107	3.22E-04	6.75E-03	5.36E-05	0
Yau Mei	HR35	823600.55	837800.67	2	10	6	0.5	-31	3.22E-04	3.22E-03	5.36E-05	0
Yau Mei	HR36	823609.29	837806.18	2	35	6	0.5	-29	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR37	823639.8	837823.3	2	35	6	0.5	-11	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR38	823674.9	837829.9	2	10	6	0.5	-27	3.22E-04	3.22E-03	5.36E-05	0
Yau Mei	HR39	823684.2	837835.1	2	35	6	0.5	-43	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR40	823711.5	837860.7	2	14	6	0.5	-83	3.22E-04	4.50E-03	5.36E-05	0
Yau Mei	HR41	823715.49	837876.74	2	21	6	0.5	-141	3.22E-04	6.75E-03	5.36E-05	0
Yau Mei	HR42	823699.06	837890.03	2	35	6	0.5	-157	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR43	823665.74	837904.45	2	35	6	0.5	-169	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR44	823632.84	837910.8	2	35	6	0.5	-152	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR45	823602.58	837926.84	2	35	6	0.5	-143	3.22E-04	1.13E-02	5.36E-05	0
Yau Mei	HR46	823574.8	837948.13	2	20	6	0.5	-143	3.22E-04	6.43E-03	5.36E-05	0

Remark: * Please refer to Appendix 3-3F for the calculation of emission factors.

Appendix 3-3E   Summary Table of Calculated RSP Emissions Modeling Input Data During Removal of Surcharge (Mitigated Scenario)

For both the unmitigated scenario and mitigated scenarios, since there will be no construction activities during restricted hours, and on Sundays and general holidays, the calculated emission rates have been applied to day-time hours during general weekdays only (i.e. 0800 to 1800 hours). While from 1800 to 0800 hours during general workdays, and on Sunday and general holidays (whole day) are adopted for impact assessment of wind erosion on the site.

Cut and Cover (day-time only)

| | | | | | | Mitigated * | |
| | | | | | Release | | Int. Vert. |
Project Site	Ref. ID	X coordiante	Y coordinate	Elevation,m	Height, m	Emission rate, g/m²/s	Dim.
Yau Mei	Y01	823716	837918	2	0	7.88E-06	0
Yau Mei	Y02	823762.638	837885.693	2	0	7.88E-06	0
Yau Mei	Y03	823791.862	837841.201	2	0	7.88E-06	0
Yau Mei	Y04	823736.167	837827.063	2	0	7.88E-06	0
Yau Mei	Y05	823630.998	837877.023	2	0	7.88E-06	0
Yau Mei	Y06	823631	837877	2	0	7.88E-06	0
Yau Mei	Y07	823661.372	837860.749	2	0	7.88E-06	0
Yau Mei	Y08	823577.758	838018.797	2	0	7.88E-06	0
Yau Mei	Y09	823471.666	838003.9	2	0	7.88E-06	0
Yau Mei	Y10	823509.885	837938.972	2	0	7.88E-06	0
Yau Mei	Y11	823610.592	837970.06	2	0	7.88E-06	0
Yau Mei	Y12	823652.24	837942.697	2	0	7.88E-06	0
Yau Mei	Y13	823604.809	837915.329	2	0	7.88E-06	0
Yau Mei	Y14	823576.077	837875.705	2	0	7.88E-06	0
Yau Mei	Y15	823505.176	837857.374	2	0	7.88E-06	0
Yau Mei	Y16	823473.021	837825.291	2	0	7.88E-06	0
Yau Mei	Y17	823525.379	837798.17	2	0	7.88E-06	0
Yau Mei	Y18	823540.631	837900.732	2	0	7.88E-06	0
Yau Mei	Y19	823577.386	837822.631	2	0	7.88E-06	0
Yau Mei	Y20	823638.814	837832.11	2	0	7.88E-06	0
Yau Mei	Y21	823594.362	837784.138	2	0	7.88E-06	0

