22 August 2016

Sarah Williamson
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BHP Billiton Iron Ore
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Email: Sarah.Williamson@bhpbilliton.com

Dear Sarah

RE: MEMORANDUM – UPDATED AIR QUALITY MODELLING FOR SOUTH FLANK PROPOSAL

Please find attached a memorandum regarding the updated air quality modelling undertaken for this project. This memorandum is provided with information on relevant issues and recommendations for your consideration.

This memorandum should be read with knowledge of the modelling procedures contained in previous memorandum (PEL, 2016), draft report (PEL, 2012), air quality assessment for Mining Area C (PEL, 2015a) and Pilbara Strategic Environmental Assessment (PEL, 2015b).

If you require further information or explanation, please do not hesitate to contact us.

Yours sincerely

Jon Harper
Manager, Western Australia

TABLE OF ABBREVIATION

Abbreviation	Definition
COS	Coarse Ore Stockpile
DoE	Department of Environment
km	Kilometre
m	Metre
MAC	Mining Area C
ms^{-1}	metre per second
Mtpa	Million tonnes per annum
NPI	National Pollution Inventory
OHP	Ore Handling Plant
PC	Primary Crushing
PEL	Pacific Environment Limited
PM_{10}	Particulate matter 10 micrometres or less in diameter
ROM	Run of Mine
the Project	Proposed development of South Flank Iron Ore Mine
TLO	Train Loadout
TSP	Total Suspended Particles
WRF	Weather Research and Forecasting
WS	Wind speed
$\mu g/m^3$	micrograms per cubic meter

1 BACKGROUND

Mining Area C (MAC) is located approximately 100 km north west of Newman in the Pilbara region of Western Australia. It is one of four mining hubs in BHP Billiton's Western Australian Iron Ore (WAIO) business. The South Flank project is proposing to develop a mixture of brownfield and green field facilities with an annual production capacity of approximately 80 Mtpa. This will increase annual production to approximately 150 Mtpa from the MAC hub. This increase will substitute the ore generation of Yandi mining hub whilst providing no increase to the total BHP Billiton's annual production. Mining activities will be extended to the South Flank project area, approximately 8 kilometres south of existing processing facilities, within Mining Lease ML281SA.

Incremental mining activity will be supported with construction of new processing facilities as follows:

- Primary Crushing (PC) facilities located south of existing infrastructure;
- Run of Mine (ROM) pads at Vista Oriental (eastern) or Grand Central (western) project areas;
- Overland conveyors;
- Coarse Ore Stockpile (COS);
- Ore Handling Plant (OHP) within existing MAC lease area;
- Upgrade to the existing stockyards and outflow facilities;
- Duplication of the existing rail loop and addition of a second Train Loadout (TLO);
- Advanced mine de-watering to support mining at South Flank;
- Expansion of Mulla Mulla Accommodation Village capacity to approximately 1500 beds;
- Installation of supporting non-processes infrastructure (e.g., power lines, access roads) to support new mining area; and
- Expansion of existing non-processing infrastructure (NPI) and industrial facilities to support production.

1.1 Objective

The objective of the current study is to assess the potential air quality impact from the proposed development, with a specific focus on:

- updating the base model for South Flank operations reflecting planned dust controls;
- updating the representative model year;
- updating the mine configuration from previous option (PEL, 2016);
- update the assessment of potential visual impacts to the receptors on Great Northern Highway using appropriate visual amenity impact criteria; and
- assessing controls requirement and provide recommendations for the proposed development.

2 SUMMARY OF MODEL INPUTS

Modelling guidelines issued for Western Australia (DoE, 2006) require air quality impact assessments to account for cumulative impacts (i.e. inclusion of background air quality concentration). Therefore, monitoring data from BHP Billiton Iron Ore background station (BG2) in Newman was included in the analysis. Review of meteorological and existing air quality in the region was used to identify 2010 as a suitable representative modelling year for this study (PEL, 2015b).

Meteorology is one of the critical factors influencing pollutant dispersion and various meteorological parameters including temperature, wind, rainfall and humidity were analysed in this project. Consistent with the approach adopted in the Pilbara Strategic Environmental Assessment, the Weather Research and Forecasting (WRF) Model, a next-generation mesoscale numerical weather prediction system was used to generate initial meteorology for the study (PEL, 2015b). Three dimensional wind fields generated by WRF were input to CALMET for further processing to finer resolution for use in the dispersion modelling (Figure 2-1). The output from the CALMET meteorological model is input to the CALPUFF dispersion model.

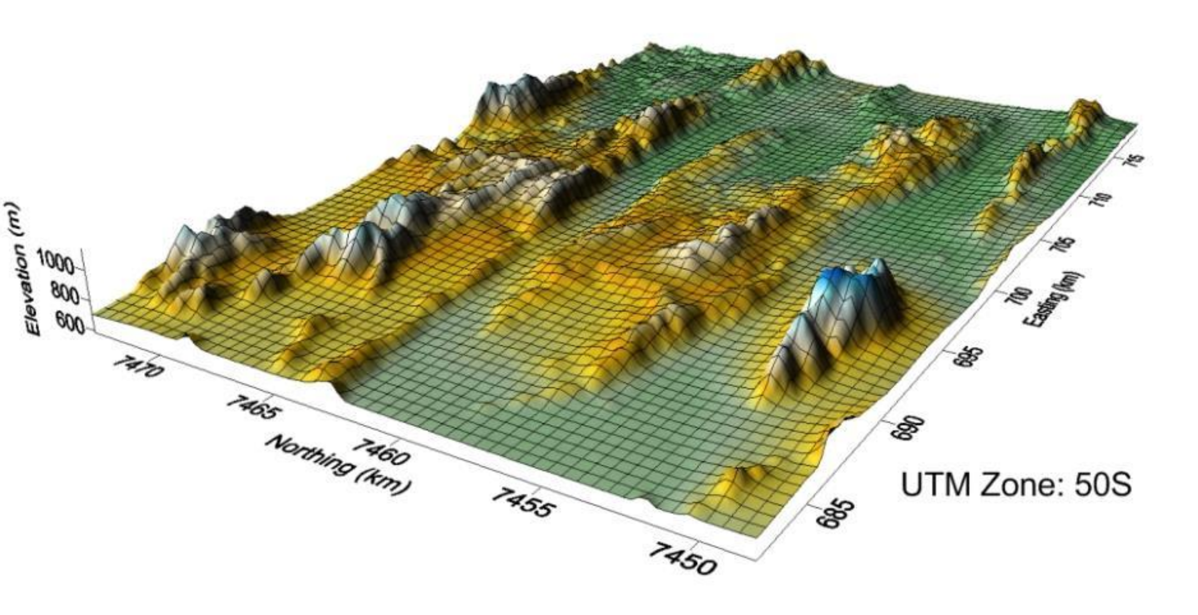

Figure 2-1: Model domain, grid and base elevation

The CALPUFF model was set to calculate concentrations both on a set grid (gridded receptors) and at 12 specified locations (discrete receptors), specifically the MAC accommodation camps (Packsaddle village and Mulla Mulla Village A and B), Hope Downs camp, airport as well as nominal locations named receptors 1 to 7 on Great Northern Highway (Figure 2-3). Packsaddle village and Mulla Mulla Village A and B as well as Hope Downs Camp, as accommodation villages, come under the definition of sensitive receptors[1]. The nominal locations on Great Northern Highway are intended as indicative sites for determining potential changes in amenity in the vicinity of the highway. The model was configured to predict the ground-level concentrations on a rectangular grid. The model domain was

1 A 'sensitive receptor' means a location where people are likely to reside or congregate; this may include a dwelling, school, hospital, nursing home, child care facility or public recreation area or land zoned residential that is either developed or undeveloped (NEPC, 2014).

defined as 25 km in the north–south direction and 37 km in the east-west direction and has its southwest corner at 681.98, 7448.19 km (50S UTM) (Figure 2-1).

