Stephenson

Environmental Management Australia

AIR QUALITY IMPACT ASSESSMENT

PROPOSED PARTICLE BOARD PLANT

BORG MANUFACTURING PTY LTD

OBERON NSW

PROJECT NO.: **5572C/S24151A/16**

DATE OF FINAL ISSUE: **12 MAY 2016**

DATE OF REVISION C: **31 MAY 2016**

Stephenson

Environmental Management Australia

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EXECUTIVE SUMMARY

Stephenson Environmental Management Australia (SEMA) has been commissioned by Borg Manufacturing Pty Ltd, to undertake an air quality impact assessment (AQIA) of a proposed Particle Board (PB) manufacturing mill and plant in conjunction with the existing MDF manufacturing complex at Oberon, New South Wales (NSW). This AQIA has been prepared in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.

For the purpose of this AQIA, Borg has provided the design emissions data, operational data, discharge stack dimensions and building dimension data for the proposed PB Plant. SEMA has used TSP, PM_{10}, NOx and formaldehyde emission measurements conducted by SEMA at the existing plant as emissions input data for the MDF plant. Where data has not been available, SEMA has made conservative assumptions; which include:

1. Where PM_{10} emission data was not available, SEMA has assumed a conservative PM_{10} to TSP ratio of 100%.
2. A conservative ratio of 40% conversion of the NOx to NO_2 has been assumed for this study.

Table 1 presents a summary of the predicted GLCs for TSP, PM_{10} and NO_2 from the existing facility; the proposed PB Plant and the cumulative effects of both these sources which are in compliance with the relevant IAC. However, predicted formaldehyde GLC's exceed the relevant IAC in the Blenheim State Forest located north-west of Borg but not in the populated Oberon township.

TABLE ES-1 IMPACT ASSESSMENT PREDICTIONS – CUMULATIVE WHOLE SITE BORG OBERON

Pollutant	Units	Averaging period	IAC	Maximum Peak Predicted GLC	
				Proposed PB Plant	Cumulative (Modified Existing Facility + PB Plant)
TSP (100%ile)	$\mu g/m^3$	Annual	90	6	8
PM_{10} (100%ile)	$\mu g/m^3$	24 hours	50	21	25
	$\mu g/m^3$	Annual	30	3	4
NO_2* (100%ile)	$\mu g/m^3$	1 hour	246	57	225
	$\mu g/m^3$	Annual	62	1	4
HCHO (99.9%ile)	mg/m^3	1 hour	0.02	0.01	0.03

Key: IAC = Impact Assessment Criteria
GLC = Ground Level Concentration
TSP = total suspended particulate matter
PM_{10} = particulate matter less than 10 microns
NO_2 = nitrogen dioxide
HCHO = formaldehyde
* = 40% NO_x to NO_2 conversion assumed

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1 INTRODUCTION

Stephenson Environmental Management Australia (SEMA) was engaged by Borg Constructions Pty Ltd (Borg) to undertake an Air Quality Impact Assessment (AQIA) for the proposed Borg Particle Board (PB) Plant at the existing plant at Oberon, New South Wales (NSW).

The objective of this AQIA is to determine the ground level concentration (GLC) of total suspended particles (TSP), fine particulate (PM_{10}), nitrogen dioxide (NO_2) and formaldehyde from the proposed PB Plant plus the cumulative impacts of this proposed plant with the existing Borg Panels Oberon whole facility and to ensure it is within Air Quality Standards.

The AERMOD computer based dispersion model was used to determine the maximum TSP, PM_{10}, NO_2 and formaldehyde GLCs for this assessment in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (AMMAAP).*

Borg provided proposed emissions data, operational data, discharge stack dimension and building dimension data for the proposed PB Plant; all of which are required as input data for the dispersion modelling of the emissions to air.

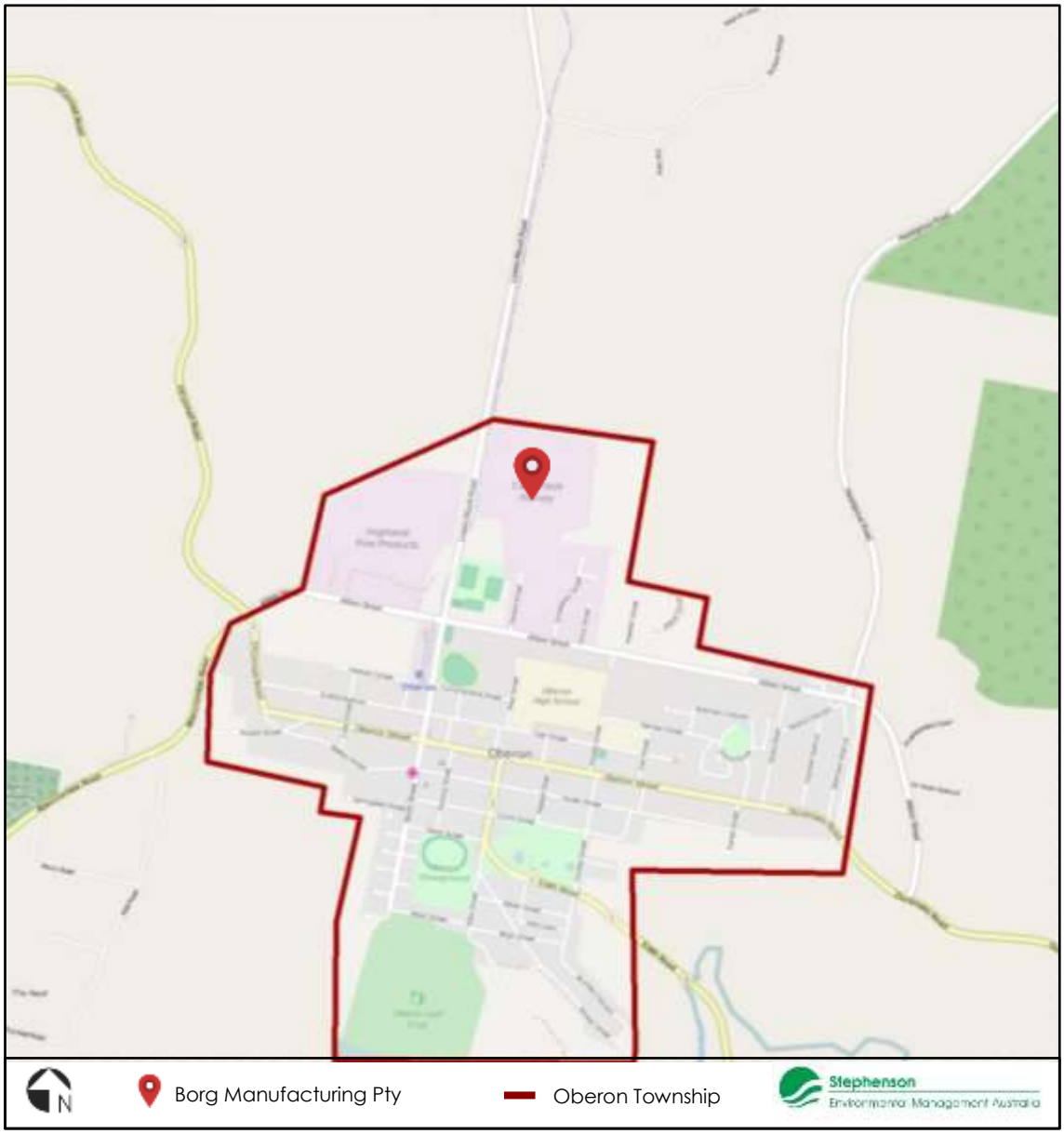
TSP, PM_{10}, NOx and formaldehyde emission measurements conducted by SEMA at the existing MDF plant on the 23rd to 27th February 2015 and 30th March 2015 have been used as the existing plant emissions input data for the modelling.

2 THE SITE

The Borg Oberon site occupies about 40 hectares, located approximately one kilometre north of the Oberon Post Office. Figure 2-1 displays the modelling domain extent and an aerial view of the existing facility. Figure 2-2 illustrates the Oberon township in relation to the total area of the modelling domain.

FIGURE 2-1 THE MODELLING DOMAIN (TOTAL AREA INCLUDED IN THE DISPERSION MODELLING)

FIGURE 2-2 OBERON TOWNSHIP (FORMS PART OF TOTAL MODELLING DOMAIN)



3 PLANT OPERATIONS

Borg advised that the Oberon facility operates on a cycle of 19 days on with two days off for scheduled maintenance on Mondays and Tuesdays every third week.

For the purpose of determining worst case impacts from the proposed Oberon PB Plant, this AQIA assumes the total Oberon facility will run 24 hours a day, seven days a week.

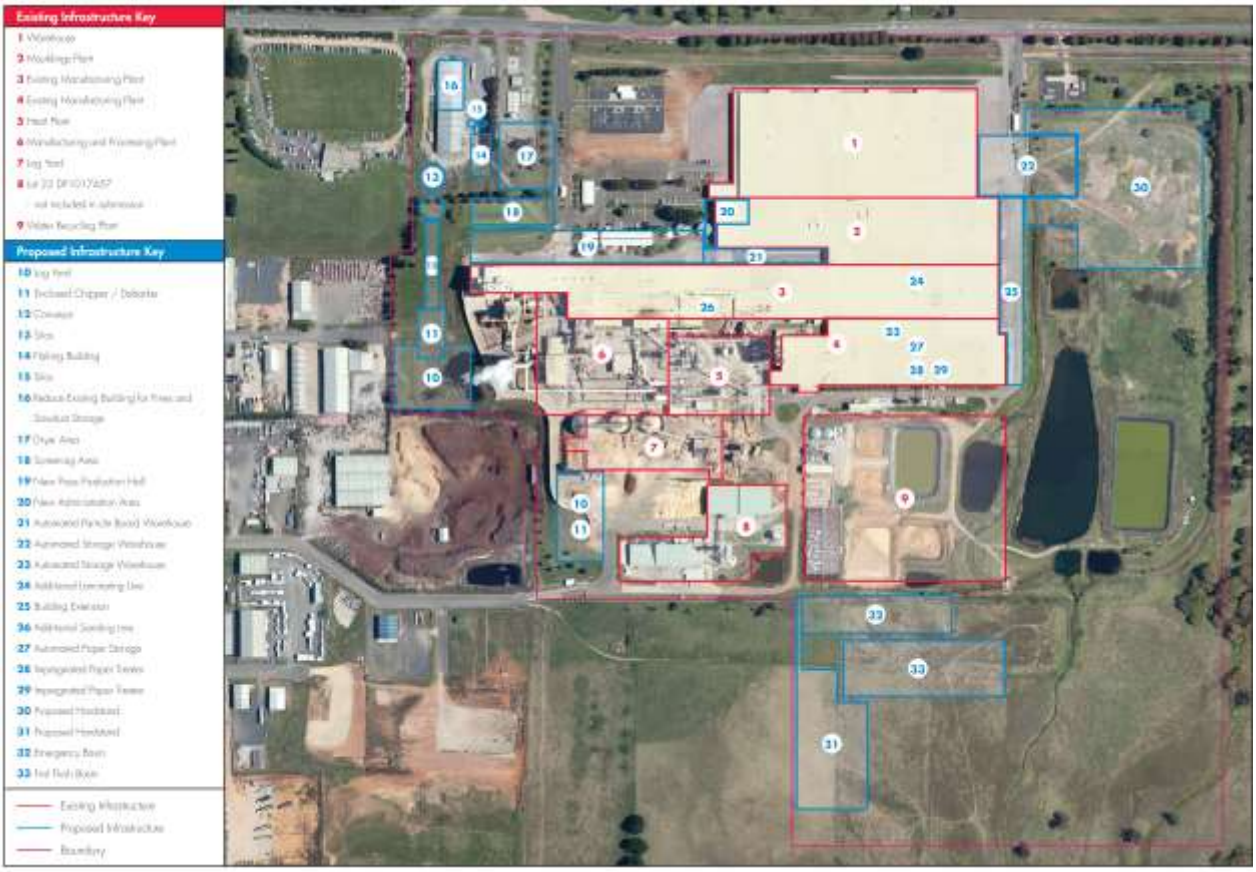
4 PROPOSED BORG OBERON PARTICLE BOARD PLANT

The proposed Oberon PB Plant design and operational specifications have been provided by Borg and are detailed in this section.

4.1 PROPOSED PB PLANT BUILDINGS AND STRUCTURES

Figure 4-1 illustrates the layout of the existing and proposed structures on the Borg Oberon site.

FIGURE 4-1 BORG OBERON SHOWING EXISTING AND PROPOSED BORG PB INFRASTRUCTURE



4.2 EMISSION POINTS – PROPOSED PB PLANT

The locations and dimensions of the emissions points (stacks and vents) for the proposed PB Plant, provided by Borg, are presented in Table 4-1.

