Appendix 11.1 Calculations of Emission Rates

Location	Source	Emission Factors	Mitigated	Parameters		*Remarks*
Kennedy Town Abattior Site	**Crushing Plant**	Crusher Loading Point (g/s) Source ID: CLP1	9.93611E-05	RSP emission factor (kg/Mg) RSP to TSP factor Crushing rate (Mg/hr) no. of operation hour (hr) % of dust suppression Emission height (m)	0.000008 2.1 85 12 75 0.5	*AP-42, Section 11.19.2, Table 11.19.2-1, 8/04 ed., Trunk Unloading - Fragmented Stone* *AP-42, Section 11.19.2, Table 11.19.2-1, 1/95 ed.* *from engineer (total crushing rate 1022Mg/day)* *from engineer (operation hours would be from 7:00 to 19:00)* with water spray
		Overall Emission Rate (g/s) Source ID: CP1	**8.04352E-03**	Summation of emission factors of secondary crushing and screening Exhaust height (m)	 15	*Discharge Point of Dust Extraction and Collection System at Rock Crushing Facility*
		Secondary Crushing (g/s)	2.83889E-03	TSP emission factor (kg/Mg) Crushing rate (Mg/hr) no. of operation hour (hr) Dust removal efficiency (%)	0.0006 85 12 80	*AP-42, Section 11.19, Table 11.19.2-1, 8/04 ed., Tertiary Crushing (Controlled)* *No data is available for secondary crushing, thus, emission factor of Tertiary Crushing is adopted* *from engineer (total crushing rate 1022Mg/day)* *from engineer (operation hours would be from 7:00 to 19:00)*
		Screening (g/s)	5.20463E-03	TSP emission factor (kg/Mg) Crushing rate (Mg/hr) no. of operation hour (hr) Dust removal efficiency (%)	0.0011 85 12 80	*AP-42, Section 11.19, Table 11.19.2-1, 8/04 ed., Screening (Controlled)* *from engineer (total crushing rate 1022Mg/day)* *from engineer (operation hours would be from 7:00 to 19:00)*
	Stock Pile	Loading Point (from crushing facility to stockpile) (g/s) Source ID: CTP1	1.32697E-02	TSP emission factor (kg/Mg) Particle size mutipler, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg) Handling capacity (Mg/hr) no. of operation hour (hr) % of dust suppression Emission height (m)	E = k × (0.0016) × [(U/2.2)^1.3 / (M/2)^1.4] 0.74 0.7 2.35 5.61E-03 85 12 90 0.5	 *AP-42, S13.2.4, particle size < 30 um, 1/95 ed.* *AP-42, Table 13.2.4-1, 1/95 ed.* *from Hong Kong Observatory, Central Station(Yr2005)* *calculated* *from engineer* *from engineer (operation hours would be from 7:00 to 19:00)* *installation of flexible curtain and provision of water spray at discharge point*
		Material handling and storage piles ($g/m^2/s$) Source ID: SP1	8.27736E-05	TSP emission factor (kg/Mg) Particle size mutipler, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg) Handling capacity (Mg/hr) no. of operation hour (hr) Area of stock pile (m^2) Active stock pile area (%) Active stock pile area (m^2) % of dust suppression Emission height (m)	E = k × (0.0016) × [(U/2.2)^1.3 / (M/2)^1.4] 0.74 0.7 2.35 5.61E-03 85 12 2000 20 400 75 0.5	 *AP-42, S13.2.4, particle size < 30 um, 1/95 ed.* *AP-42, Table 13.2.4-1, 1/95 ed.* *from Hong Kong Observatory, Central Station(Yr2005)* *calculated* *from engineer* *from engineer (operation hours would be from 7:00 to 19:00)* *calculated* *80% of site is inactive area with coverage, only 20% is active area for loading/unloading* *calculated, Area(m^2) = 2000 x 80% = 20.0 x 20.0* watering four times a day
		Wind erosion ($g/m^2/s$) Source ID: SP1	2.69533E-06	TSP emission factor (Mg/hectare/yr) % of dust suppression Emission height (m) Active stock pile area (m^2)	0.85 0 0.5 400	*AP-42, 5th ed., Table 11.9.4* *calculated, Area(m^2) = 2000 x 80% = 20.0 x 20.0*
		Haul Road - Transporting out the crushed rocks from stock pile to barging point (g/m/s) Source ID: HR1	4.540041E-04	TSP emission factor (g/VKT) Particle size multiplier, k (g/VKT) Road silt loading (g/m2), sL Average truck weight (tons), W E (g/VKT) Total no. of truck per day no. of operation hour (hr) % of dust suppression Road width (m) Emission height (m)	E=k × (sL/2)^0.65 × (W/3)^1.5 *AP-42, Section 13.2.1, 11/06 ed.* 24 12 25 1850 106 12 90 3 0.5	 *AP-42, Section 13.2.1, Table 13.2.1-1, 11/06 ed.* *AP-42, Section 13.2.1, Table 13.2.1-4, 11/06 ed.* *from engineer* *calculated* *from engineer, round-trip included* *from engineer(7:00-19:00)* *90%, keeping haul road in wet condition* *from engineer*
	Barging Point	Unloading of spoils to barge (g/s) Source ID: BP1	1.32697E-02	TSP emission factor (kg/Mg) Particle size mutipler, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg) Handling capacity (Mg/hr) no. of operation hour (hr) % of dust suppression Emission height (m)	E = k × (0.0016) × [(U/2.2)^1.3 / (M/2)^1.4] 0.74 0.7 2.35 5.61E-03 85 12 90 0.5	 *AP-42, S13.2.4, particle size < 30 um, 1/95 ed.* *AP-42, Table 13.2.4-1, 1/95 ed.* *from Hong Kong Observatory, Central Station(Yr2005)* *calculated* *from engineer* *from engineer (operation hours would be from 7:00 to 19:00)* *installation of flexible curtain and provision of water spray at discharge point*