Figure 2-2: Sensitive Receptor Locations for Model Interpretation

Location	Sensitive Receptors	
	Easting (m)	Northing (m)
Potential Hwy Receptor 1	684411	7458397
Potential Hwy Receptor 2	684454	7457634
Potential Hwy Receptor 3	685040	7456818
Potential Hwy Receptor 4	685746	7456051
Potential Hwy Receptor 5	686366	7455366
Potential Hwy Receptor 6	687166	7454865
Potential Hwy Receptor 7	687967	7454039
Hope Downs Camp	706983	7449292
Airport	685772	7459106
Mulla Mulla Village A	688033	7460336
Packsaddle Village	693065	7465283
New Mulla Mulla B Village	687466	7460942

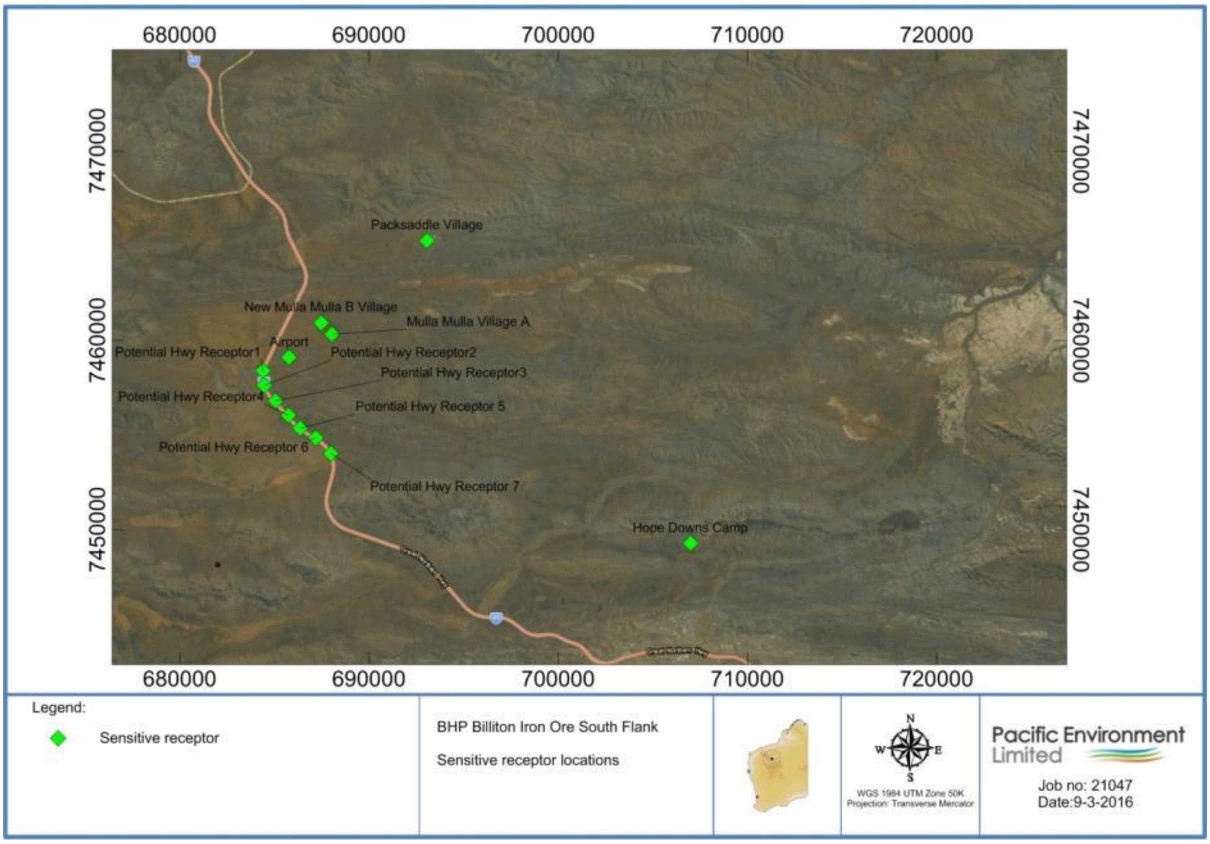

Figure 2-3: Sensitive Receptor Locations

3 EMISSION ESTIMATION

The predominant emissions from an iron ore mine and material handling facility operations are particulates (PM_{10} and TSP). The emission estimation process has followed previous studies conducted for BHP Billiton Iron Ore at South Flank and MAC (PEL, 2012 and 2015a). An emissions inventory for the operations was developed for PM_{10} and TSP.

BHP Billiton Iron Ore provided the activity data for the activities to be conducted as part of the assessment (BHP Billiton Iron Ore, 2016). Proposed mine plan for the Project, including tonnages, locations of deposits, overburden storage area, provided for this assessment are shown in Table 3-1 and Figure 3-1.

Table 3-1: Proposed movement of South Flank (SF) including R Deposit in Year 2031

Million tonnes	Ore	Waste	Total
SF2	14.1	5.6	19.6
SF3	0.40	0.04	0.45
SF7	10.6	0.6	11.2
SF9	14.9	26.2	41.1
SF16	9.2	35.3	44.5
SF19	4.0	3.9	7.9
SF25	10.2	2.6	12.8
R1	2.8	0.2	3.0
R3	8.4	2.7	11.1
R5	5.5	11.3	16.7
Total	**80.0**	**88.5**	**168.5**