Further detail of these emission points including emission concentrations, mass emission rates, exhaust gas flow rates, velocities and temperatures are detailed in Section 7.5 and Tables 7-2 and 7-3 of this AQIA.

TABLE 4-1 PROPOSED BORG OBERON PB PLANT POINT SOURCE SPECIFICATIONS

Proposed PB Emission Point		Proposed PB Stack dimensions			Co-ordinates	
No.	**Name**	**Height** (m)	**Exit diam.** (m)	**Exit area** (m^2)	**x**	**y**
E1	HD - Transport Sawdust and MDF Fines	20	0.26	0.05	764816	6267958
E2	HM particles- transport cyclofilter	20	0.22	0.04	764842	6267952
E3	Chipper cyclofilter	7	0.66	0.34	764974	6267885
E4	Hammer mill baghouse	10	0.97	0.74	764818	6267957
E5	Flaker mill baghouse	19	1.1	0.95	764875	6267947
E7	Baghouse dust transport	20	0.25	0.05	764816	6268012
E8	Baghouse air grader	10	1.39	1.53	764911	6267980
E9	Cyclofilter oversize mill	12	0.72	0.41	764914	6268034
E10	Cyclofilter oversize mill	12	0.72	0.41	764914	6268031
E12	Baghouse Forming line	40	1.6	2.01	764932	6267999
E13	Baghouse	10	0.96	0.72	764941	6268000
E14	Baghouse reject mat transport	20	0.69	0.37	764808	6267977
E15	Baghouse exhaust DD and trimming saws	20	0.91	0.65	764808	6267975
E16	Baghouse- material dust transport, E12,13,15.	20	0.25	0.05	764808	6267973
E19	Wet Electrostatic Precipitator	40	2.80	6.16	764871	6268019

Source: Borg Manufacturing

Key: E = Emission point
m = metres
diam. = diameter
m^2 = square metre(s)

FIGURE 4-2 BORG OBERON SITE ELEVATIONS

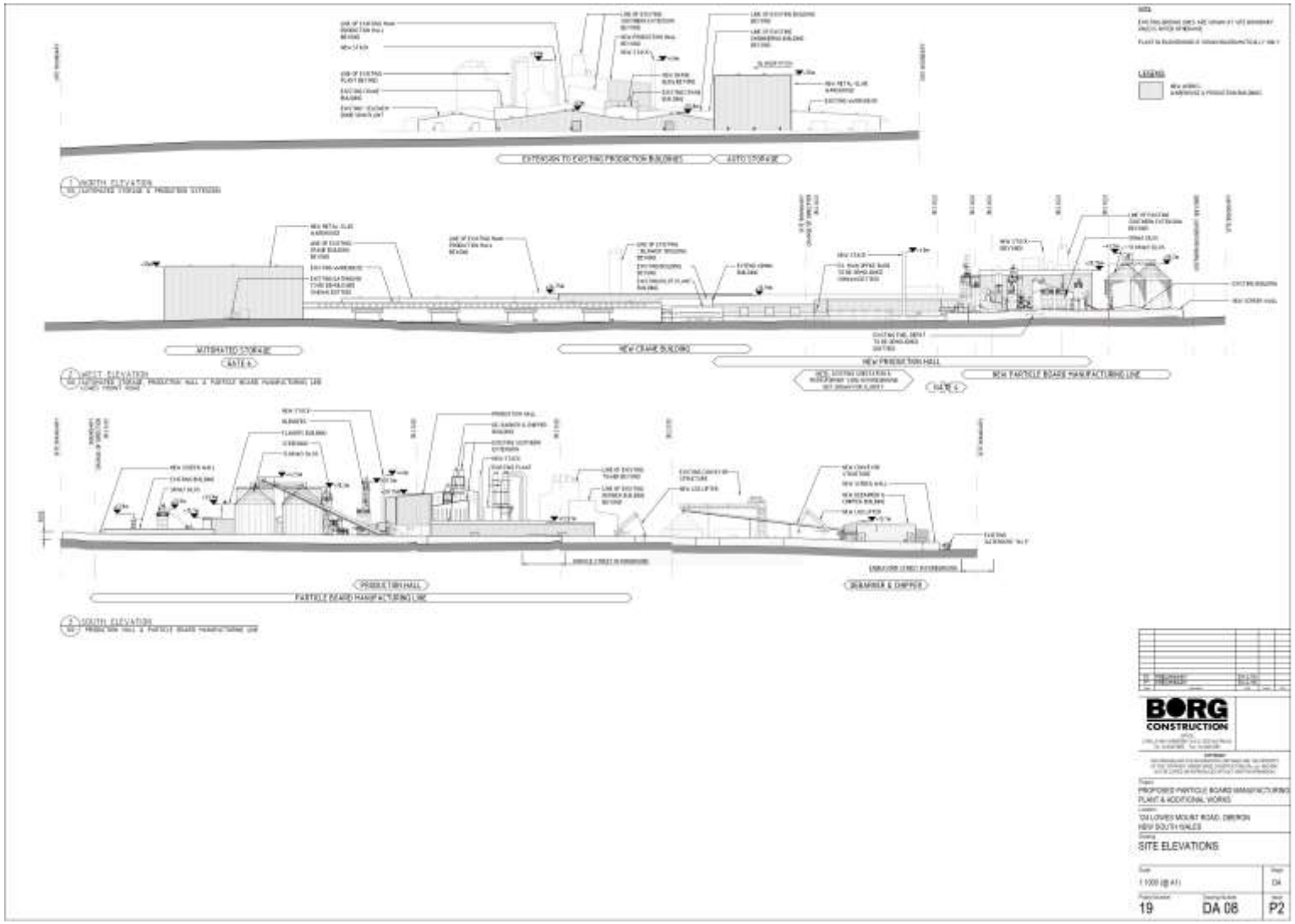
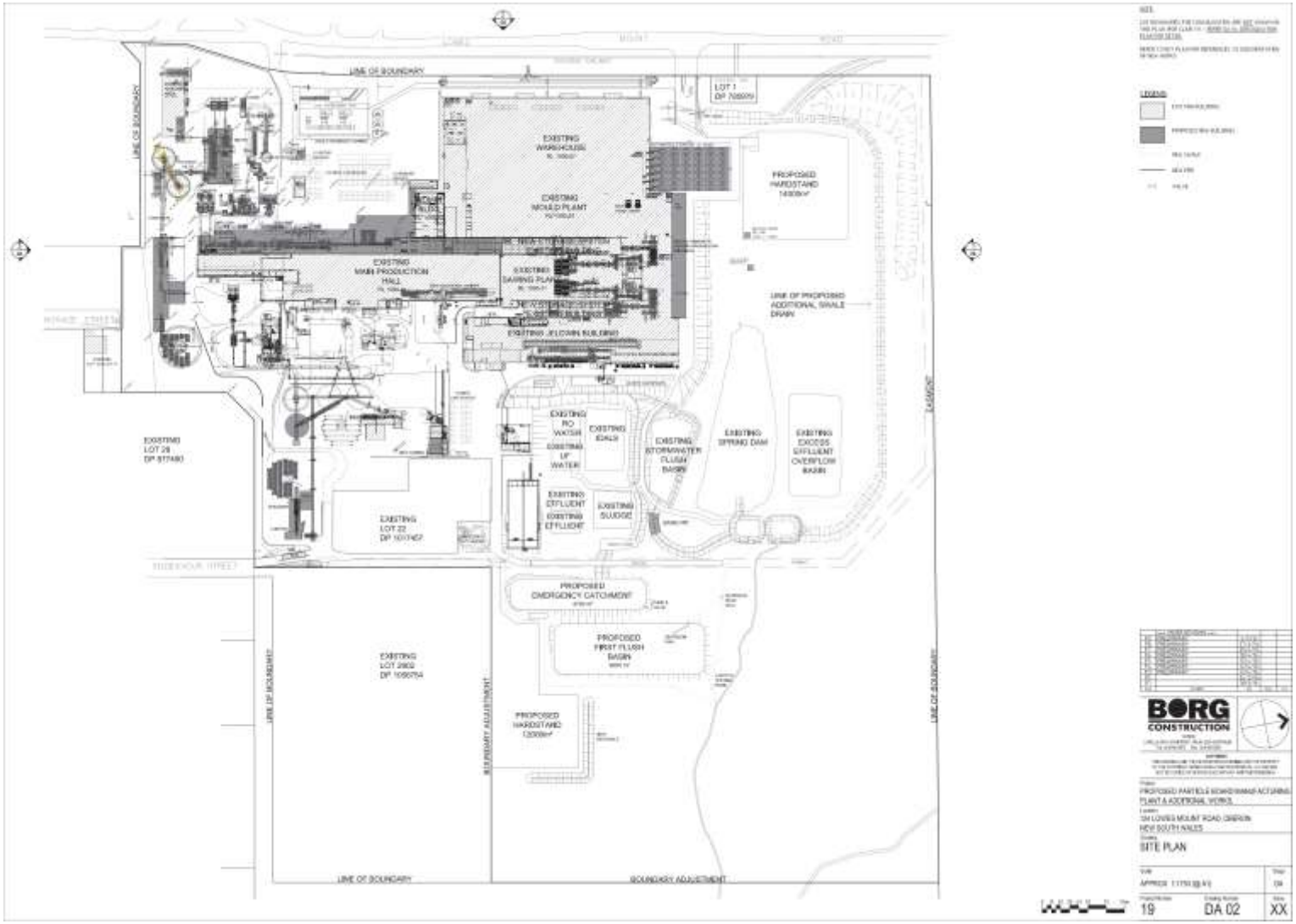


FIGURE 4-3 BORG OBERON PROPOSED PB PLANT LAYOUT



5 EXISTING EMISSIONS FROM MDF PLANTS PLUS PROPOSED COMBINED STACK

TSP, PM_{10}, NO_2 and formaldehyde emission measurements were conducted by Stephenson Environmental Management Australia (SEMA) at the existing Borg Oberon MDF facility on the 23 -27 February 2015 and 30 March 2015.

Modifications have been proposed for the existing approved MDF facility, which include additional mitigative measures on some existing emission points and the installation of new emission points. Borg has provided details of the emissions associated with these proposed modifications.

These modifications to the existing approved MDF facility, which form part of the assumptions for this AQIA, include:

1. EPA ID 23 (Paper treater) together with another additional treater (with a total flow rate of 80,000 m^3 per hour), will be diverted to EPA ID 11 (Conti-2 heat plant) where 95% of formaldehyde will be removed before discharge to the atmosphere;

2. EPA ID 12-2 (Conti 1 roof vent) will be diverted to EPA ID 17 (Conti-1 heat plant) were 95% of formaldehyde will be removed before discharge to the atmosphere;

3. A new 'combined stack' will be installed. This stack is proposed to be 40 metres high, 1.5 metres diameter, with a total flow rate of 100,000 m^3 per hour;

4. EPA ID 4 (DC1 baghouse) and EPA ID 5 (DC2 baghouse) will be discharged to the atmosphere through the proposed combined stack;

5. A wet scrubber system will be installed on the Conti 2 press line. This system is designed to emit a maximum of 40 mg/m^3 of TSP and 30 mg/m^3 of formaldehydes with a total flowrate of 100,000 m^3 per hour, which will be emitted through the combined stack.

The emissions details collected by SEMA for the existing facility, together with emission details provided by Borg regarding proposed modifications to MDF emission points and the proposed PB Plant have been included in this AQIA as cumulative emissions from the total Oberon facility. Table 5-1 presents the physical characteristics, exhaust gas temperature, flow rate and exit velocity of the emissions points used for the MDF facility.

Table 5-2 presents the TSP, PM_{10}, formaldehydes and NO_x emission rates for these stacks.

Refer to Section 9 for results of the cumulative impact assessment.