Appendix 11.1 Calculations of Emission Rates

Location	Source	Emission Factors	Mitigated	Parameters		*Remarks*
Kennedy Town Station Construction Site	**Construction Site**	Heavy Construction				
		Area Source	2.59452E-05	TSP emission factor (Mg/hectare/month of activity)	2.69	*from AP-42, S13.2.3, 1/95 ed.*
		(g/m2/s)		Percentage area actively operating (%)	50	*from engineer*
		Source ID: A1-A20		% of dust suppression	75	*for watering four times a day*
				Emission height (m)	0.5	
				Area of emission source A1 (m^2)	583	*Area(m^2) = 27.0 x 21.6*
				Area of emission source A2 (m^2)	558	*Area(m^2) = 27.2 x 20.5*
				Area of emission source A3 (m^2)	565	*Area(m^2) = 27.7 x 20.4*
				Area of emission source A4 (m^2)	662	*Area(m^2) = 27.8 x 23.8*
				Area of emission source A5 (m^2)	970	*Area(m^2) = 28.6 x 33.9*
				Area of emission source A6 (m^2)	1034	*Area(m^2) = 30.5 x 33.9*
				Area of emission source A7 (m^2)	1081	*Area(m^2) = 31.6 x 34.2*
				Area of emission source A8 (m^2)	829	*Area(m^2) = 28.7 x 28.9*
				Area of emission source A9 (m^2)	756	*Area(m^2) = 30.1 x 25.1*
				Area of emission source A10 (m^2)	777	*Area(m^2) = 31.2 x 24.9*
				Area of emission source A11 (m^2)	1373	*Area(m^2) = 26.0 x 52.8*
				Area of emission source A12 (m^2)	2004	*Area(m^2) = 36.3 x 55.2*
				Area of emission source A13 (m^2)	1823	*Area(m^2) = 42.2 x 43.2*
				Area of emission source A14 (m^2)	874	*Area(m^2) = 44.6 x 19.6*
				Area of emission source A15 (m^2)	223	*Area(m^2) = 8.4 x 26.6*
				Area of emission source A16 (m^2)	502	*Area(m^2) = 12.3 x 40.8*
				Area of emission source A17 (m^2)	1722	*Area(m^2) = 88.3 x 19.5*
				Area of emission source A18 (m^2)	1906	*Area(m^2) = 95.8 x 19.9*
				Area of emission source A19 (m^2)	58	*Area(m^2) = 7.3 x 8.0*
				Area of emission source A20 (m^2)	58	*Area(m^2) = 7.3 x 8.0*
		Wind erosion	1.34767E-06	TSP emission factor (Mg/hectare/yr)	0.85	*AP-42, 5th ed., Table 11.9.4*
		E (g/m2/s)		Percentage area actively operating (%)	50	*from engineer*
		Source ID: A1-A20		% of dust suppression	0	
				Emission height (m)	0.5	
		(For night-time only)		Area of emission source A1 (m^2)	583	*Area(m^2) = 27.0 x 21.6*
				Area of emission source A2 (m^2)	558	*Area(m^2) = 27.2 x 20.5*
				Area of emission source A3 (m^2)	565	*Area(m^2) = 27.7 x 20.4*
				Area of emission source A4 (m^2)	662	*Area(m^2) = 27.8 x 23.8*