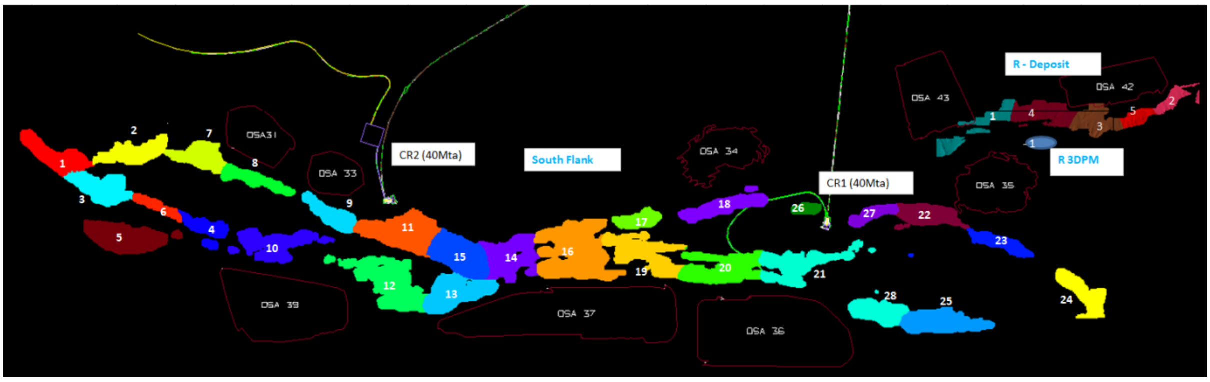

Figure 3-1: South Flank Pits, Crusher and Convey Infrastructure

3.1 Emission Sources

The key emission sources for the operating phase of the Project are considered to be associated with:

- Bulldozing
- Loading
- Unloading
- Wheel generated dust from haul roads
- Wind erosion from stockpiles and open areas
- Blasting
- Drilling
- Crushing
- Screening
- Stacking
- Reclaiming
- Transfer Stations

BHP Billiton Iron Ore site specific empirical equations and National Pollution Inventory (NPI) emission estimation techniques were used to derive source specific emissions. Emission factors adopted in this study are listed in Table 3-2. An overview of the emission sources are shown in Figure 3-2.

Table 3-2: Emission factors for this assessment

Activity	PM_{10} emission factor	TSP emission factor	Unit	Reference
Scalping Screening Building	1.5 – 7 (based on material's DI)	2.86 x PM_{10} emission factor	g/s	BHP Billiton Iron Ore site specific empirical equations
Transfer Station	$\frac{0.001 \times (DI + 30)}{450} \times \frac{t}{3.6} \times \left(\frac{WS}{2.2}\right)^{1.3}$	2.13 x PM_{10} emission factor	g/s	BHP Billiton Iron Ore site specific empirical equations
Stacking	$\frac{0.001 \times (DI + 30)}{200} \times \frac{t}{3.6} \times \left(\frac{WS}{2.2}\right)^{1.3}$	2.38 x PM_{10} emission factor	g/s	BHP Billiton Iron Ore site specific empirical equations
Reclaiming	$\frac{0.001 \times (DI + 30)}{450} \times \frac{t}{3.6} \times \left(\frac{WS}{2.2}\right)^{1.3}$	2.38 x PM_{10} emission factor	g/s	BHP Billiton Iron Ore site specific empirical equations
Wind erosion	$1.44 \times 10^{-6} \times WS^3 \times (1 - \frac{{U_0}^2}{WS^2})$ (when WS > U_0 ms^{-1} and U_0 is 5.23 ms^{-1})	2	$g/m^2/s$	(SKM, 2005)
Bulldozing of waste/ore	0.94	4.27	kg/hour	(NPI, 2012)
Loading of trucks with ore/waste	0.012	0.025	kg/t	(NPI, 2012)
Unloading of trucks with ore/waste	0.0043	0.0120	kg/t	(NPI, 2012)
Drilling of ore/waste	0.31	0.59	kg/hole	(NPI, 2012)
Blasting of ore/waste	79.15	152.75	kg/blast	(NPI, 2012)
Primary Crusher	0.004	0.01	kg/t	(NPI, 2012)
Secondary Crusher Building	0.012	0.03	kg/t	(NPI, 2012)
Wheel generated dust (unpaved road)	2.3	7.6	kg/VKT	(NPI, 2012)