TABLE 5-1 MODIFIED EXISTING MDF FACILITY - EMISSION POINT PHYSICAL CHARACTERISTICS

EPA ID	Emission Point	Stack Height (m)	Stack Exit Diameter (m)	Flow Rate (am^3/min)	Exit Velocity (m/s)	Exit Temp. (°C)
7	Conti 2 cyclone (west)	44.40	2.48	3540	12.2	48
8	Conti 2 cyclone (east)	44.40	2.48	3767	13.0	48
9	Conti 1 South	30.50	2.23	3851	16.4	54
10	Conti 1 North	30.50	2.23	3660	15.6	55
11	Conti 2 heat plant	22.00	1.50	751	7.1	333
12-1	Conti 1 roof vent	11.95	1.14	668	10.9	52
12-5	Conti 1 roof vent	11.95	1.17	761	11.8	33
12-6	Conti 1 roof vent	11.95	1.19	908	13.6	34
17	Conti 1 Heat Plant	30.50	1.20	688	10.1	258
--	Conti-2 Proposed 40m Stack	40.00	1.50	1667	15.7	35

TABLE 5-2 MODIFIED EXISTING MDF FACILITY - TSP, PM_{10}, HCHO & NO_x EMISSION RATES

EPA ID	Emission Point	TSP (g/s)	PM_{10} (g/s)	HCHO (g/s)	NOx (g/s)
7	Conti 2 cyclone (west)	0.852	0.852	N/A	5.31
8	Conti 2 cyclone (east)	0.575	0.575	N/A	7.13
9	Conti 1 South	0.329	0.373	0.3397	2.40
10	Conti 1 North	0.505	0.256	0.5432	2.06
11	Conti 2 heat plant	0.983	0.887	0.0155	3.70
12-1	Conti 1 roof vent	0.010	0.012	0.0002	0.04
12-5	Conti 1 roof vent	0.001	0.002	0.0125	0.04
12-6	Conti 1 roof vent	0.002	0.002	0.0058	0.00
17	Conti 1 Heat Plant	1.055	0.976	0.0032	4.66
--	Conti-2 Proposed 40m Stack	1.114	1.114	0.4538	0.03

Key to Tables 5.1 and 5.2:

m	=	metres
am^3/min	=	actual cubic metres per minute
m/s	=	metres per second
°C	=	degrees Celsius
TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
HCHO	=	formaldehyde
NO_2	=	nitrogen dioxide
g/s	=	grams per second
N/A	=	Not Applicable

6 IMPACT ASSESSMENT CRITERIA

The AMMAAP criterion for TSP, PM_{10}, NO_2 and formaldehyde is outlined in Table 6-1.

For the purpose of this study, the maximum predicted ground level concentration at each ground level receptor location is defined as the 99.9th percentile peak concentration for formaldehyde and the 100th percentile peak concentration for NO_2, PM_{10} and TSP in accordance with AMMAAP.

TABLE 6-1 IMPACT ASSESSMENT CRITERIA FOR PARTICULATES

Pollutant	Averaging period	Units of measure	Impact Assessment Criteria	Source
TSP	Annual	µg/m^3	90	NHMRC (1996)
PM_{10}	24 hours	µg/m^3	50	NEPC (1998)
	Annual	µg/m^3	30	EPA (1998)
NO_2	1 hour	µg/m^3	246	NEPC (1998)
	Annual	µg/m^3	62	NEPC (1998)
HCHO	1 hour	mg/m^3	0.02	VGG (2001)

Key:

TSP	=	total suspended particulate matter
NO_2	=	nitrogen dioxide
PM_{10}	=	particulate Matter less than 10 micron
HCHO	=	formaldehyde
µg/m^3	=	micrograms per cubic metre
mg/m^3	=	milligrams per cubic metre
NHMRC	=	National Health and Medical Research Council
NEPC	=	National Environment Protection Council
EPA	=	NSW Environment Protection Authority
VGG	=	Victorian Government Gazette

7 DISPERSION MODELLING INPUT DATA

USEPA's AERMOD model was used to assess the potential impact of emissions from the proposed Borg PB Plant at Oberon. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

To best approximate site conditions and thus predict the most accurate ground level concentrations for pollutants modelled, AERMOD is customised with operation and input parameters, which are discussed in further detail below.

7.1 METEOROLOGICAL DATA

The meteorological data for this Oberon, NSW site was processed in two steps. MM5 (5th-generation Mesoscale Model) which is a prognostic meteorology model developed by Pennsylvania State University and the U.S. National Center for Atmospheric Research (NCAR) was used for modelling 2014 surface and upper air meteorological data for the dispersion modelling domain. Further processing of the MM5 data was then undertaken in AERMET to produce the wind field and weather data suitable for dispersion modelling with AERMOD.

Figure 7-1 summarises the annual 2014 wind strength, direction and frequency near Borg Oberon, showing prevailing winds were from a south-westerly direction. The 2014 meteorological data was selected as representative for the purposes of the dispersion modelling.

7.2 BUILDING DATA

As winds approach buildings and other structures, the wind tries to flow over or around the structure. This results in higher air pressures on the upwind side of the structures and lower air pressures on the downwind side of the structures. Depending on the discharge height of the stack relative to building or structure heights the lower pressures on the downwind side of buildings can cause plumes from stacks and other building openings to be trapped in the wake air flows, which increase ground level impacts and decrease the effects of dispersion on the downwind side of the buildings. This scenario is referred to as building wake or building down wash effects.

The AERMOD model contains options for including the effects of building wakes/downwash in the calculations. The model requires the building heights and widths and geographic coordinates as input to calculate the effects of building downwash.

The location and dimensions of existing and proposed major structures at the Borg Oberon site have been included for the purpose of this AQIA. Figure 7-2 shows the building structures which have been incorporated in the model and their orientation in relation to the emission points.

FIGURE 7-1 ANNUAL WIND ROSE, OBERON 2014

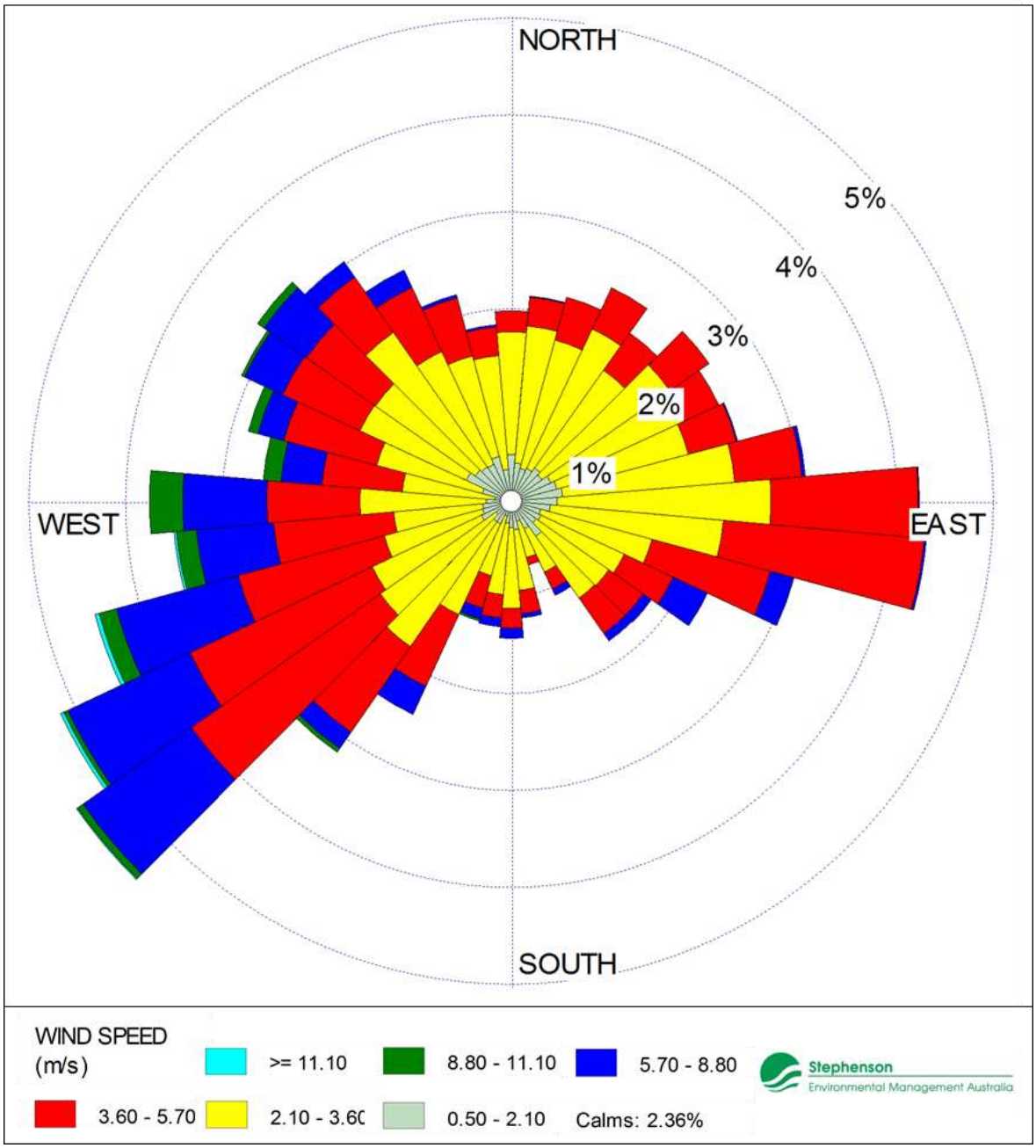
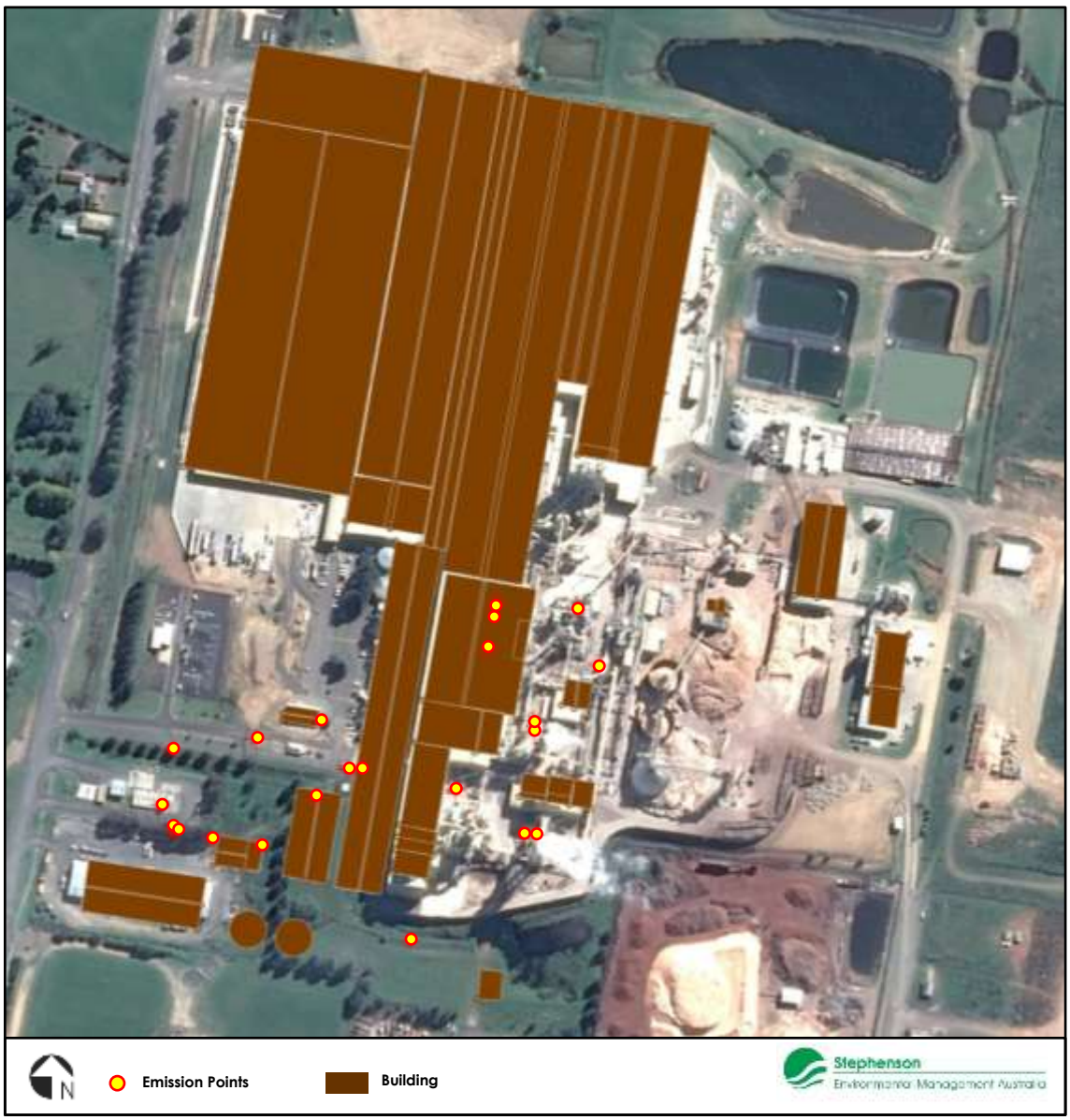