				Area of emission source A5 (m^2)	970	*Area(m^2) = 28.6 x 33.9*
				Area of emission source A6 (m^2)	1034	*Area(m^2) = 30.5 x 33.9*
				Area of emission source A7 (m^2)	1081	*Area(m^2) = 31.6 x 34.2*
				Area of emission source A8 (m^2)	829	*Area(m^2) = 28.7 x 28.9*
				Area of emission source A9 (m^2)	756	*Area(m^2) = 30.1 x 25.1*
				Area of emission source A10 (m^2)	777	*Area(m^2) = 31.2 x 24.9*
				Area of emission source A11 (m^2)	1373	*Area(m^2) = 26.0 x 52.8*
				Area of emission source A12 (m^2)	2004	*Area(m^2) = 36.3 x 55.2*
				Area of emission source A13 (m^2)	1823	*Area(m^2) = 42.2 x 43.2*
				Area of emission source A14 (m^2)	874	*Area(m^2) = 44.6 x 19.6*
				Area of emission source A15 (m^2)	223	*Area(m^2) = 8.4 x 26.6*
				Area of emission source A16 (m^2)	502	*Area(m^2) = 12.3 x 40.8*
				Area of emission source A17 (m^2)	1722	*Area(m^2) = 88.3 x 19.5*
				Area of emission source A18 (m^2)	1906	*Area(m^2) = 95.8 x 19.9*
				Area of emission source A19 (m^2)	58	*Area(m^2) = 7.3 x 8.0*
				Area of emission source A20 (m^2)	58	*Area(m^2) = 7.3 x 8.0*
Magazine Site	Construction Site	Heavy Construction				
		Area Source	5.18904E-05	TSP emission factor (Mg/hectare/month of activity)	2.69	*from AP-42, S13.2.3, 1/95 ed.*
		(g/m2/s)		Percentage area actively operating (%)	50	*from engineer*
		Source ID: A21-A25		% of dust suppression	50	*for watering twice a day*
				Emission height (m)	0.5	
				Area of emission source A21 (m^2)	1238	*Area(m^2) = 32.4 x 38.2*
				Area of emission source A22 (m^2)	1347	*Area(m^2) = 32.7 x 41.2*
				Area of emission source A23 (m^2)	153	*Area(m^2) = 11.5 x 13.3*
				Area of emission source A24 (m^2)	119	*Area(m^2) = 8.7 x 13.7*
				Area of emission source A25 (m^2)	90	*Area(m^2) = 9.0 x 10.0*
		Wind erosion	1.34767E-06	TSP emission factor (Mg/hectare/yr)	0.85	*AP-42, 5th ed., Table 11.9.4*
		E (g/m2/s)		Percentage area actively operating (%)	50	*from engineer*
		Source ID: A21-A25		% of dust suppression	0	
				Emission height (m)	0.5	
		(For night-time only)		Area of emission source A21 (m^2)	1238	*Area(m^2) = 32.4 x 38.2*
				Area of emission source A22 (m^2)	1347	*Area(m^2) = 32.7 x 41.2*
				Area of emission source A23 (m^2)	153	*Area(m^2) = 11.5 x 13.3*
				Area of emission source A24 (m^2)	119	*Area(m^2) = 8.7 x 13.7*
				Area of emission source A25 (m^2)	90	*Area(m^2) = 9.0 x 10.0*