Note: DI denotes Dustiness index

t denotes tonnes of material handling

WS denotes wind speed

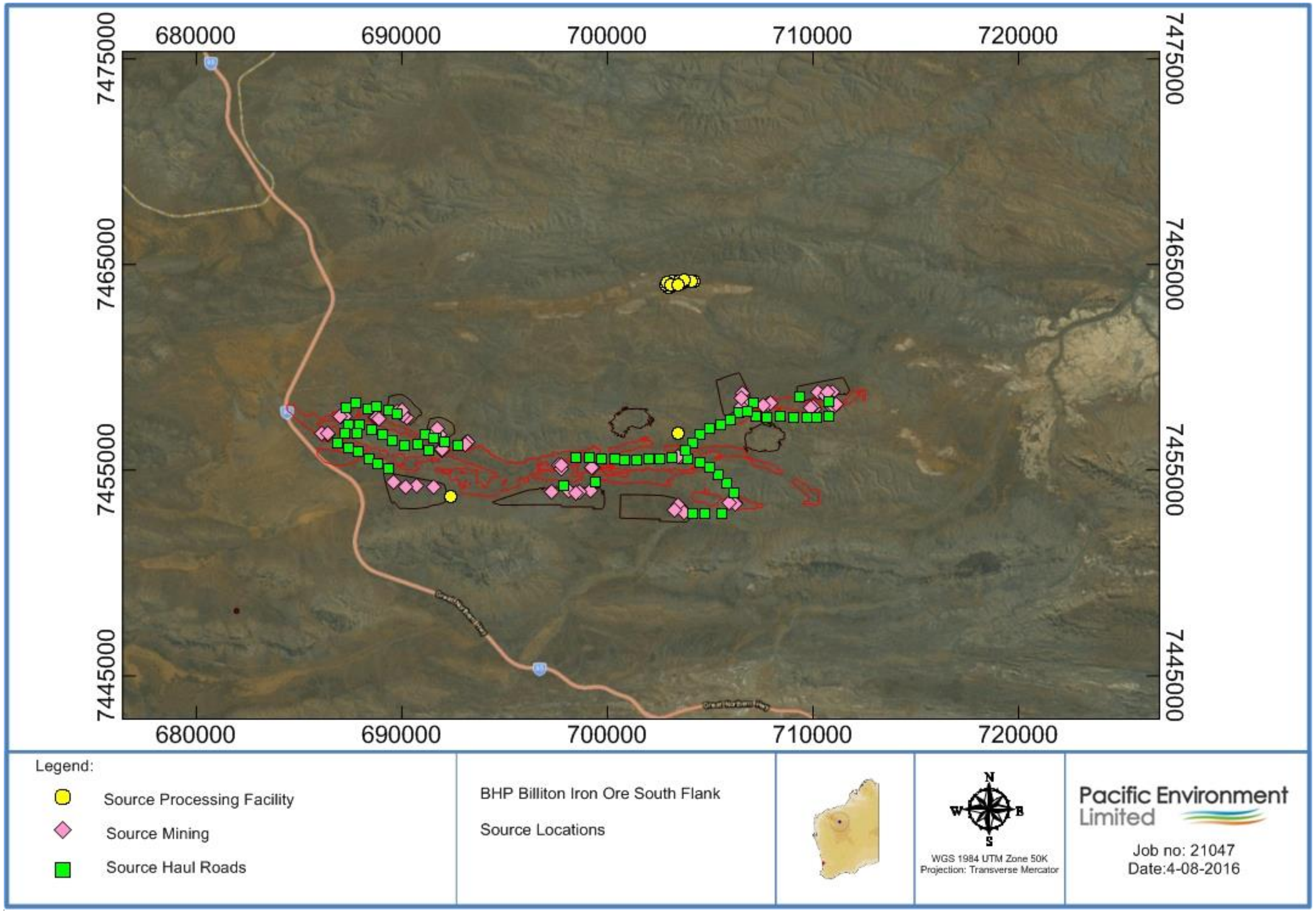

Figure 3-2: Source locations

Emissions controls were included in the emissions estimation based on information provided by BHP Billiton Iron Ore and PEL experience for similar projects in the same region (Table 3-3). A summary of the estimated annual emissions from the Project is shown in Table 3-4. Emission data were input into CALPUFF as an hourly varying file together with source parameters including initial sigmas, effective height and base elevation.

Table 3-3: Summary of planned control factors for the Project

Operation	Control method and emission reduction
	Mining
Bulldozing	No control
Loading ore and waste	TSP: 50% for pit retention; PM_{10}: 5% for pit retention
Unloading waste	No control
Unloading ore on to primary crushers	70% for water sprays
Drilling	65% for hooded with cyclone
Blasting	TSP: 50% for pit retention; PM_{10}: 5% for pit retention
Wind Erosion in OSA and ROM pad	50% for watering
	Haul road
Hauling	80% for chemical treatment
	Processing facility
Primary crushing of ore	50% for water sprays
ROM stacker	No control
Screening plant	No control
Secondary crushing building	75% for enclosure with extraction
Transfer station*	Emission reduction already accounted for in emission equation as per Port Hedland studies
Stackers*	Emission reduction already accounted for in emission equation as per Port Hedland studies
Train load out*	Emission reduction already accounted for in emission equation as per Port Hedland studies
Wind erosion in open area	50% for water sprays

*Note: Extensive Port Hedland studies have determined site specific emission factor equations for these fixed plant equipment.

Table 3-4: Estimate of annual particle emissions from the Project

Project Activity	PM_{10} (tonne/year)	TSP (tonne/year)
Mining		
Bulldozing	8	37
Loading ore and waste	2,204	4,591
Unloading waste	378	1,056
Unloading ore	207	523
Drilling	4	8
Blasting	6	12
Wind Erosion in OSA and ROM pad	1,025	-
Haul road		
Hauling	1,698	5,580
Processing facility		
Primary crushing of ore	160	400
ROM stacker	30	86
Screening plant	268	698
Transfer station	44	100
Stackers	37	88
Train load out	10	23
Wind erosion in open area	67	-
Total	**6,146**	**13,202**

4 ATMOSPHERIC DISPERSION MODELLING RESULTS

Consistent methodology from previous studies in the region has been adopted in determining the air quality impacts associated with the Project (PEL, 2012 and 2015a). Particles, as PM_{10} and TSP, were modelled (24-hour average) with tabulated results presented for the listed sensitive receptor locations, and contours across the model domain.

The following scenario results are presented:

- Scenario 1: The Project in isolation (including background)
- Scenario 2: Cumulative Impacts associated with the Project and MAC (including background)

4.1 Scenario 1: The Project in isolation (including background)

The predicted ground level concentrations of particles as PM_{10} and TSP at the key sensitive receptor locations are presented in this section.

4.1.1 Particles as PM_{10}

The model results for PM_{10} from the Project (including the background concentrations) are summarised in Table 4-1. The results indicate that:

- The highest PM_{10} (24-hour) concentration of 199 µg/m^3 is predicted to occur at the Airport, with the 95th percentile predicted concentration at 97 µg/m^3. The annual average is estimated to be 40.9 µg/m^3.
- The highest PM_{10} (24-hour) concentration predicted at the potential highway receptors is estimated to be 191 µg/m^3 at Potential Hwy Receptor 2. The 95th percentile is estimated to be 102 µg/m^3. The least impacted highway receptor is Potential Hwy Receptor 7 with the maximum and 99th percentiles estimated to be 110 µg/m^3 and 87 µg/m^3 respectively. Higher variation is noted in the maxima at the receptors, while the annual averages at the potential highway receptors range between 39.7 µg/m^3 and 31.8 µg/m^3.
- The results indicate that the maximums can be an isolated event and the modelled year is a worst case year for sensitive receptors located in the immediate north of the operations.
- The highest PM_{10} (24-hour) concentration predicted at the accommodation camps is estimated to be 102 µg/m^3 at Mulla Mulla village A. As the 95th percentile, at 32 µg/m^3, is predicted to be significantly lower indicates that the maximum predicted concentration can be regarded as isolated high event.

4.1.2 Particles as TSP

The model results for TSP from the Project (including the background concentrations) are summarised in Table 4-2. The results indicate that:

- The highest TSP (24-hour) concentration of 285 µg/m^3 is predicted to occur at the Potential Highway Receptor 2, with the 95th percentile predicted at 168 µg/m^3. The annual average is 67.5 µg/m^3. Potential Hwy Receptor 7 is the least impacted highway receptor with maximum and 95th percentile at 186 µg/m^3 and 111 µg/m^3 respectively. The annual average is 55.5 µg/m^3 at this receptor.
- The highest TSP (24-hour) concentration predicted at the accommodation camps is estimated to be 156 µg/m^3 at Mulla Mulla Village A. The 95Th percentile and annual average are predicted to be 105 µg/m^3 and 54.4 µg/m^3 respectively.
- The above observations indicate the maximums can be an isolated event and the modelled year is a worst case year for sensitive receptors located in the immediate north of the operations.

Table 4-1: Statistics for predicted 24-hour average PM_{10} concentrations (including background) – Project in isolation (µg/m³)

	Potential Hwy Receptor 1	Potential Hwy Receptor 2	Potential Hwy Receptor 3	Potential Hwy Receptor 4	Potential Hwy Receptor 5	Potential Hwy Receptor 6	Potential Hwy Receptor 7	Hope Downs Camp	Airport	Mulla Mulla Village A	Packsaddle Village	New Mulla Mulla B Village
Max	176	191	166	116	129	121	110	74	199	102	46	90
99th Percentile	139	153	122	99	89	87	87	40	123	85	37	81
95th Percentile	104	102	92	77	69	64	65	30	97	60	32	56
90th Percentile	81	77	72	60	57	56	54	25	79	54	29	49
70th Percentile	43	43	42	40	38	37	35	20	48	35	24	32
Annual Average	39.7	39.6	38.4	34.5	33.4	33.1	31.8	20.5	40.9	32.0	22.8	29.7
Exceedances > 50 µg/m³	86	80	82	62	51	52	46	2	101	47	0	33
Exceedances > 70 µg/m³	51	43	38	23	16	13	13	1	57	10	0	8