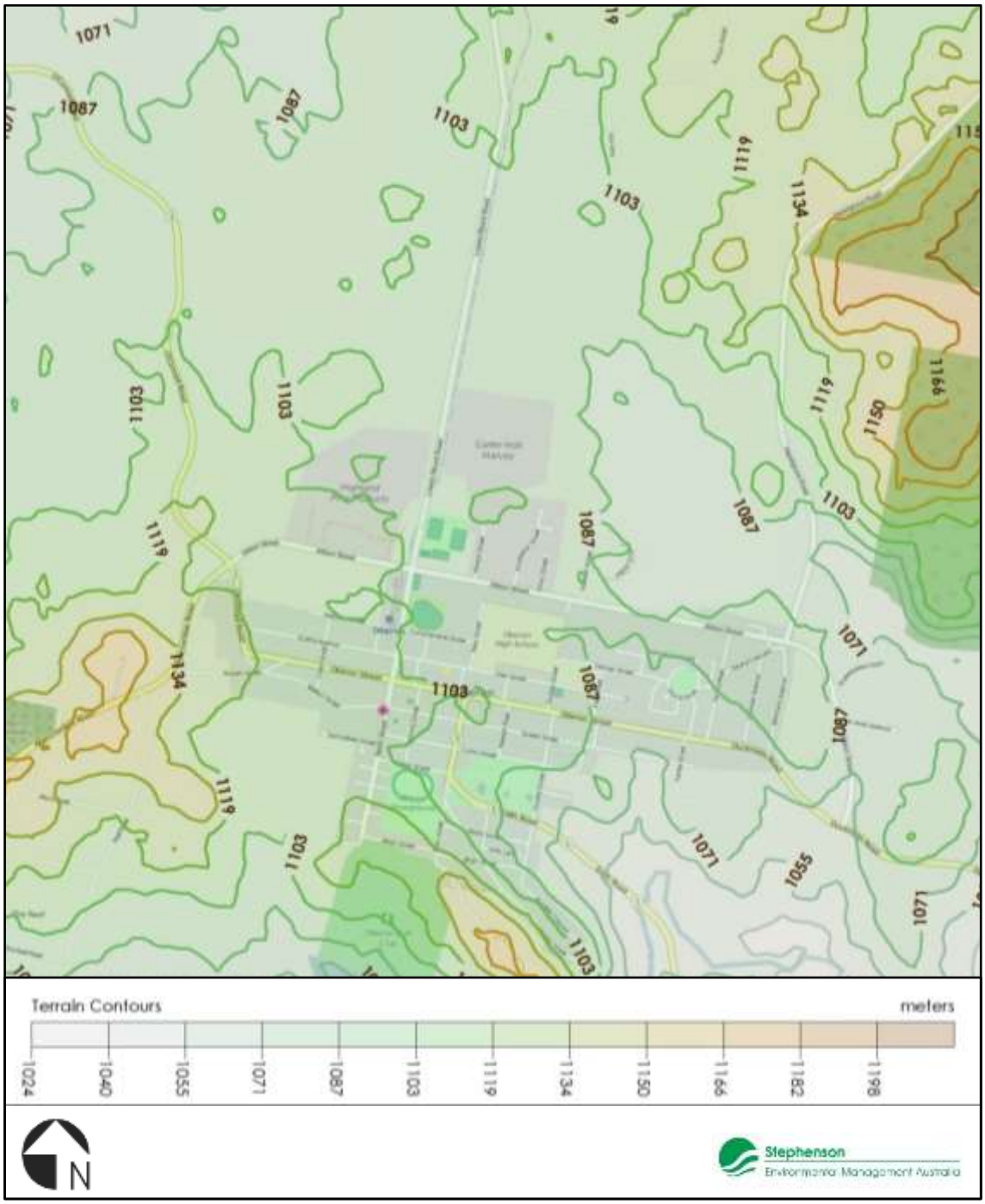
FIGURE 7-2 MODELLING ASSESSMENT BUILDING PROFILE



7.3 TERRAIN DATA

Shuttle Radar Topography Mission (1 arc second) (SRTM1) (Global ~30m) terrain data was processed through AERMAP and elevations were applied to all buildings, emission points and receptors modelled. Refer Figure 7-3 for a terrain map illustrating the elevations of the modelling domain.

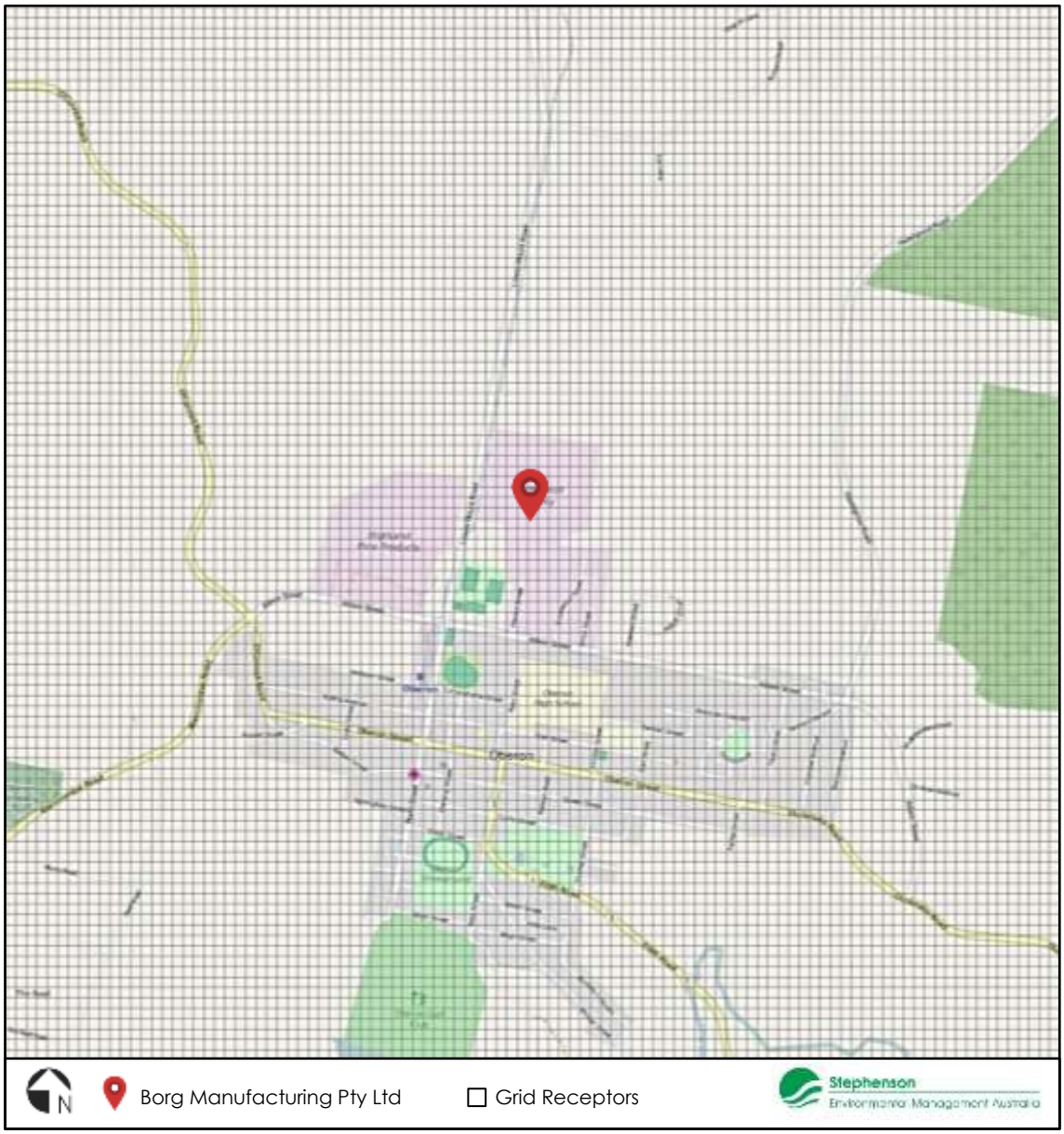
FIGURE 7-3 ELEVATION OF MODELLING DOMAIN



7.4 RECEPTORS

Cartesian grid receptors were setup over the modelling domain at 50 metre intervals. Figure 7-4 illustrates these receptors. Additional receptors were setup at the boundary of the Borg site. Receptors inside the boundary of the Borg Oberon site were removed.

FIGURE 7-4 RECEPTOR LOCATIONS



7.5 PROPOSED PB PLANT EMISSIONS INPUT DATA

Emissions input data for the proposed PB Plant was sourced from the following:

- Borg provided building locations, stack and vent locations and dimensions. Refer Section 4.
- SEMA provided actual measured stack and vent emissions from existing facility. Refer Section 5.
- Supplier specifications were provided by Borg for equipment design calculations and conservative emission data from the proposed emission points.

  Refer Table 7-1 for flow rates, velocities and exhaust gas temperatures and Table 7-2 for TSP, PM_{10}, NO_2 and formaldehyde concentrations and mass emission rates.

TABLE 7-1 PROPOSED BORG PB PLANT - EMISSION POINT FLOW RATES, VELOCITIES & TEMPERATURES

Emission Point	Nominated				
	Stack Height (m)	**Stack Exit Diameter** (m)	**Flow Rate** (am^3/min)	**Exit Velocity** (m/s)	**Exit Temperature** (°C)
E1	20.0	0.26	64	20.0	ambient
E2	20.0	0.22	45	20.0	ambient
E3	7.0	0.66	417	20.0	ambient
E4	10.0	0.97	667	15.0	ambient
E5	19.0	1.10	855	15.0	ambient
E7	20.0	0.25	45	15.0	ambient
E8	10.0	1.39	917	10.0	45
E9	12.0	0.72	367	15.0	50
E10	12.0	0.72	367	15.0	50
E12	40.0	1.60	2583	21.4	20
E13	10.0	0.96	433	10.0	20
E14	20.0	0.69	333	15.0	20
E15	20.0	0.91	583	15.0	20
E16	20.0	0.25	45	15.0	ambient
E19	40.0	2.80	6353	17.2	67

Key overleaf

TABLE 7-2 PROPOSED BORG PB PLANT - EMISSION POINT MASS EMISSION RATES

Emission Point	TSP	PM_{10}*	NOx	HCHO
	g/s	g/s	g/s	g/s
E1	0.005	0.005	--	--
E2	0.004	0.004	--	--
E3	0.035	0.035	--	--
E4	0.056	0.056	--	--
E5	0.072	0.072	--	--
E7	0.004	0.004	--	--
E8	0.076	0.076	--	--
E9	0.306	0.031	--	--
E10	0.306	0.031	--	--
E12	0.160	0.160	--	0.22
E13	0.036	0.036	--	--
E14	0.028	0.028	--	--
E15	0.049	0.049	--	--
E16	0.004	0.004	--	--
E19	1.588	1.588	9.72	0.32

Key to Tables 7.1 and 7.2

m	=	metres
am^3/min	=	actual cubic metres per minute
m/s	=	metres per second
°C	=	degrees Celsius
TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
NO_2	=	oxides of nitrogen
HCHO	=	formaldehyde
g/s	=	grams per second
N/A	=	Not Applicable
*	=	assumed same as TSP

8 IMPACT ASSESSMENT PREDICTIONS

Section 8.1 provides the impacts of the proposed PB Plant. Section 8.2 provides the cumulative impacts from the proposed PB Plant together with the existing MDF facility with its proposed modifications.

For the purpose of this AQIA, the NO_2 ground level concentration prediction has been conducted by modelling the total oxides of nitrogen emission rate from each source, with the results scaled by an empirical nitric oxide/nitrogen dioxide conversion ratio. A ratio of 40% conversion of the NO_x to NO_2 has been assumed for this study, which is very conservative considering the size of the domain and the ratio of short travel/conversion reaction time of plume to the maximum ground level concentrations.

8.1 PROPOSED PB PLANT IMPACT ASSESSMENT PREDICTIONS

This AQIA predicts maximum GLC's from the proposed PB Plant will be as follows:

- Annual average worst case predicted TSP GLC is 6µg/m^3.
- 24-hour average worst case predicted PM_{10} GLC is 21µg/m^3.
- Annual average worst case predicted PM_{10} GLC is 3µg/m^3.
- One-hour average worst case predicted NO_2 GLC is 57µg/µm^3.
- Annual average worst case predicted NO_2 GLC is 1µg/m^3.
- One-hour average worst case predicted formaldehyde GLC is 0.01 mg/m^3.

Table 8-1 presents proposed PB Plant impact assessment predictions for the total modelling domain, the Oberon township and the Borg site boundary.

Figure 8-1 to Figure 8-6 present the impact assessment schematic plots for each pollutant.