Appendix 11.1 Calculations of Emission Rates

Location	Source	Emission Factors	Mitigated	Parameters		*Remarks*
Western PCWA Site	**Crushing Plant**	Crusher Loading Point (g/s) Source ID: CLP2	1.27361E-04	RSP emission factor (kg/Mg) RSP to TSP factor Crushing rate (Mg/hr) no. of operation hour (hr) % of dust suppression Emission height (m)	0.000008 2.1 109 12 75 0.5	*AP-42, Section 11.19.2, Table 11.19.2-1, 8/04 ed., Trunk Unloading - Fragmented Stone* *AP-42, Section 11.19.2, Table 11.19.2-1, 1/95 ed.* *from engineer (total crushing rate 1310Mg/day)* *from engineer (operation hours would be from 7:00 to 19:00)* with water spray
		Overall Emission Rate (g/s) Source ID: CP2	**1.03102E-02**	Summation of emission factors of secondary crushing and screening Exhaust height (m)	 15	*Discharge Point of Dust Extraction and Collection System at Rock Crushing Facility*
		Secondary Crushing (g/s)	3.63889E-03	TSP emission factor (kg/Mg) Crushing rate (Mg/hr) no. of operation hour (hr) Dust removal efficiency (%)	0.0006 109 12 80	*AP-42, Section 11.19, Table 11.19.2-1, 8/04 ed., Tertiary Crushing (Controlled)* *No data is available for secondary crushing, thus, emission factor of Tertiary Crushing is adopted* *from engineer (total crushing rate 1310Mg/day)* *from engineer (operation hours would be from 7:00 to 19:00)*
		Screening (g/s)	6.67130E-03	TSP emission factor (kg/Mg) Crushing rate (Mg/hr) no. of operation hour (hr) Dust removal efficiency (%)	0.0011 109 12 80	*AP-42, Section 11.19, Table 11.19.2-1, 8/04 ed., Screening (Controlled)* *from engineer (total crushing rate 1310Mg/day)* *from engineer (operation hours would be from 7:00 to 19:00)*
	Stock Pile	Loading Point (from crushing facility to stockpile) (g/s) Source ID: CTP2	1.70092E-02	TSP emission factor (kg/Mg) Particle size mutipler, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg) Handling capacity (Mg/hr) no. of operation hour (hr) % of dust suppression Emission height (m)	E = k × (0.0016) × [(U/2.2)^1.3 / (M/2)^1.4] 0.74 0.7 2.35 5.61E-03 109 12 90 0.5	 *AP-42, S13.2.4, particle size < 30 um, 1/95 ed.* *AP-42, Table 13.2.4-1, 1/95 ed.* *from Hong Kong Observatory, Central Station(Yr2005)* *calculated* *from engineer* *from engineer (operation hours would be from 7:00 to 19:00)* *installation of flexible curtain and provision of water spray at discharge point*
		Material handling and storage piles (g/m2/s) Source ID: SP2, SP3	1.16643E-04	TSP emission factor (kg/Mg) Particle size mutipler, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg) Handling capacity (Mg/hr) no. of operation hour (hr) Area of stock pile (m^2) Active stock pile area (%) Active stock pile area (m^2) % of dust suppression Emission height (m)	E = k × (0.0016) × [(U/2.2)^1.3 / (M/2)^1.4] 0.74 0.7 2.35 5.61E-03 109 12 364 100 364 75 0.5	 *AP-42, S13.2.4, particle size < 30 um, 1/95 ed.* *AP-42, Table 13.2.4-1, 1/95 ed.* *from Hong Kong Observatory, Central Station(Yr2005)* *calculated* *from engineer* *from engineer (operation hours would be from 7:00 to 19:00)* *calculated* *100% active site area for loading/unloading* *calculated, Area (m^2) = 19.8 x 13.0 + 9.0 x 11.9* watering four times a day