Table 4-2: Statistics for predicted 24-hour average TSP concentrations (including background) – Project in isolation (µg/m³)

	Potential Hwy Receptor 1	Potential Hwy Receptor 2	Potential Hwy Receptor 3	Potential Hwy Receptor 4	Potential Hwy Receptor 5	Potential Hwy Receptor 6	Potential Hwy Receptor 7	Hope Downs Camp	Airport	Mulla Mulla Village A	Packsaddle Village	New Mulla Mulla B Village
Max	283	285	265	223	210	257	186	100	255	156	65	142
99th Percentile	220	256	199	166	151	152	154	60	213	136	60	128
95th Percentile	175	168	150	123	114	110	111	49	163	105	52	96
90th Percentile	134	129	120	96	96	94	93	43	140	92	48	83
70th Percentile	71	70	73	69	66	63	61	35	80	58	41	52
Annual Average	67.7	67.5	65.7	60.2	58.3	58.3	55.5	36.0	70.3	54.4	39.2	50.5

4.2 Scenario 2: Cumulative Impacts associated with the Project and MAC (including background)

The predicted cumulative ground level concentrations of particles as PM_{10} and TSP at the key sensitive receptor locations are presented in this section. Contour maps showing maximum 24-hour average concentration (PM_{10} and TSP) and the number of exceedances of the 50 µg/m³ and 70 µg/m³ (PM_{10}) are also presented.

4.2.1 Particles as PM_{10}

Based on the operations of the Project, the model results for PM_{10} from the project in conjunction with impacts from MAC (cumulative impacts) are summarised in Table 4-3 and shown in Figure 4-1. The contour maps indicating number of exceedances of the 50 µg/m³ and 70 µg/m³ are also shown in Figure 4-2 and Figure 4-3 respectively. The results demonstrate that:

- The highest PM_{10} (24-hour) concentration, estimated to be 214 µg/m³, is predicted to occur at the Packsaddle Village. The 95th percentile and annual average predicted concentrations at this receptor are 73 µg/m³ and 35.9 µg/m³ respectively.
- The highest PM_{10} (24-hour) concentration predicted at the Airport is 200 µg/m³. The 95th percentile and annual average is predicted to be 97 µg/m³ and 43.4 µg/m³ respectively.
- The highest number of excursions of 70 µg/m³ is predicted to occur at the Airport (62) followed by the Potential Hwy Receptor1 (54). Hope Downs Camp is the least impacted receptor with 1 excursion of 70 µg/m³ predicted to occur. The highest number of excursions of the 70 µg/m³ at the accommodation camps is predicted to occur at Packsaddle Village (24).
- These observations indicate that receptors located north of MAC and in between MAC and the Project are expected to be the most impacted from the operations.

Table 4-3: Statistics for predicted 24-hour average PM_{10} concentrations (including background) – Cumulative Impacts (µg/m³)

	Potential Hwy Receptor 1	Potential Hwy Receptor 2	Potential Hwy Receptor 3	Potential Hwy Receptor 4	Potential Hwy Receptor 5	Potential Hwy Receptor 6	Potential Hwy Receptor 7	Hope Downs Camp	Airport	Mulla Mulla Village A	Packsaddle Village	New Mulla Mulla B Village
Max	176	192	167	118	130	124	114	77	200	115	214	127
99th Percentile	140	153	129	102	92	90	90	43	125	97	130	92
95th Percentile	104	103	92	78	72	67	68	32	97	68	73	73
90th Percentile	83	80	74	62	58	57	56	27	80	57	54	59
70th Percentile	45	45	45	41	39	38	37	20	50	41	37	42
Annual Average	41.5	41.3	39.8	35.7	34.4	34.0	32.6	20.8	43.4	37.6	35.9	37.6
Exceedances > 50 µg/m³	91	85	90	70	60	59	48	2	111	65	45	69
Exceedances > 70 µg/m³	54	46	42	26	20	16	17	1	62	15	24	21

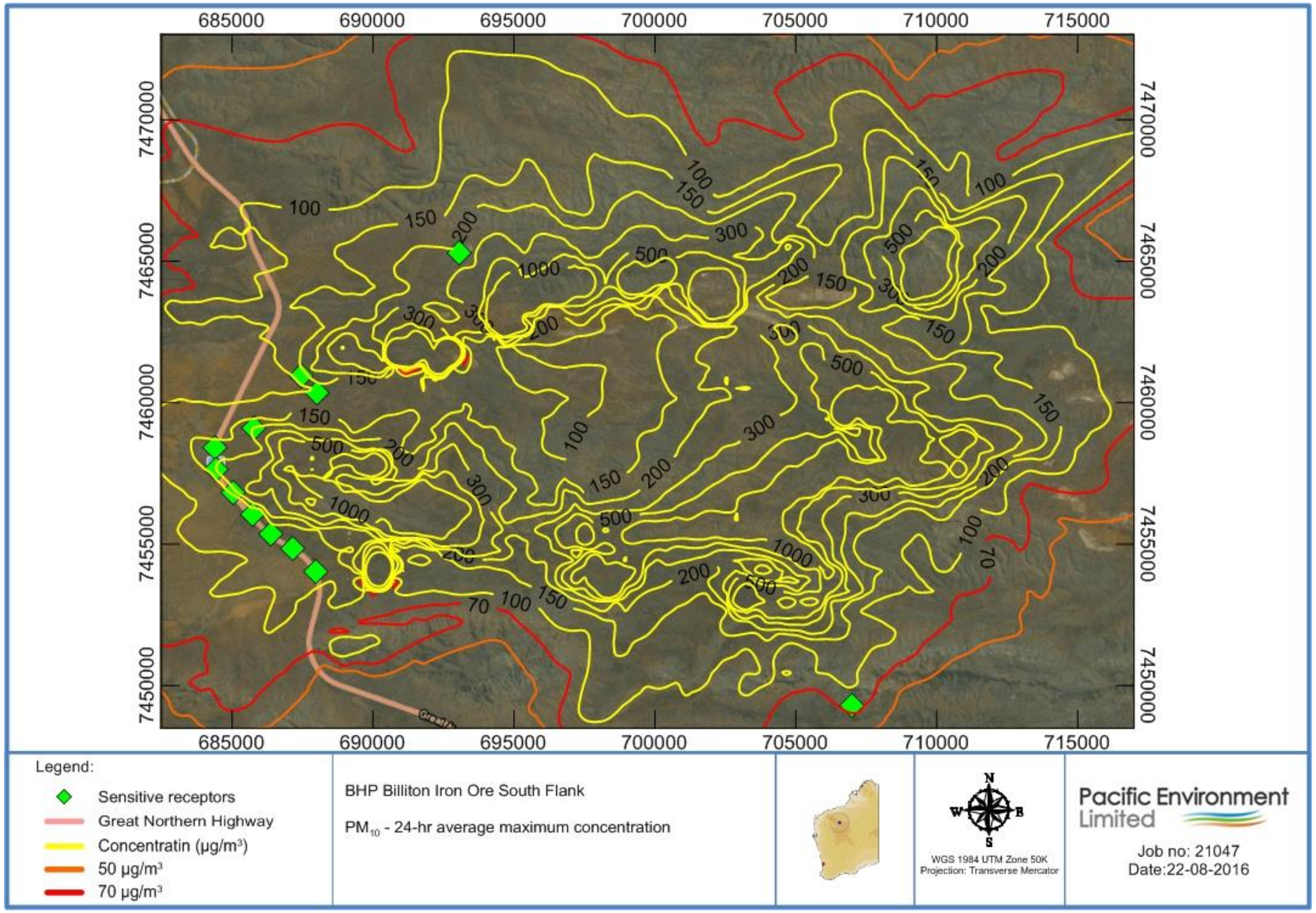

Figure 4-1: Maximum 24-hour PM_{10} concentration - cumulative impacts (the Project and MAC)

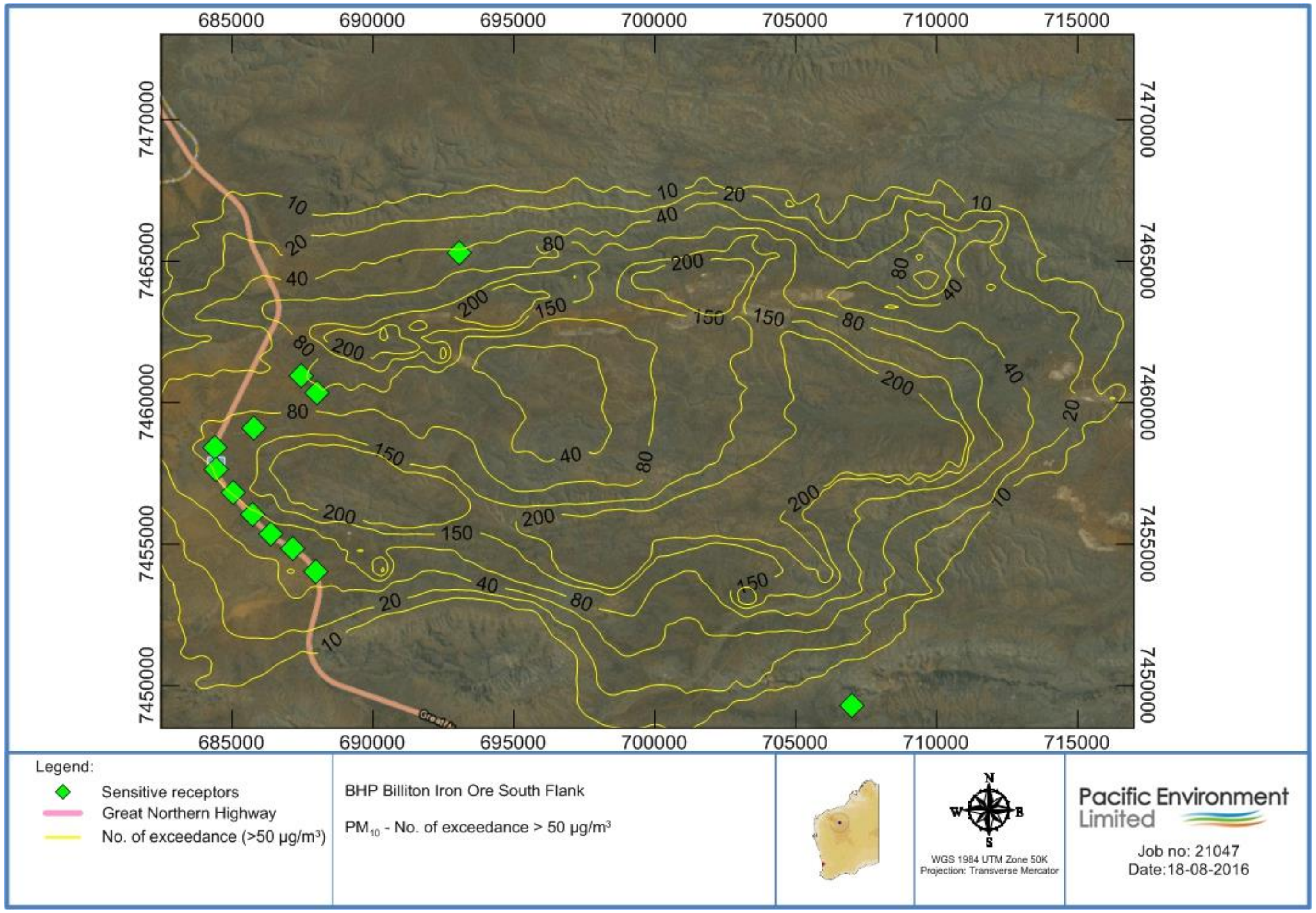

Figure 4-2: No. of exceedances greater than 50 µg/m³ - cumulative impacts (the Project and MAC)

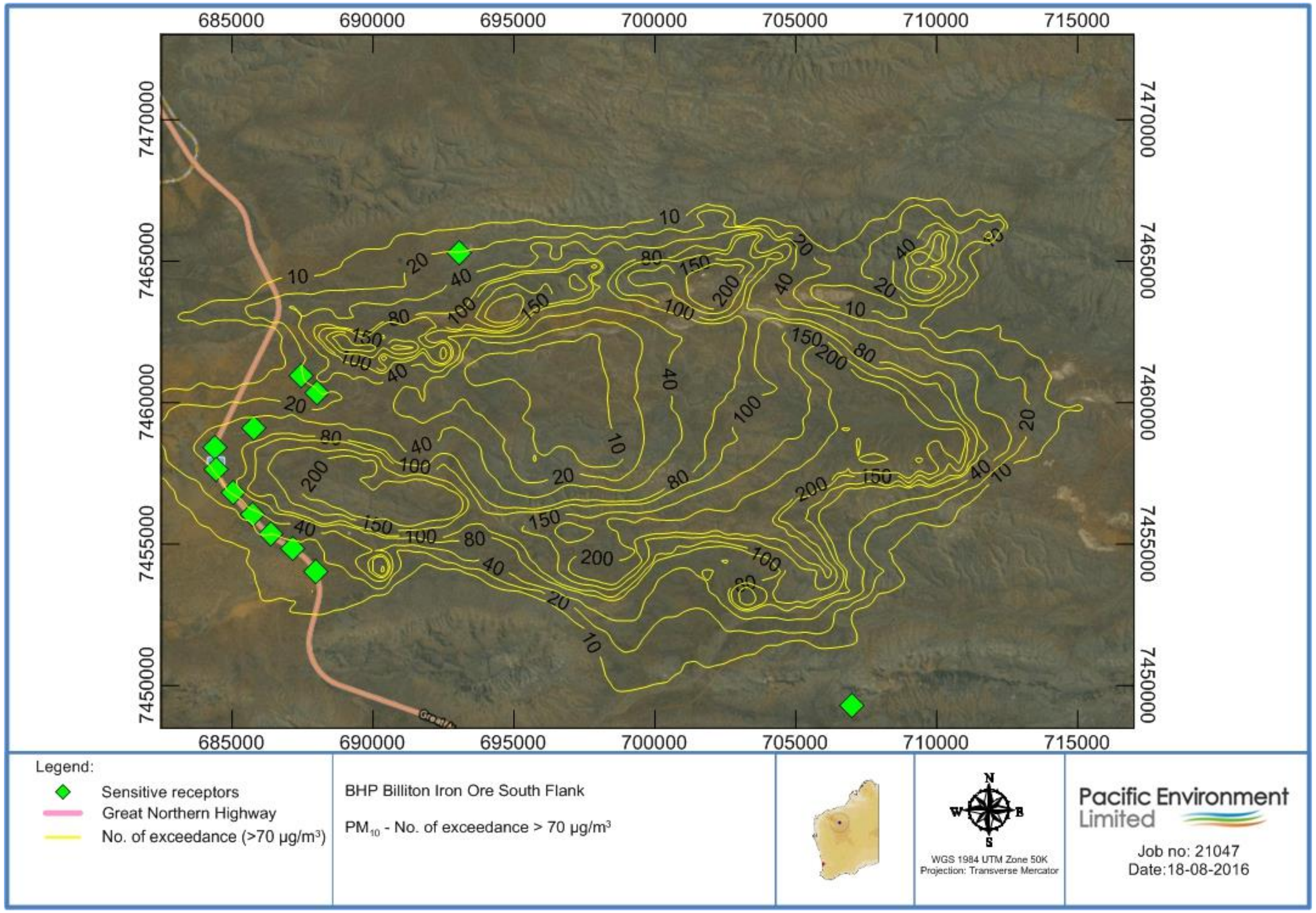

Figure 4-3: No. of exceedances greater than 70 µg/m³ - cumulative impacts (the Project and MAC)

4.2.2 Particles as TSP

The model results for TSP from the Project in conjunction with impacts from MAC (cumulative impacts) are summarised in Table 4-2 and Figure 4-4. The results indicate that:

- The highest TSP (24-hour) concentration of 285 µg/m^3 is predicted to occur at the Potential Highway Receptor 2. The 95th percentile and annual average concentrations predicted at this receptor are 170 µg/m^3 and 69.6 µg/m^3 respectively.
- The highest TSP (24-hour) concentration predicted at the accommodation camps is estimated to be 241 µg/m^3 at Packsaddle village. The 95th percentile and annual average concentrations are predicted to be 101 µg/m^3 and 57.6 µg/m^3 respectively.

Table 4-4: Statistics for predicted 24-hour average TSP concentrations (including background) – Cumulative Impacts (µg/m³)

	Potential Hwy Receptor 1	Potential Hwy Receptor 2	Potential Hwy Receptor 3	Potential Hwy Receptor 4	Potential Hwy Receptor 5	Potential Hwy Receptor 6	Potential Hwy Receptor 7	Hope Downs Camp	Airport	Mulla Mulla Village A	Packsaddle Village	New Mulla Mulla B Village
Max	283	285	267	224	213	260	191	104	255	162	241	162
99th Percentile	221	257	199	171	156	157	156	64	213	140	160	142
95th Percentile	175	170	152	128	118	114	118	51	164	109	101	112
90th Percentile	134	130	123	99	98	97	95	44	141	98	84	97
70th Percentile	74	72	75	71	67	65	62	35	83	67	62	70
Annual Average	70.0	69.6	67.5	61.6	59.6	59.5	56.6	36.4	73.6	62.2	57.6	62.2

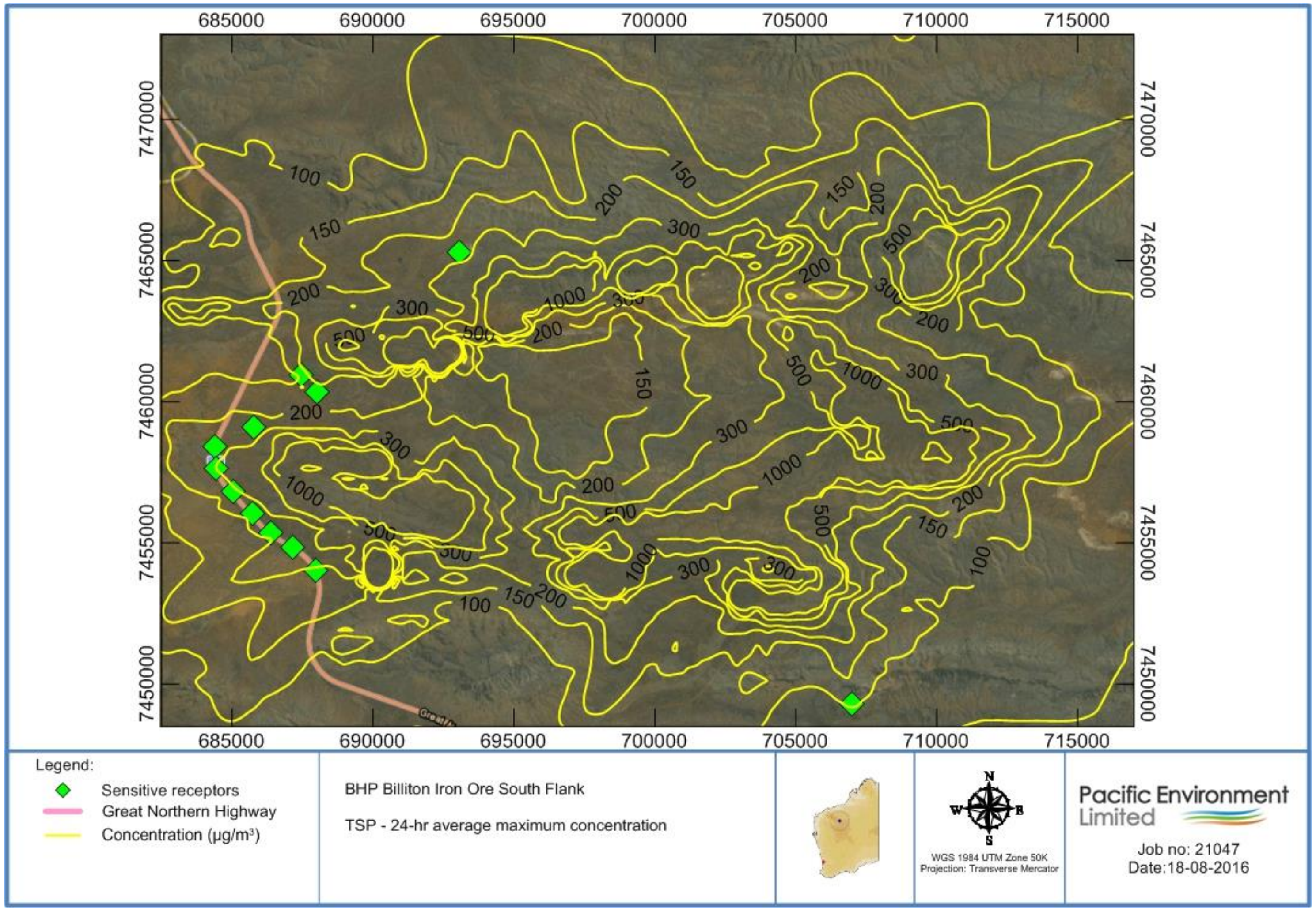

Figure 4-4: Maximum 24-hour TSP concentration - cumulative impacts (the Project and MAC)

4.3 Visibility

The methodology used to assess the potential risk in visibility reduction along the Great Northern Highway (west of the Project and MAC) is consistent with the methodology used for BHP Billiton Iron Ore's Central Pilbara Strategic Environmental Assessment (PEL, 2015b).

The percentages of potential reduction in visibility at the receptors due to the operations of the Project and MAC (cumulative impacts) over the modelled year are presented in Table 4-5. The potential of reduction in visibility along the Great Northern Highway (cumulative impacts) are illustrated in Figure 4-5.

Table 4-5: Percentage of the year with potential risk in reduced visibility at nominated sensitive receptors along Great Northern Highway

	Potential Hwy Receptor 1	Potential Hwy Receptor 2	Potential Hwy Receptor 3	Potential Hwy Receptor 4	Potential Hwy Receptor 5	Potential Hwy Receptor 6	Potential Hwy Receptor 7
High risk	12%	10%	9%	4%	3%	3%	4%
Medium risk	26%	30%	29%	32%	30%	28%	23%
Low risk	62%	60%	62%	64%	66%	69%	73%

Low risk rating is predicted along the Great Northern Highway for majority of the year (greater than 60%). Although a high risk rating is predicted at Potential Receptor 1 for 12% of the time; a high risk rating is predicted less than 10% of the time for the rest of the receptors.

Please note that the risk rating is determined based on the modelled year which represents the highest mining tonnage (ore and waste) within the Highway section of South Flank including haulage and waste dumps. This is representative of 'worst case' conditions and does not represent all potential mining years.

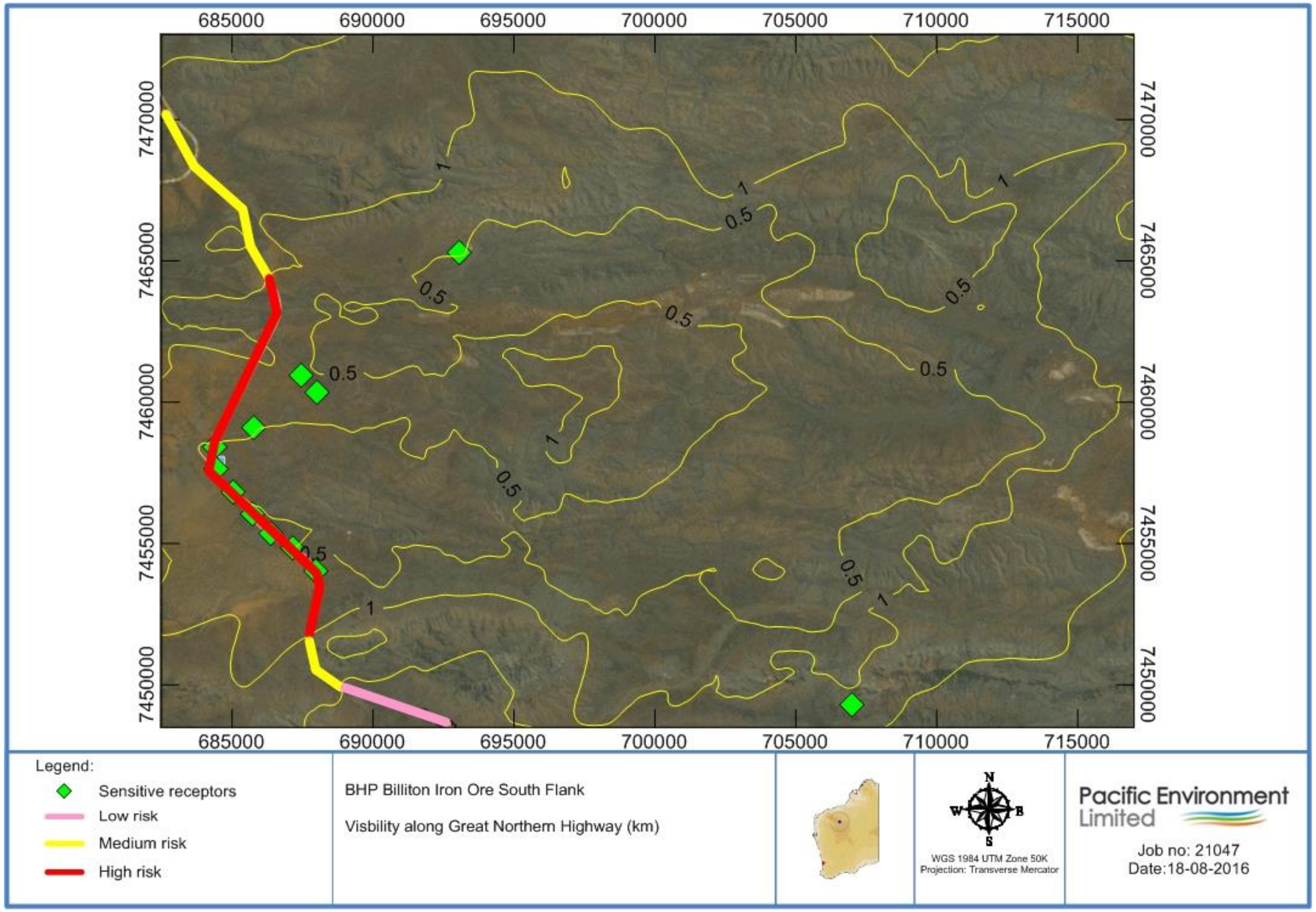

Figure 4-5: Potential Visibility Risk from cumulative impacts

5 SUMMARY

In summary, the proposed project at South Flank is comprised almost solely of Marra Mamba ore and the proposed operations are primarily above the water table. This will result in high dust emission and potential issues with visibility due to the Project's close proximity to the Great Northern Highway. Isolated high dust events are predicted at the accommodation camps and reduction in visibility is predicted along Great Northern Highway.

The modelling indicates that isolated high dust events are likely to occur at the accommodation camps, especially at Packsaddle Village, under certain meteorological conditions.

Along the adjacent sections of the Great Northern Highway, the greatest risks are with visibility. A very high risk of reduced visibility particularly during small averaging periods (1-hour) in high dust days is possible. Nevertheless, a low risk rating is predicted along the Great Northern Highway for the majority of the year (greater than 60%). The majority of the receptors on Great Northern Highway are predicted to have a potential high risk of visibility less than 10% of the time.

6 REFERENCE

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