TABLE 8-1 IMPACT ASSESSMENT PREDICTIONS – BORG PROPOSED PB PLANT

Pollutant	Units	Averaging period	IAC	Predicted worst case GLC location		
				Total Modelling Domain	Borg Oberon Site Boundary	Oberon Township
TSP	µg/m³	Annual	90	6	6	6
PM_{10}	µg/m³	24 hours	50	21	21	20
	µg/m³	Annual	30	3	3	3
NO_2*	µg/m³	1 hour	246	57	11	31
	µg/m³	Annual	62	1	1	1
HCHO	mg/m³	1 hour	0.02	0.01	0.002	0.002

Key:

TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
NO_2	=	nitrogen dioxide
HCHO	=	formaldehyde
GLC	=	Ground Level Concentration
IAC	=	Impact Assessment Criteria
µg/m³	=	micrograms per cubic metre
mg/m³	=	milligrams per cubic metre
*	=	40% NO_x to NO_2 conversion assumed

FIGURE 8-1 PREDICTED IMPACT - ANNUAL AVERAGE TSP CONCENTRATIONS - PB PLANT ONLY

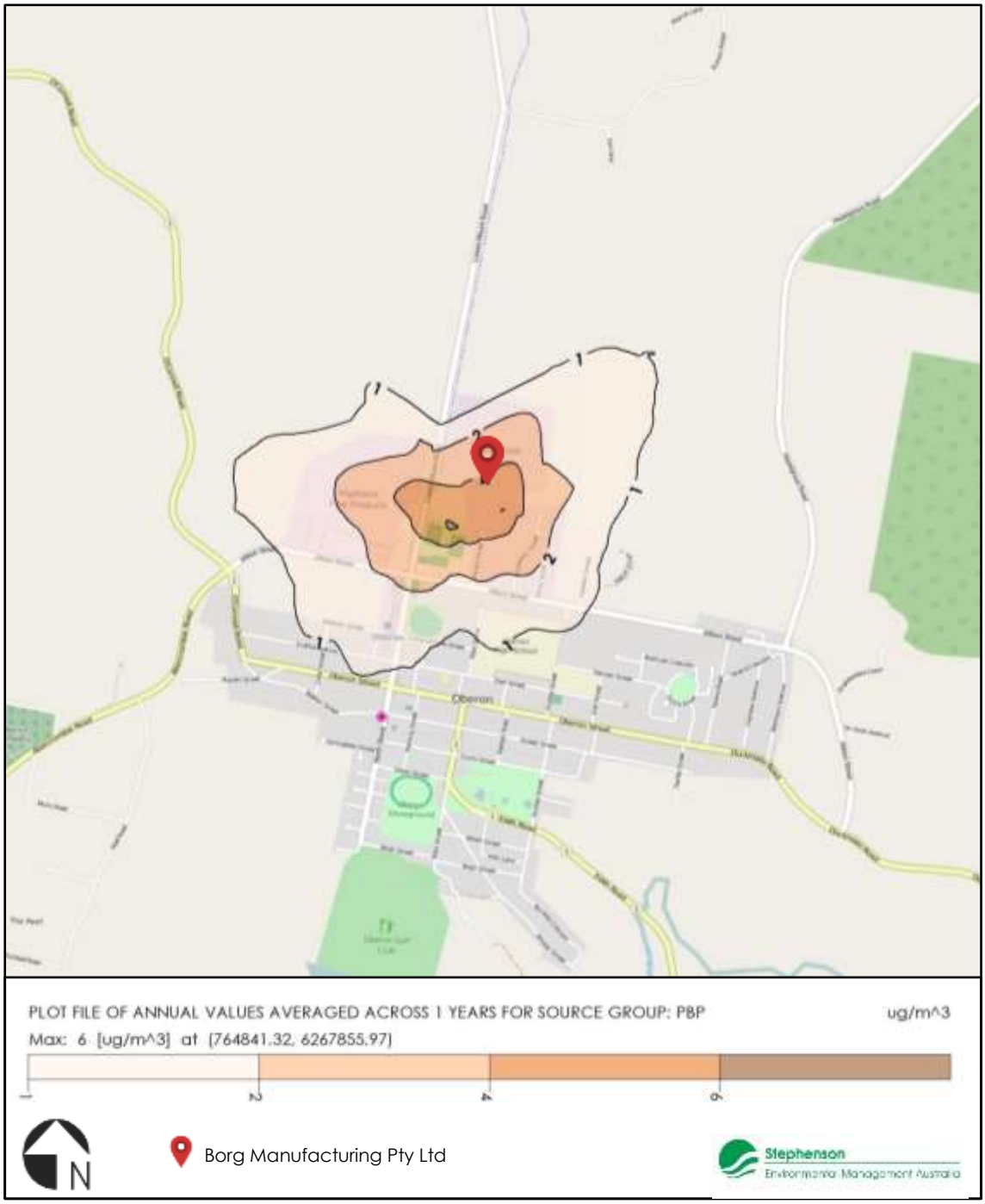


FIGURE 8-2 PREDICTED IMPACT - 24 HR AVERAGE PM_{10} CONCENTRATIONS- PB PLANT ONLY

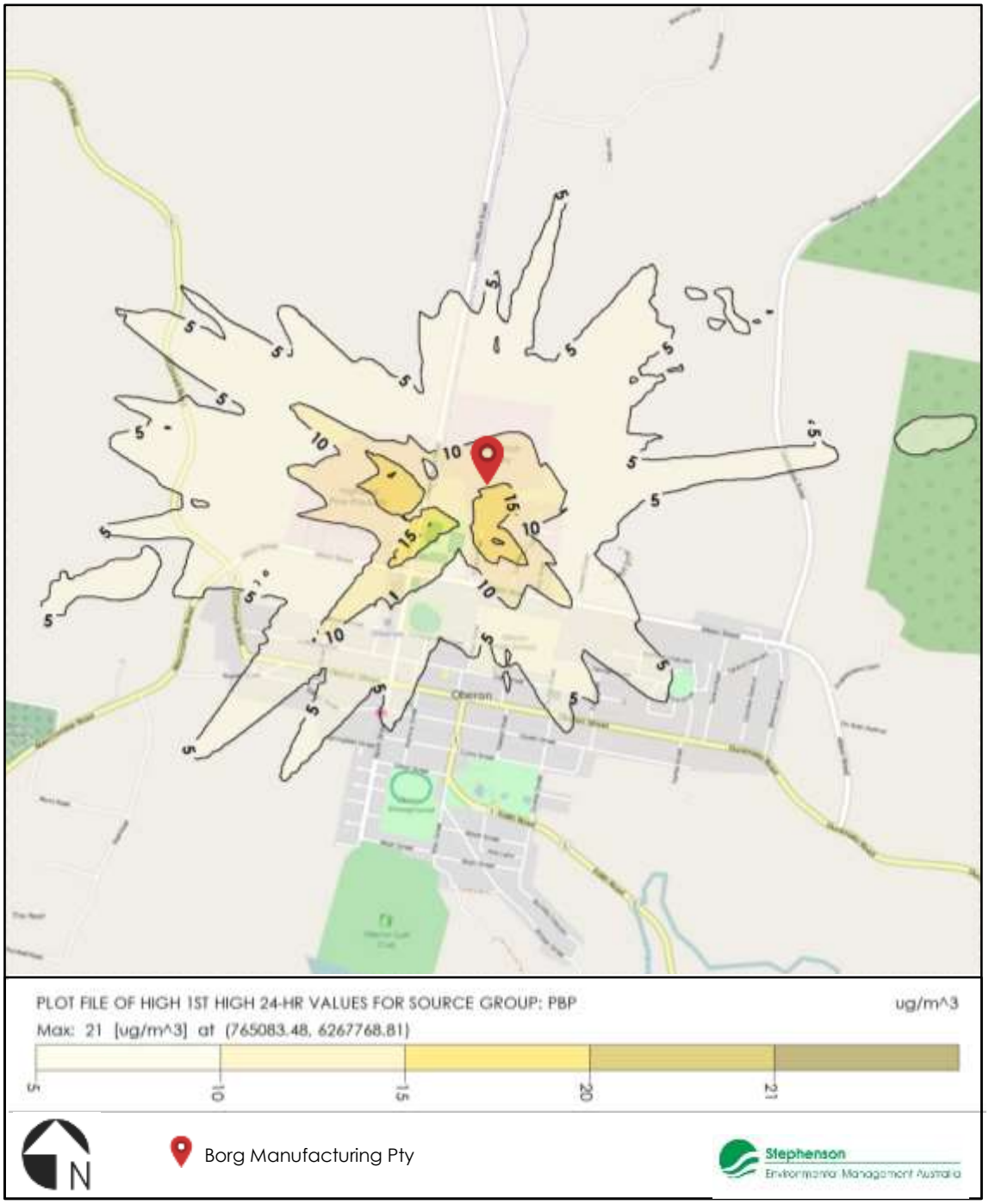


FIGURE 8-3 PREDICTED IMPACT - ANNUAL AVERAGE PM_{10} CONCENTRATIONS - PB PLANT ONLY

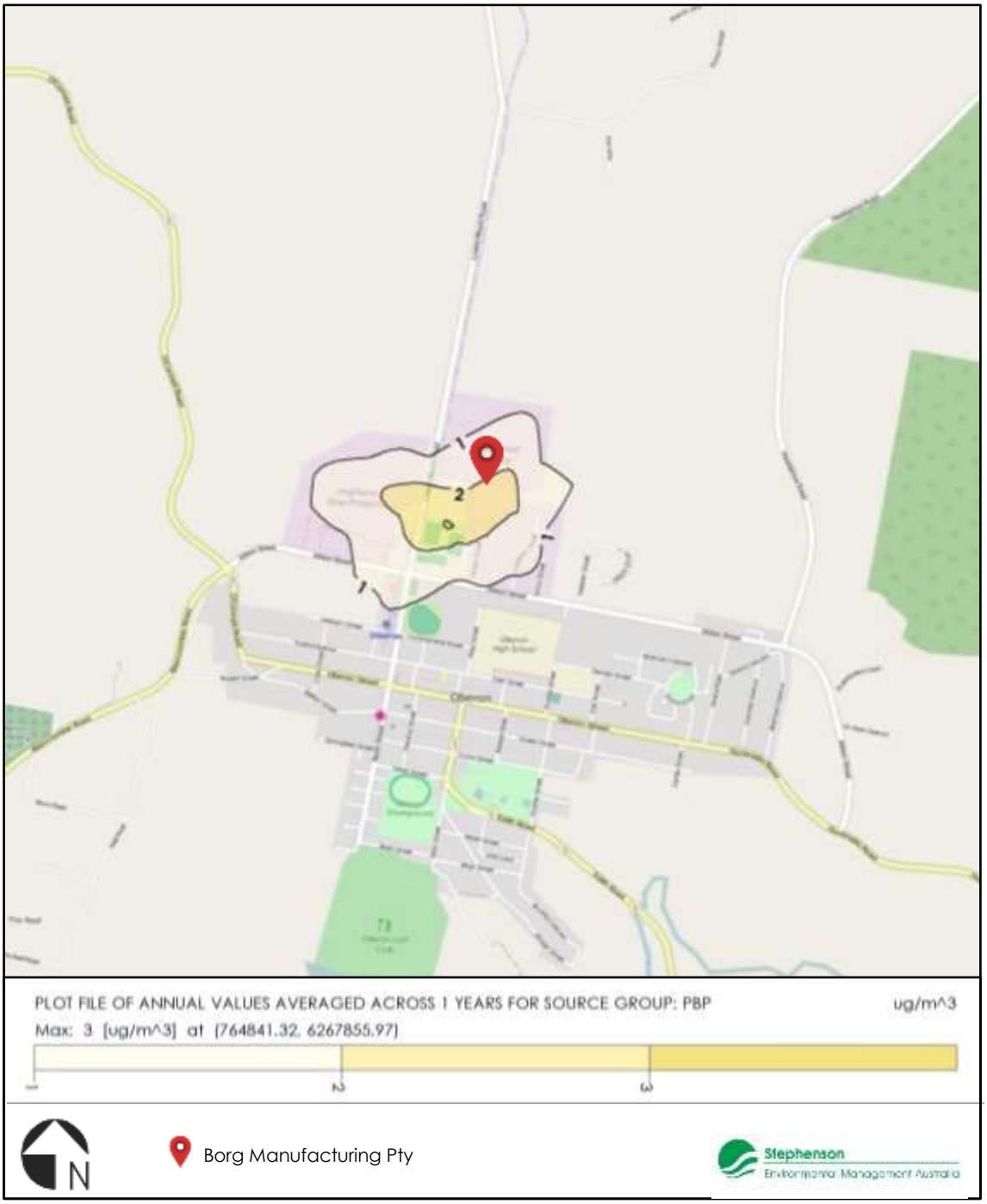


FIGURE 8-4 PREDICTED IMPACT - 1 HR AVERAGE NO_2 CONCENTRATIONS - PB PLANT ONLY

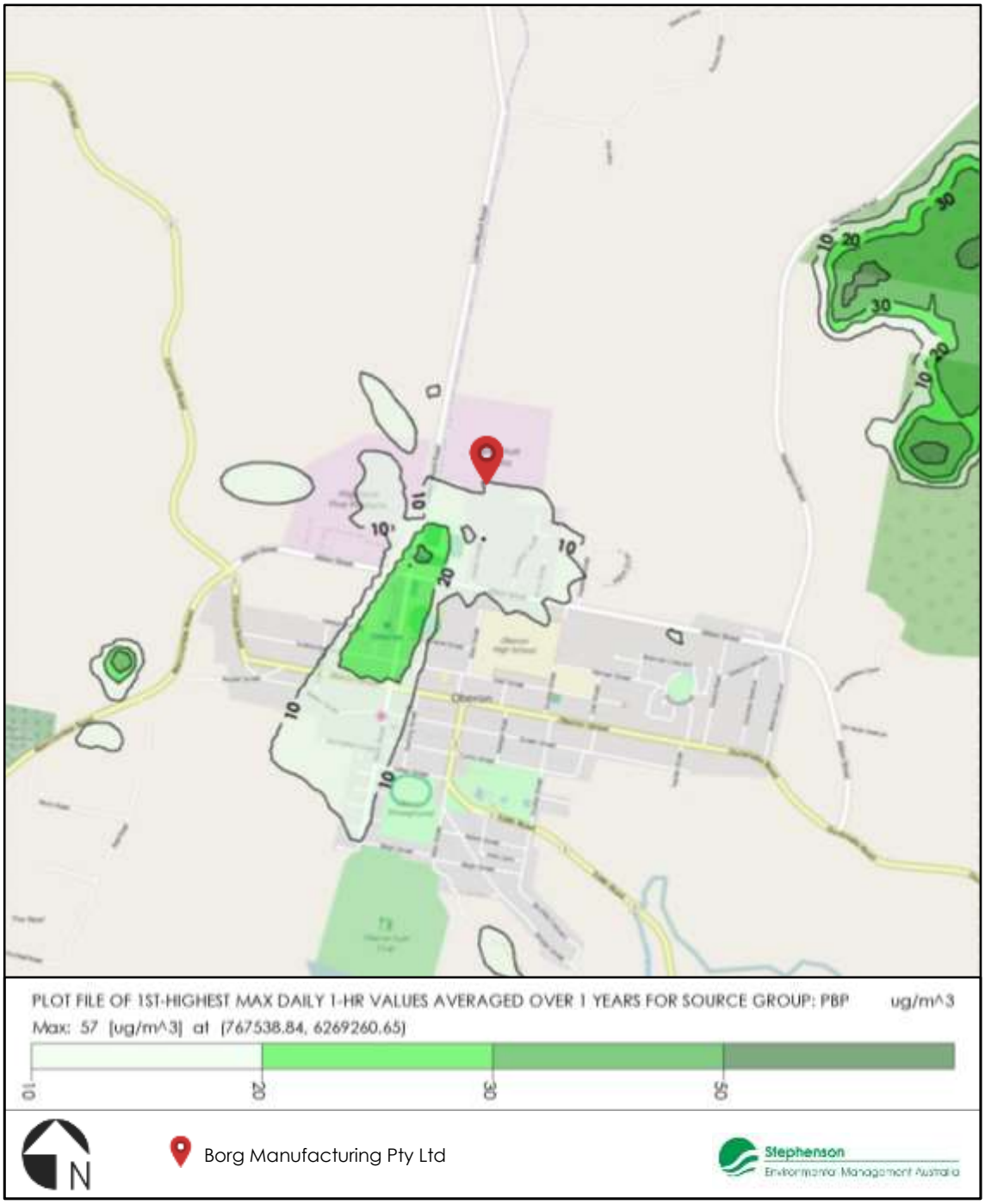


FIGURE 8-5 PREDICTED IMPACT - ANNUAL AVERAGE NO_2 CONCENTRATIONS - PB PLANT ONLY

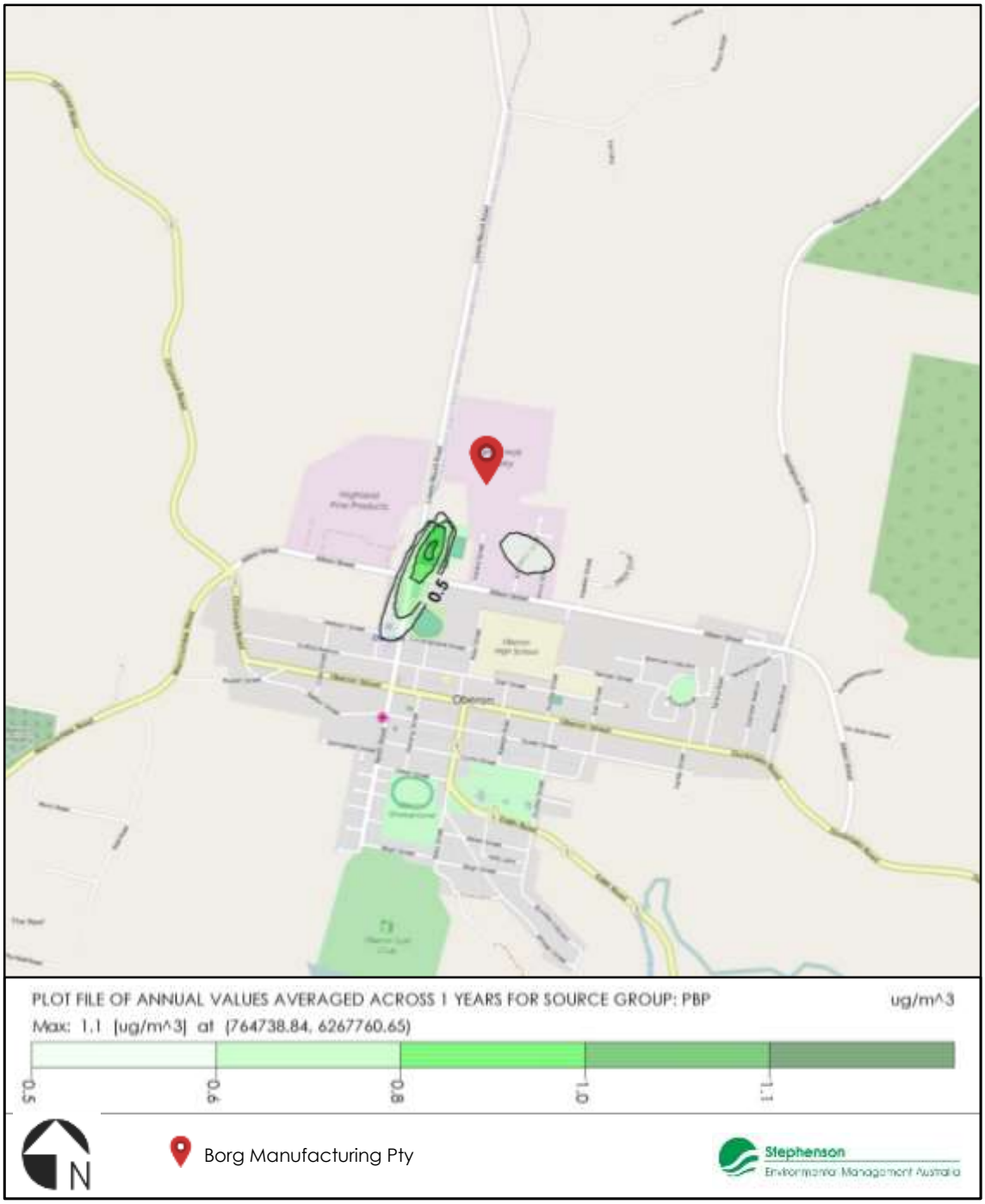
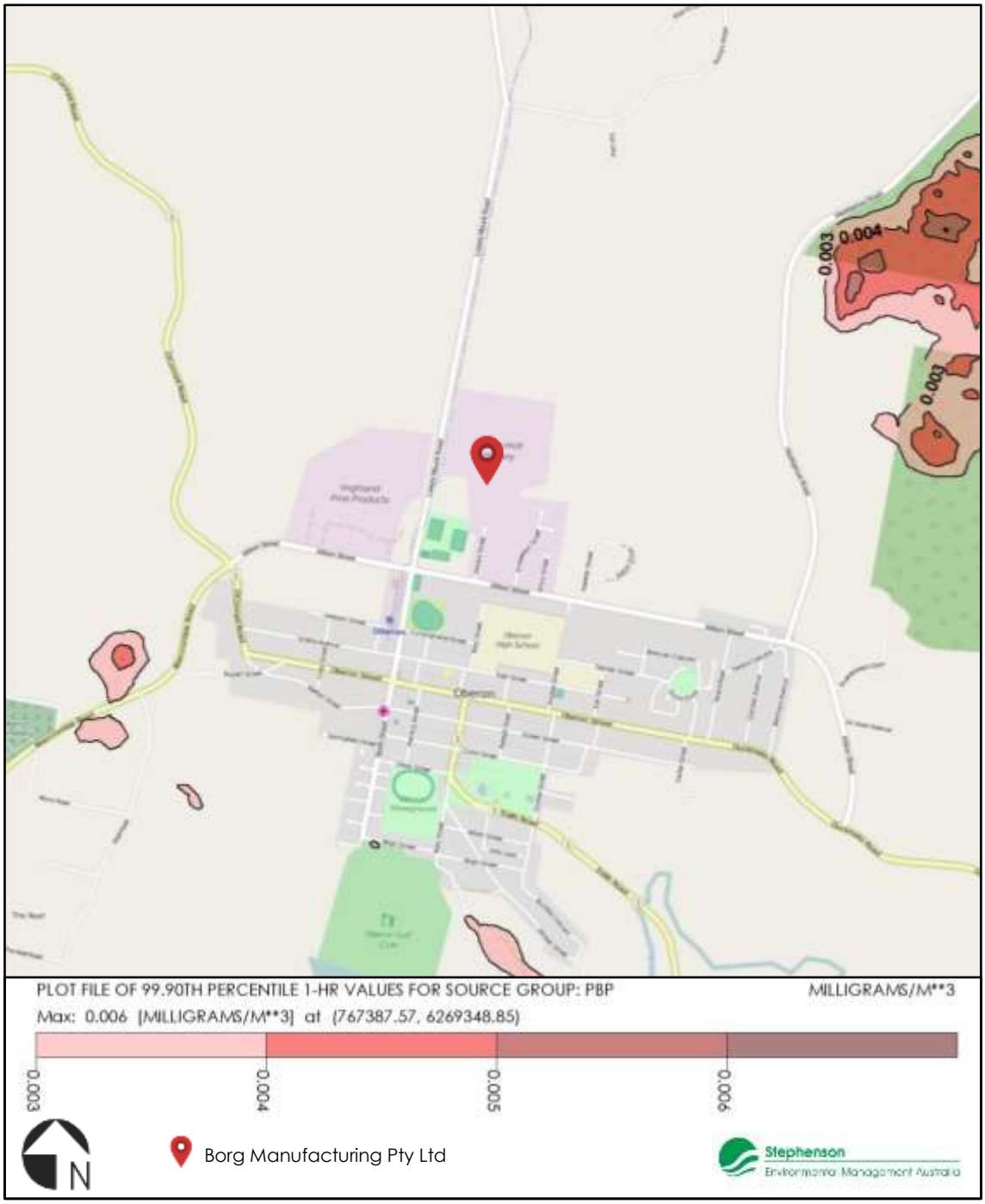


FIGURE 8-6 PREDICTED IMPACT - 1 HR AVERAGE FORMALDEHYDE CONCENTRATIONS- PB PLANT ONLY



9 CUMULATIVE IMPACT ASSESSMENT – EXISTING MDF PLANT PLUS PB PLANT

The cumulative impact of the Borg Oberon PB Plant and the existing Oberon MDF plant is detailed in this section. The cumulative impact assessment indicates that; in the total modelling domain:

- The annual average worst case predicted TSP GLC is 8 µg/m^3.
- The 24-hour average worst case predicted PM_{10} GLC is 25 µg/m^3.
- The annual average worst case predicted PM_{10} GLC is 4 µg/m^3.
- The one-hour average worst case predicted NO_2 GLC is 225 µg/m^3.
- The annual average worst case predicted NO_2 GLC is 4 µg/m^3.
- The one-hour average worst case predicted formaldehyde GLC is 0.03 mg/m^3.

Table 9-1 presents the cumulative impact assessment predictions for the proposed PB Plant with the MDF Plant (after modifications).

Figures 9-1 to Figure 9-6 present the impact assessment plots for the ground level impact of each pollutant.

TABLE 9-1 IMPACT ASSESSMENT PREDICTIONS – CUMULATIVE EXISTING MDF PLUS PROPOSED PB

Pollutant	Units	Averaging period	IAC	Predicted Cumulative Maximum GLC		
				Total Modelling Domain	Borg Oberon Site Boundary	Oberon Township
TSP	µg/m^3	Annual	90	8	8	7
PM_{10}	µg/m^3	24 hours	50	25	24	25
	µg/m^3	Annual	30	4	4	4
NO_2*	µg/m^3	1 hour	246	225	51	49
	µg/m^3	Annual	62	4	3	3
HCHO	mg/m^3	1 hour	0.02	0.03	0.01	0.01

Key:

IAC	=	Impact Assessment Criteria
TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
NO_2	=	nitrogen dioxide
HCHO	=	formaldehyde
GLC	=	Ground Level Concentration
µg/m^3	=	micrograms per cubic metre
mg/m^3	=	milligrams per cubic metre
*	=	40% NO_x to NO_2 conversion assumed

FIGURE 9-1 PREDICTED IMPACT - CUMULATIVE ANNUAL AVERAGE TSP GLC

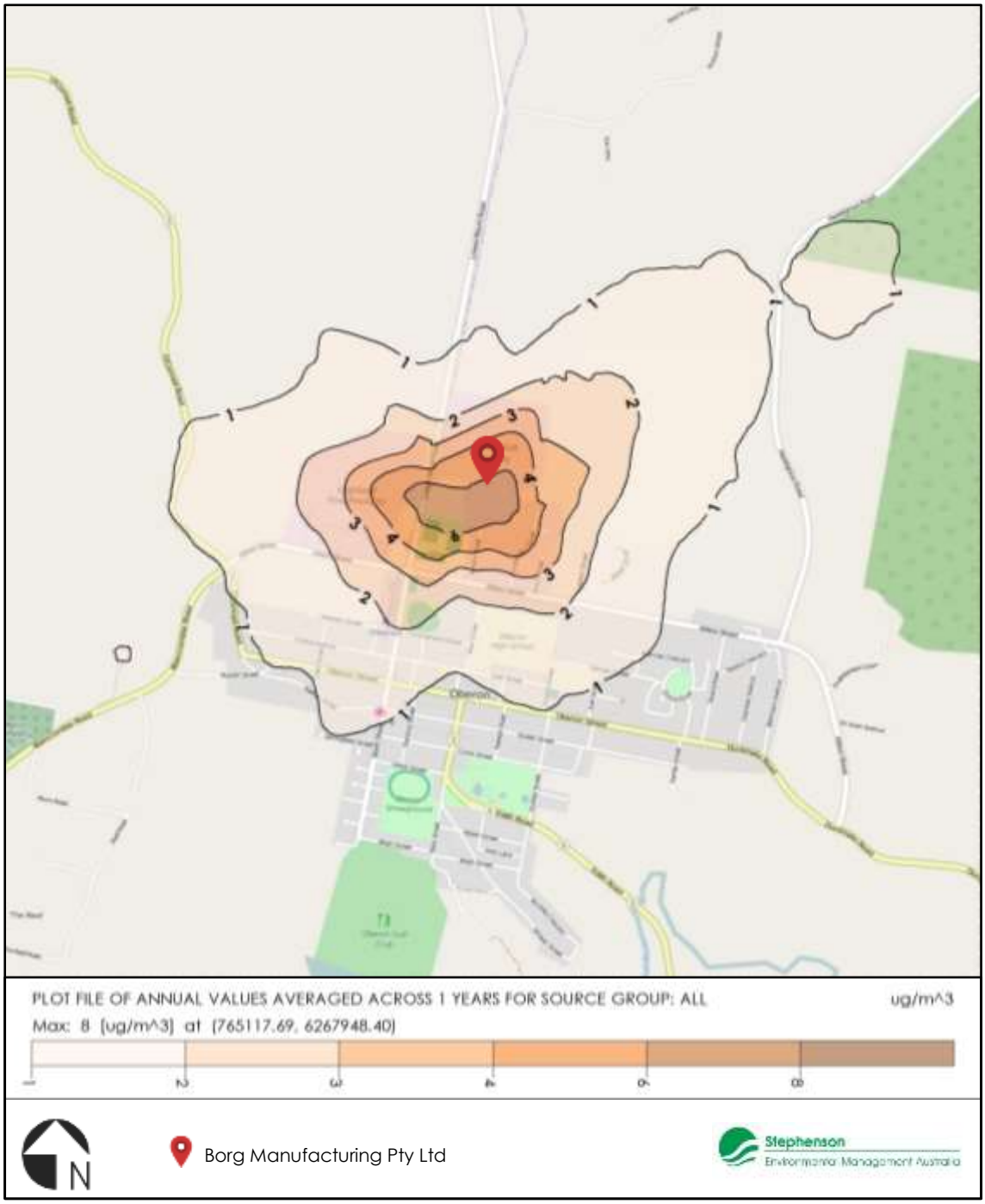


FIGURE 9-2 PREDICTED IMPACT - CUMULATIVE 24 HR AVERAGE PM_{10} GLC

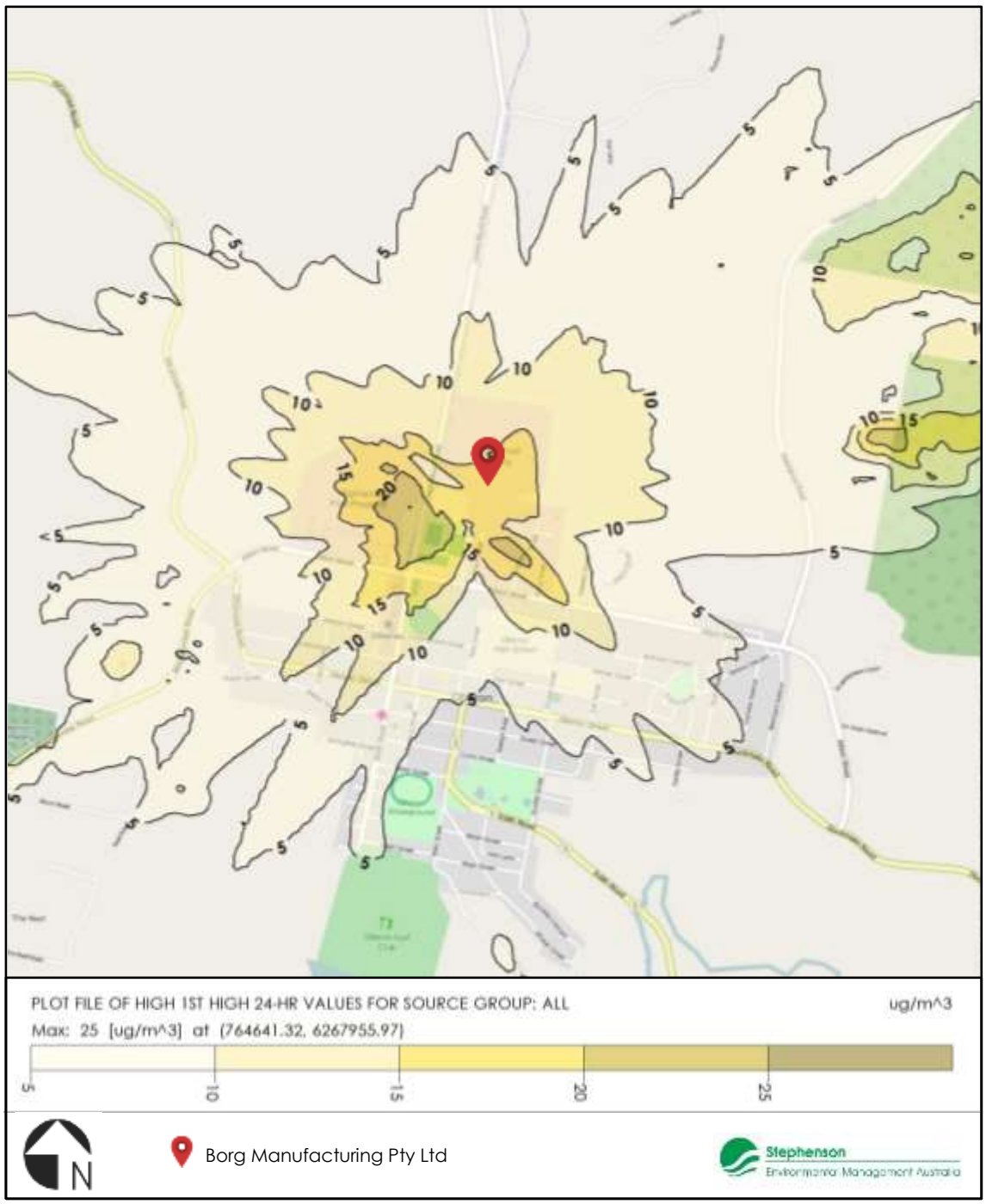


FIGURE 9-3 PREDICTED IMPACT - CUMULATIVE ANNUAL AVERAGE PM_{10} GLC

FIGURE 9-4 PREDICTED IMPACT - CUMULATIVE 1 HR AVERAGE NO_2 GLC

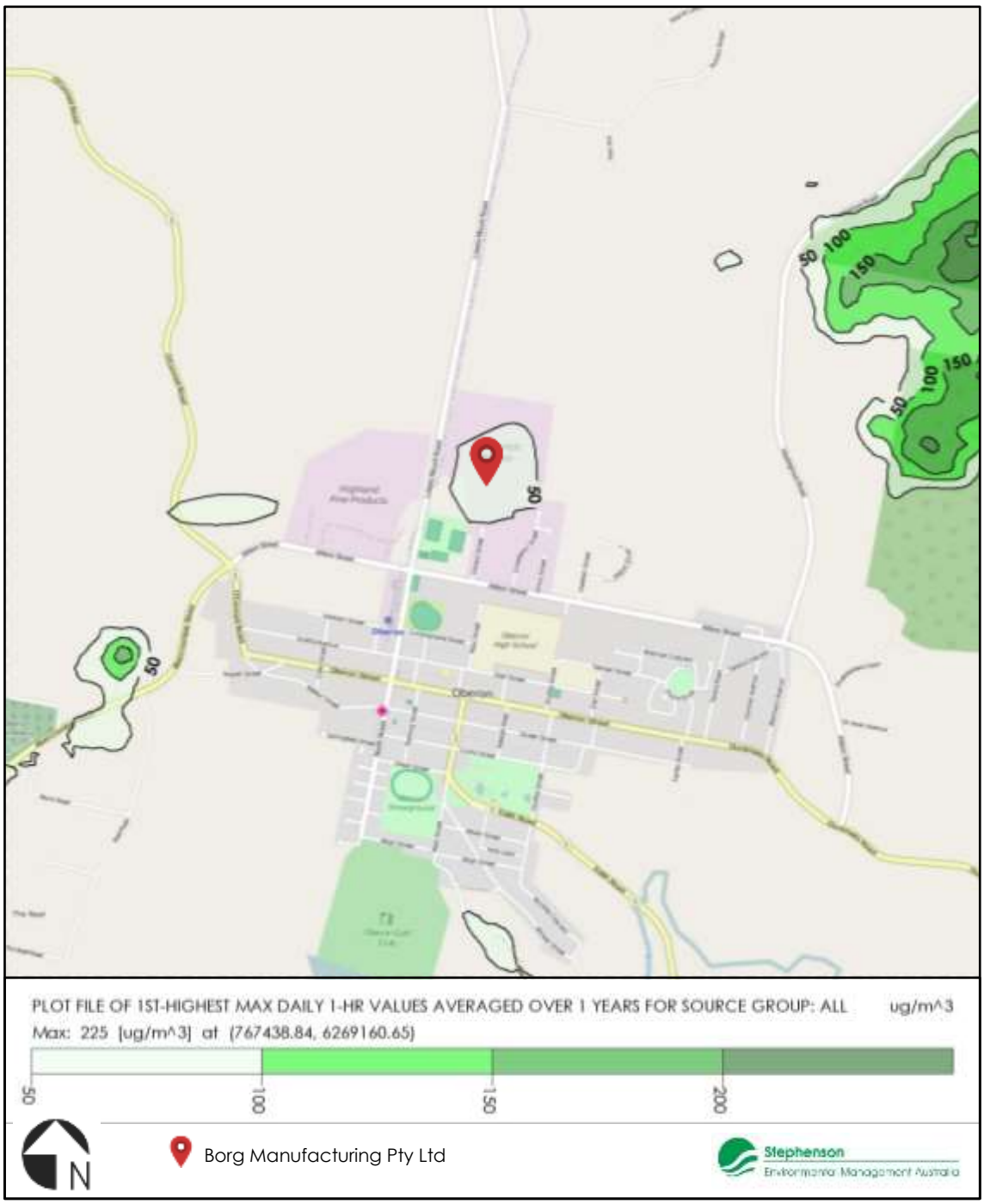


FIGURE 9-5 PREDICTED IMPACT - CUMULATIVE ANNUAL AVERAGE NO_2 GLC

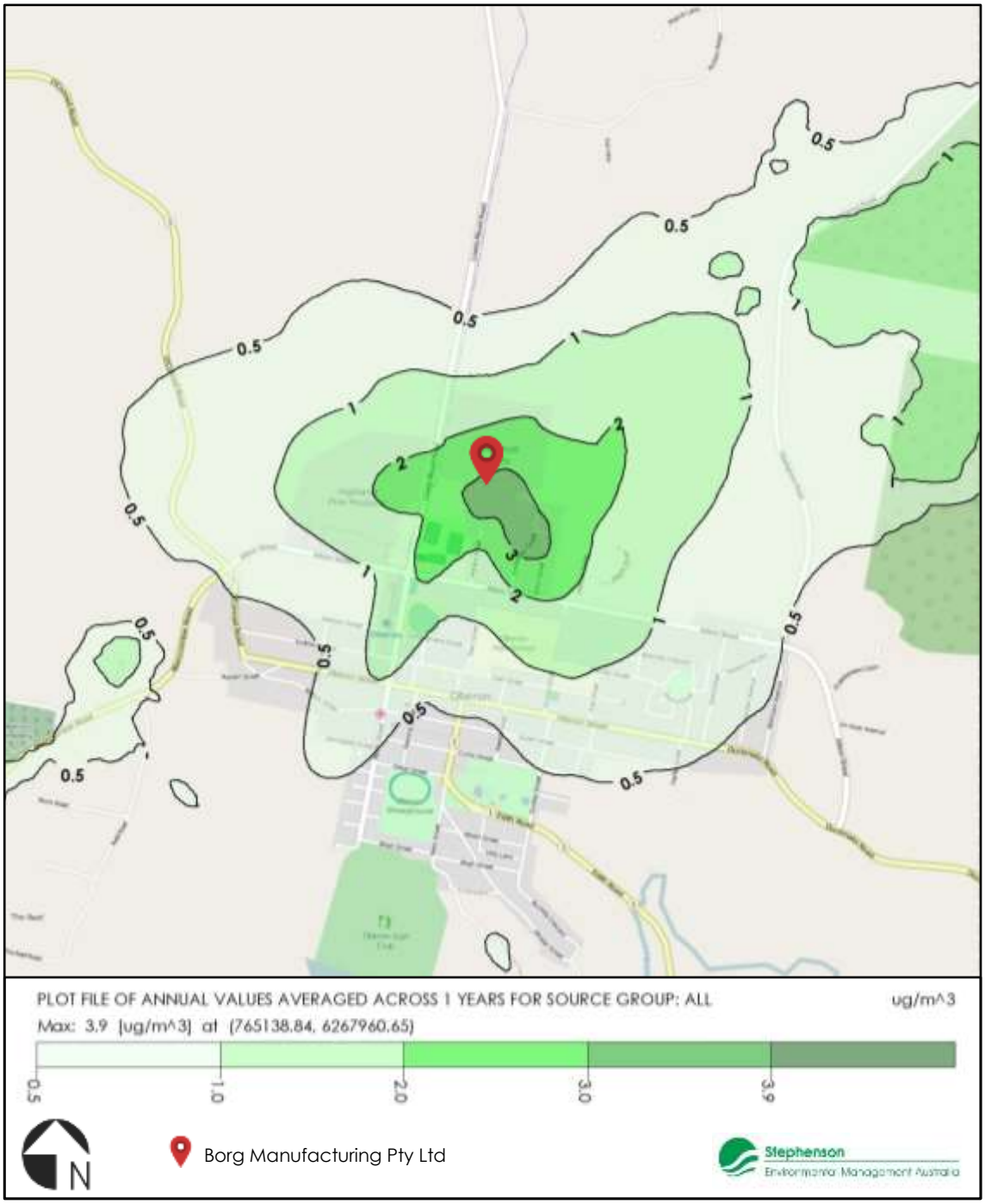
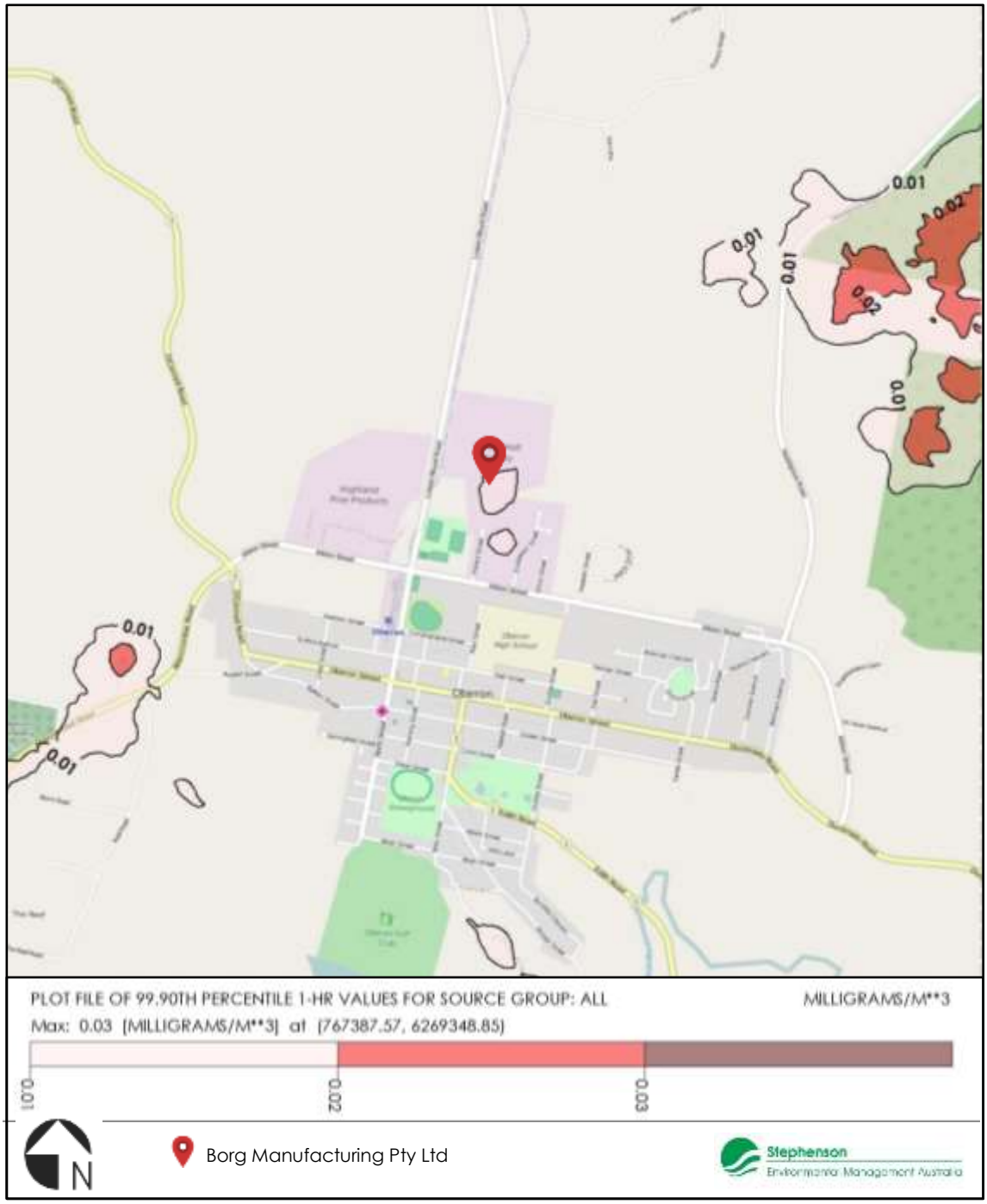


FIGURE 9-6 PREDICTED IMPACT - CUMULATIVE 1 HR AVERAGE HCHO GLC



10 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this AQIA are discussed in this section in 10.1 to 10.4. Mitigation measures proposed to be implemented are discussed in 10.5. Table 10.1 shows this data in tabular form.

These conclusions are based on the assumptions that the:

- background levels for TSP, PM_{10}, NO_2 and formaldehyde in the vicinity of the Borg Oberon facility are zero;
- proposed modifications to the existing MDF plant are complete; and
- proposed PB Plant is in operation.

10.1 TOTAL SOLID PARTICULATE MATTER (TSP)

TSP GLCs are predicted to be below the IAC of 90 $\mu g/m^3$. The maximum cumulative Borg facility, (which includes the proposed PB Plant), annual average TSP GLC is predicted to be 8 $\mu g/m^3$ at both the site boundary and throughout the total modelling domain, and is predicted to be 7 $\mu g/m^3$ at receptors in the Oberon township.

10.2 PARTICULATE MATTER LESS THAN 10 MICRONS (PM_{10})

PM_{10} GLCs are predicted to be below both the 24-hour average PM_{10} GLC IAC of 50 $\mu g/m^3$ and the annual average PM_{10} GLC IAC of 30 $\mu g/m^3$.

The total modelling domain maximum cumulative 24-hour average PM_{10} GLC is predicted to be 25 $\mu g/m^3$ and the total modelling domain maximum annual average PM_{10} GLC is predicted to be 4 $\mu g/m^3$.

At receptors in the Oberon township, the maximum 24-hour average PM_{10} GLC is predicted to be 25 $\mu g/m^3$ for the cumulative Borg facility (including the proposed PB Plant) and the annual average PM_{10} GLC is predicted to be 4 $\mu g/m^3$ for the cumulative Borg facility (including the proposed PB Plant).

At the Borg Oberon site boundary, the maximum 24-hour average PM_{10} GLC is predicted to be 24 $\mu g/m^3$ for the cumulative Borg facility (including the proposed PB Plant) and the annual average PM_{10} GLC is predicted to be 4 $\mu g/m^3$ for the whole Borg facility.

10.3 NITROGEN DIOXIDE (NO_2)

NO_2 GLCs are predicted to be below both the 1-hour average IAC of 246 $\mu g/m^3$ and the annual average IAC of 62 $\mu g/m^3$.

The total modelling domain maximum cumulative 1-hour average NO_2 GLC is predicted to be 225 µg/ m^3 and the total modelling domain maximum cumulative annual average NO_2 GLC is predicted to be 4 µg/ m^3.

At receptors in the Oberon township, the cumulative Borg facility (including the proposed PB Plant) maximum 1-hour average NO_2 GLC is predicted to be 49 µg/m^3, and the maximum annual average NO_2 GLC is predicted to be 3 µg/ m^3.

At the Borg Oberon site boundary, the maximum 1-hour average NO_2 GLC is predicted to be 53 µg/ m^3 for the cumulative Borg facility (including the proposed PB Plant) and the maximum annual average NO_2 GLC is predicted to be 3 µg/ m^3.

10.4 FORMALDEHYDE (HCHO)

At receptors in the Oberon township, the maximum annual average formaldehyde GLC is predicted to be 0.002 mg/ m^3 for the proposed PB Plant and 0.01 mg/ m^3 for the cumulative Borg facility including the proposed PB Plant. Both predicted GLCs are less than the relevant IAC limit.

At the Borg Oberon site boundary, the maximum annual average formaldehyde GLC is predicted to be 0.002 mg/ m^3 for the proposed PB Plant and 0.01 mg/ m^3 for the cumulative Borg facility including the proposed PB Plant. Both GLCs are less than the relevant IAC limit.

However, the total modelling domain maximum cumulative annual average formaldehyde GLC is predicted to be 0.03 mg/m^3 which will exceed the IAC.

10.5 PROPOSED PB PLANT MITIGATION MEASURES

The following mitigation measures have been provisioned for the proposed particle board plant to reduce ground level impact:

- E12 will utilise dispersion to reduce impacts.
- Press scrubber does not vent directly to atmosphere as the emissions will be diverted to the Combustion chamber and excess gas will be emitted via the WESP stack.
- Wet Electrostatic Precipitator will be used as particulate control for moisture laden air from dryer.
- Low NO_x burner will be used for dryer Hot gas generator.
- Baghouses and cyclofilters will be installed on all other material transport and process applications.

Table 10-1 summarises the predicted emissions from the existing facility, the proposed PB Plant and the cumulative effects of the emission sources on both the existing MDF plants and the proposed PB plant.

TABLE 10-1 COMPARISON OF THE GROUND LEVEL IMPACT OF EXISTING AND PROPOSED EMISSIONS

Pollutant	Units	Averaging period	IAC	Maximum Peak Predicted GLC	
				Proposed PB Plant	Cumulative (Modified Existing Facility + PB Plant)
TSP (100%ile)	µg/m³	Annual	90	6	8
PM_{10} (100%ile)	µg/m³	24 hours	50	21	25
	µg/m³	Annual	30	3	4
NO_2* (100%ile)	µg/m³	1 hour	246	57	225
	µg/m³	Annual	62	1	4
HCHO (99.9%ile)	mg/m³	1 hour	0.02	0.01	0.03

Key:

TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
NO_2	=	nitrogen dioxide
HCHO	=	formaldehyde
GLC	=	Ground Level Concentration
µg/m³	=	micrograms per cubic metre
mg/m³	=	milligrams per cubic metre
*	=	40% NO_x to NO_2 conversion assumed