		Wind erosion E (g/m2/s) Source ID: SP2, SP3	2.69533E-06	TSP emission factor (Mg/hectare/yr) % of dust suppression Emission height (m) Active stock pile area (m^2)	0.85 0 0.5 364	*AP-42, 5th ed., Table 11.9.4* *calculated, Area (m^2) = 19.8 x 13.0 + 9.0 x 11.9*
		Haul Road - Transporting spoils to barging point (g/m/s) Source ID: HR2 to HR6	6.852893E-04	TSP emission factor (g/VKT) Particle size multiplier, k (g/VKT) Road silt loading (g/m2), sL Average truck weight (tons), W E (g/VKT) Total no. of truck per day no. of operation hour (hr) % of dust suppression Road width (m) Emission height (m)	E=k × (sL/2)^0.65 × (W/3)^1.5 *AP-42, Section 13.2.1, 11/06 ed.* 24 12 25 1850 160 12 90 9 0.5	 *AP-42, Section 13.2.1, Table 13.2.1-1, 11/06 ed.* *AP-42, Section 13.2.1, Table 13.2.1-4, 11/06 ed.* *from engineer* *calculated* *from engineer, round-trip included* *from engineer(7:00-19:00)* *90%, keeping haul road in wet condition* *from engineer*
	Barging Point 2	Unloading of spoils to barge (g/s) Source ID: BP2	3.56089E-02	TSP emission factor (kg/Mg) Particle size mutipler, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg) Total Handling capacity (Mg/day) no. of operation hour (hr) % of dust suppression Emission height (m)	E = k × (0.0016) × [(U/2.2)^1.3 / (M/2)^1.4] 0.74 0.7 2.35 5.61E-03 2743 12 90 0.5	 *AP-42, S13.2.4, particle size < 30 um, 1/95 ed.* *AP-42, Table 13.2.4-1, 1/95 ed.* *from Hong Kong Observatory, Central Station(Yr2005)* *calculated* *from engineer* *from engineer (operation hours would be from 7:00 to 19:00)* *installation of flexible curtain and provision of water spray at discharge point*
	Barging Point 3	Truck unloading to conveyor leading to BP3 (g/s) Source ID: BPP1	1.66675E-03	RSP emission factor (kg/Mg) RSP to TSP factor Total Handling capacity (Mg/day) no. of operation hour (hr) % of dust suppression Emission height (m)	0.00005 2.1 2743 12 75 0.5	*AP-42, Section 11.19.2, Table 11.19.2-1, 8/04 ed., Trunk Unloading - Conveyor, crushed stone* *AP-42, Section 11.19.2, Table 11.19.2-1, 1/95 ed.* *from engineer* *from engineer (operation hours would be from 7:00 to 19:00)* with water spray
		Unloading of spoils to barge (g/s) Source ID: BP3	3.56089E-02	TSP emission factor (kg/Mg) Particle size mutipler, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg) Total Handling capacity (Mg/day) no. of operation hour (hr) % of dust suppression Emission height (m)	E = k × (0.0016) × [(U/2.2)^1.3 / (M/2)^1.4] 0.74 0.7 2.35 5.61E-03 2743 12 90 0.5	 *AP-42, S13.2.4, particle size < 30 um, 1/95 ed.* *AP-42, Table 13.2.4-1, 1/95 ed.* *from Hong Kong Observatory, Central Station(Yr2005)* *calculated* *from engineer* *from engineer (operation hours would be from 7:00 to 19:00)* *installation of flexible curtain and provision of water spray at discharge point*