Wind Erosion

| | | | | | | Night-time only * | | Day-time only * |
| | | | | | Release | | Int. Vert. | Emission rate, |
Project Site	Ref. ID	X coordiante	Y coordinate	Elevation,m	Height, m	Emission rate, g/m²/s	Dim.	g/m²/s
Yau Mei	Y01	823716	837918	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y02	823762.638	837885.693	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y03	823791.862	837841.201	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y04	823736.167	837827.063	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y05	823630.998	837877.023	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y06	823631	837877	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y07	823661.372	837860.749	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y08	823577.758	838018.797	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y09	823471.666	838003.9	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y10	823509.885	837938.972	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y11	823610.592	837970.06	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y12	823652.24	837942.697	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y13	823604.809	837915.329	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y14	823576.077	837875.705	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y15	823505.176	837857.374	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y16	823473.021	837825.291	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y17	823525.379	837798.17	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y18	823540.631	837900.732	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y19	823577.386	837822.631	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y20	823638.814	837832.11	2	0	1.37E-06	0	1.37E-06
Yau Mei	Y21	823594.362	837784.138	2	0	1.37E-06	0	1.37E-06

Inputs to the ISCST Model:

	Calculated Emission Rate *	Emission Rate Factor **
General Workdays		
Day-time (A)	7.88E-06	
Night-time (B)	1.37E-06	0.17390 =B/A

Remark:

* Please refer to Appendices 3-3F for the calculation of emission factors.

** For general workdays, in order to simulate calculated emission rate due to wind erosion during nightime period, the "Emission Rate Factor" is applied from 1800 to 0800 hours in the ISCST model.   Similarly, for Sundays and Holidays, the calculated emission rate due to wind erosion during day-time period is simulated by adopting the "Emission Rate Factor" from 0800 to 1800 hours in the ISCST model.

Travelling on Haul Road (paved) (day-time only)

Project Site	Road Segment ID	X coordiante	Y coordinate	Ground mPD level, m	X Length, m	Y Length, m	Emission Height, m	Angle, degree	Mitigated *			Int. Vert. Dim.
									Calculated emission rate, g/m/s	Total emission, g/s	Emission rate, g/m^2/s	
					B	C			D	= (D*B)	=(D*B)/ (B*C)	
Yau Mei	HR34	823606.25	837783.42	2	21	6	0.5	-107	3.22E-05	6.75E-04	5.36E-06	0
Yau Mei	HR35	823600.55	837800.67	2	10	6	0.5	-31	3.22E-05	3.22E-04	5.36E-06	0
Yau Mei	HR36	823609.29	837806.18	2	35	6	0.5	-29	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR37	823639.8	837823.3	2	35	6	0.5	-11	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR38	823674.9	837829.9	2	10	6	0.5	-27	3.22E-05	3.22E-04	5.36E-06	0
Yau Mei	HR39	823684.2	837835.1	2	35	6	0.5	-43	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR40	823711.5	837860.7	2	14	6	0.5	-83	3.22E-05	4.50E-04	5.36E-06	0
Yau Mei	HR41	823715.49	837876.74	2	21	6	0.5	-141	3.22E-05	6.75E-04	5.36E-06	0
Yau Mei	HR42	823699.06	837890.03	2	35	6	0.5	-157	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR43	823665.74	837904.45	2	35	6	0.5	-169	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR44	823632.84	837910.8	2	35	6	0.5	-152	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR45	823602.58	837926.84	2	35	6	0.5	-143	3.22E-05	1.13E-03	5.36E-06	0
Yau Mei	HR46	823574.8	837948.13	2	20	6	0.5	-143	3.22E-05	6.43E-04	5.36E-06	0

Remark: * Please refer to Appendix 3-3F for the calculation of emission factors.

Appendix 3-3F   Calculation of <u>RSP Emission Rates</u> of the Project Site <u>During Removal of Surcharge</u> (Both Unmitigated and Mitigated Scenarios)

Type of Work	Type of Emission Source	Parameter		Remark
Wind Erosion on Exposed Ground	(1) Wind Erosion (day-time)	TSP emission factor (Mg/hectare/year)	0.85	USEPA AP-42, S11.9, Table 11.9-4, 7/98 ed.
		Calculated RSP emission factor (Mg/hectare/year)	0.43	Converted from the above TSP emission factor based on a ratio of 0.51 for RSP/TSP. [@]
		Emission rate, g/m²/s (unmitigated)	**1.37E-06**	={(0.43*1000000)/10000m²/(365*24*60*60)}
		% of dust supression [#]	90.0%	for watering 8 times per day [#]
		Emission rate, g/m²/s (mitigated)	**1.37E-07**	
	(1) Wind Erosion (night-time)	TSP emission factor (Mg/hectare/year)	0.85	USEPA AP-42, S11.9, Table 11.9-4, 7/98 ed.
		Calculated RSP emission factor (Mg/hectare/year)	0.43	Converted from the above TSP emission factor based on a ratio of 0.51 for RSP/TSP. [@]
		Emission rate, g/m²/s (unmitigated)	**1.37E-06**	={(0.43*1000000)/10000m²/(365*24*60*60)}
Cut and Cover Activites	(2) Bulldozing & Surface Compacting (day-time only)	Eqn.: $E = (0.45 (s)^{1.5} / (M)^{1.4}) \times 0.75$		USEPA AP-42, S11.9, Table 11.9-2, 7/98 ed. (Based on the eqn. of particle size <= 15 µm. According to Table 11.9-2 of the AP-42, a scaling factor of 0.75 has been applied to the equation in order to represent RSP emission factor) *
		Material moisture content (%), M	2.2	To represent the worst case scenario, the lowest moisture content within the range specified for overburden in the USEPA AP-42, S11.9, Table 11.9-3, 7/98 ed., is adopted
		Material silt content (%), s	15.1	To represent the worst case scenario, the highest silt content within the range specified for overburden in the USEPA AP-42, S11.9, Table 11.9-3, 7/98 ed., is adopted
		Calculated Emission Factor (kg/hr), E	6.57E+00	
		Site Area (m²), A ***	44000	-
		Calculated emission rate (unmitigated) (g/m²/s)	**4.15E-05**	= (E*1000)/A/(60*60)
		% of dust supression [#]	90.0%	for watering 8 times per day [#]
		Calculated emission rate, g/m²/s (mitigated)	**4.15E-06**	Due to % of dust supression.
	(3) Removal/ unloading soil materials by excavators (day-time only)	Emission Factor of excavator unloading topsoil (kg/Mg), E1	0.02	USEPA AP-42, S11.9, Table 11.9-4, 7/98 ed. (scraper unloading topsoil is adopted). *
		Topsoil removal by excavator (kg/Mg), E2	0.029	USEPA AP-42, S11.9, Table 11.9-4, 7/98 ed. (Topsoil removal by scraper is adopted). *
		Total Emission by excavator (kg/Mg), E1+E2	4.90E-02	
		Calculated RSP Emission by excavator (kg/Mg), E = (E1+E2) x0.51)	2.50E-02	Converted from the above TSP emission factor based on a ratio of 0.51 for RSP/TSP. [@]
		Total quantity of materials involved (m³), Q	105000	The total amount of concerned surcharge materials to be removed as provided by Engineer
		No. of months for site formation (Phase B to D), m	4.5	Total duration of "removal of surcharge" of concerned site formation works.
		No. of working days per month, d	25	From Project Engineer
		No. of working hours per day, h	10	From Project Engineer (working hours = 0800 hr to 1800 hr)
		Average hourly output (m³/hr), O1	93.33	= Q/(m*d*h)
		Average hourly output (Mg/hr), O2	233.33	= O1 x 2.5Mg/m³. Assuming the truck capacity of 6m3 and 15 tons (i.e. soil density of 2.5 Mg/m3).
		Site Area (m²), A ***	44000	-
		Calculated emission rate (unmitigated) (g/m²/s)	**3.68E-05**	= (O2 x (E x 1000)/ A)/(60*60)
		% of dust supression [#]	90.0%	for watering 8 times per day [#]
		Calculated emission rate (mitigated) (g/m²/s)	**3.68E-06**	

Type of Work	Type of Emission Source	Parameter		Remark
	(4) Earth Handling/ Loading, Unloading, and stockpiling (day-time only)	Eqn.: $E = k \times (0.0016) \times ((U/2.2)^{1.3} / (M/2)^{1.4}$		USEPA AP-42, S13.2.4, 11/06 ed. *
		Particle size multiplier, k	0.35	particle size multiplier for particle size of 10 μm
		Mean wind speed (m/s), U	1.85	Based on year 2010 average wind speed recorded at Wetland Park Station of Hong Kong Observatory.
		Material moisture content (%), M	2.2	Pls. refer to Works Item no. 2 above
		Calculated Emission Factor (kg/Mg), E	0.00039	$E = k \times (0.0016) \times ((U/2.2)^{1.3} / (M/2)^{1.4}$
		Total quantity of materials involved (m³), Q	105000	The total amount of concerned surcharge materials to be removed as provided by Engineer
		No. of months for site formation, m	4.5	Total duration of "removal of surcharge" of concerned site formation works.
		No. of working days per month, d	25	From Project Engineer
		No. of working hours per day, h	10	From Project Engineer (working hours = 0800 hr to 1800 hr)
		Average hourly output (m³/hr), O1	93.33	= Q/(m*d*h)
		Average hourly output (Mg/hr), O2	233.33	= O1 x 2.5Mg/m³. Assuming the truck capacity of 6m3 and 15 tons (i.e. soil density of 2.5 Mg/m3).
		Site Area (m²), A ***	44000	-
		Calculated emission rate (unmitigated) (g/m²/s)	5.74E-07	= (O2 x (E x 1000)/ A)/(60*60)
		% of dust supression #	90.0%	for watering 8 times per day #
		Calculated emission rate (mitigated) (g/m²/s)	5.74E-08	
	Total Emission for "Cut and Cover" (= (2) + (3) + (4))	Total Emission rate, g/m²/s (Unmitigated) (day-time only)	7.88E-05	Calculated total emission factor for "Cut and Cover".
		Total Emission rate, g/m²/s (mitigated) (day-time only)	7.88E-06	Calculated total emission factor for "Cut and Cover" ##.

Vehicle movement on Haul Road	(5) Paved Haul Road (day-time only)	Eqn.: $E = k \times (sL)^{0.91} \times (W)^{1.02}$		USEPA AP-42, S13.2.1, 11/06 ed.
		Particle size multiplier (g/VKT), k	0.62	USEPA AP-42, S13.2.1, 11/06 ed., Table 13.2.1-1 for PM-10.
		Road surface silt loading (g/m²), sL	14	To represent the worst case scenario, the highest silt loading within the range of typical values specified for quarry operation in the USEPA AP-42, S13.2.1, 1/11 ed., Table 13.2.1-3, is adopted. **
		Mean vehicle weight (tons), W	16	The average weight of the empty truck and full load truck.
		Calculated Emission Factor (g/VKT), E1	115.76	$E = k \times (sL)^{0.91} \times (W)^{1.02}$
		Calculated emission factor (g/v-m), E2	0.116	= E1/1000
		Average no. of trucks (veh./hr), T	10	Estimated maximum no. of trucks per hour from Engineer
		Calculated emission rate (unmitigated), g/m/s	3.22E-04	= E2*(T/60*60)
		% of dust supression #	90.0%	for watering 8 times per day #
		Calculated emission rate (mitigated), g/m/s	3.22E-05	

Remark:

Please refer to Appendix 3-9 for calculation of dust supression efficiency.

Due to the phased construction area, only limited space and construction plants will be available for construction in any one time. Thus, the construction activities under the "Cut and Cover" category that would contribute to dust emissions will unlikely to operate at the same time. In fact, only one of the above activities will operate in any one time. However, to be conservative, air quality impacts due to simultaneous construction of these activities has been taken into account in the assessment.

* The equation recommended for concerned particular construction activity as per Section 13.2.3 of USEPA AP-42 regarding heavy construction operation.

** The concerned construction activity of this Project during site formation stage will involve earth movement activities and transportation of excavated/ fill materials, etc. The nature of these activities is similar to that of quarry operation. Thus, the typical silt loading within the range of typical values from quarry site, as stipulated in USEPA AP-42, Table 13.2.1-3, S13.2.1, 11/06 ed., is adopted in the above equation. The reported highest silt loading value has been used in this exercise for worst case scenario. It is noted that similar assumption has also been adopted for paved construction haul road in the approved EIA report, Appendix F of the "EIA-032/1999 - East Rail Extension Hung Hom to Tsim Sha Tsui - Environmental Impact Assessment".

*** Total site area of Phases B to D as well as buffer planting area along its edge in adjacent to the WRA, is taken as 4.4ha.

@ Based on conservative ratio reported in literature. Please refer to Appendix 3-10 for the justification.