N

830700 E

831000 E

831300 E

831600 E

816000 N

815700 N

BARGING POINT

BP1

CP1

HR1

SP1

CTP1

CLP1

K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 K14 K15 K16 K17 K18

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20

BELCHER'S STREET

SMITHFIELD

VICTORIA ROAD

POK FU LAM ROAD

BLOCK B NOT AFFECTED

LEGEND:

- STATION STRUCTURE
- UNDERGROUND STRUCTURE
- WORKS SITE
- SURFACE WORKS AREA
- REPRESENTATIVE AIR SENSITIVE RECEIVERS

AECOM

ENSR

MAUNSELL

ENSR Asia (HK) Ltd.

WEST ISLAND LINE ENVIRONMENTAL IMPACT ASSESSMENT

LOCATIONS OF POTENTIAL DUST EMISSION SOURCES - KENNEDY TOWN STATION

(SHEET 1 OF 2)

SCALE	A3 1:3000	DATE	APR. 2008
CHECK	FWYW	DRAWN	LC
JOB No.	60017115	DRAWING No.	APPENDIX 11.1
		REV	–

SZO:

N

830100 E

830300 E

830500 E

815600 N

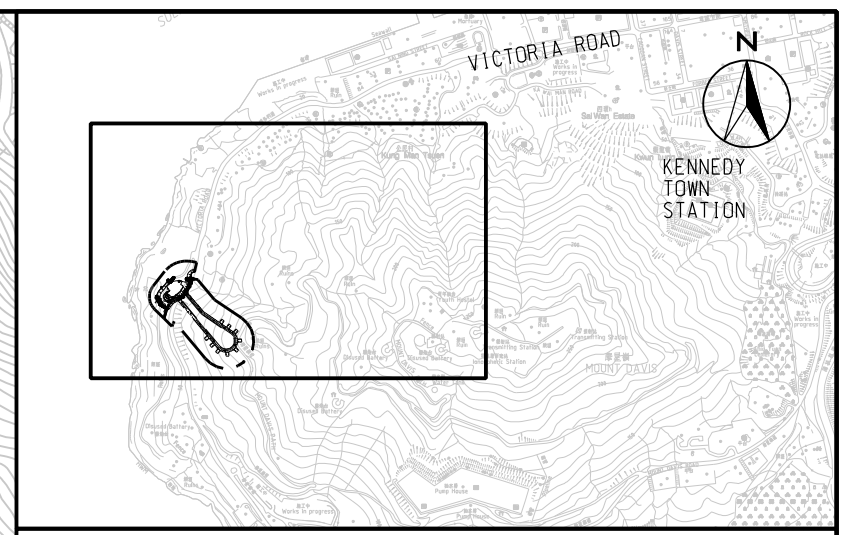
815400 N

A25
A24
A23
A22
A21

K19

K20

VICTORIA ROAD



KEY PLAN
A3 1:15000

LEGEND:

- STATION STRUCTURE
- UNDERGROUND STRUCTURE
- ABOVE GROUND WORKS SITE
- UNDERGROUND WORKS SITE
- SURFACE WORKS AREA
- REPRESENTATIVE AIR SENSITIVE RECEIVERS

AECOM
ENSR
MAUNSELL
ENSR Asia (HK) Ltd.

WEST ISLAND LINE ENVIRONMENTAL IMPACT ASSESSMENT

LOCATIONS OF POTENTIAL DUST EMISSION SOURCES - KENNEDY TOWN STATION

(SHEET 2 OF 2)

SCALE	A3 1:2000	DATE	APR. 2008
CHECK	-	DRAWN	HYY
JOB No.	60017115	DRAWING No. APPENDIX 11.1	REV -

SZO:

N

831400 E

831700 E

832000 E

832300 E

816500 N

816200 N

TEMPORARY OVERHEAD CONVEYOR BELT SYSTEM

CONSTRUCTION SHAFT

ELEVATED CONVEYOR BELT SYSTEM

WESTERN DISTRICT PUBLIC CARGO WORKING AREA

BARGING POINT

BP3

HR2

BP2

HR6

SP2

HR5

HR3

BPP1

SP3

HR4

CTP2

CP2

CLP2

SHING SAI ROAD

SAI CHEUNG STREET NORTH

KENNEDY TOWN PRAYA

BELCHER'S STREET

UNDERGROUND CONSTRUCTION ADIT

THE BELCHER'S

HILL ROAD (ELEVATED)

CONNAUGHT ROAD WEST

DES VOEUX ROAD WEST

UNIVERSITY STATION

HONG KONG UNIVERSITY

U1

U2

U3

U4

U5

U6

U7

U8

U9

U10

U11

LEGEND:

- STATION STRUCTURE
- UNDERGROUND STRUCTURE
- WORKS SITE
- SURFACE WORKS AREA
- REPRESENTATIVE AIR SENSITIVE RECEIVERS

AECOM

ENSR

MAUNSELL

ENSR Asia (HK) Ltd.

WEST ISLAND LINE ENVIRONMENTAL IMPACT ASSESSMENT

LOCATIONS OF POTENTIAL DUST EMISSION SOURCES - WESTERN PCWA SITE

SCALE	A3 1:3000	DATE	DEC.2007
CHECK	–	DRAWN	GXH
JOB No.	60017115	DRAWING No.	APPENDIX 11.1
		REV	–

SZO: