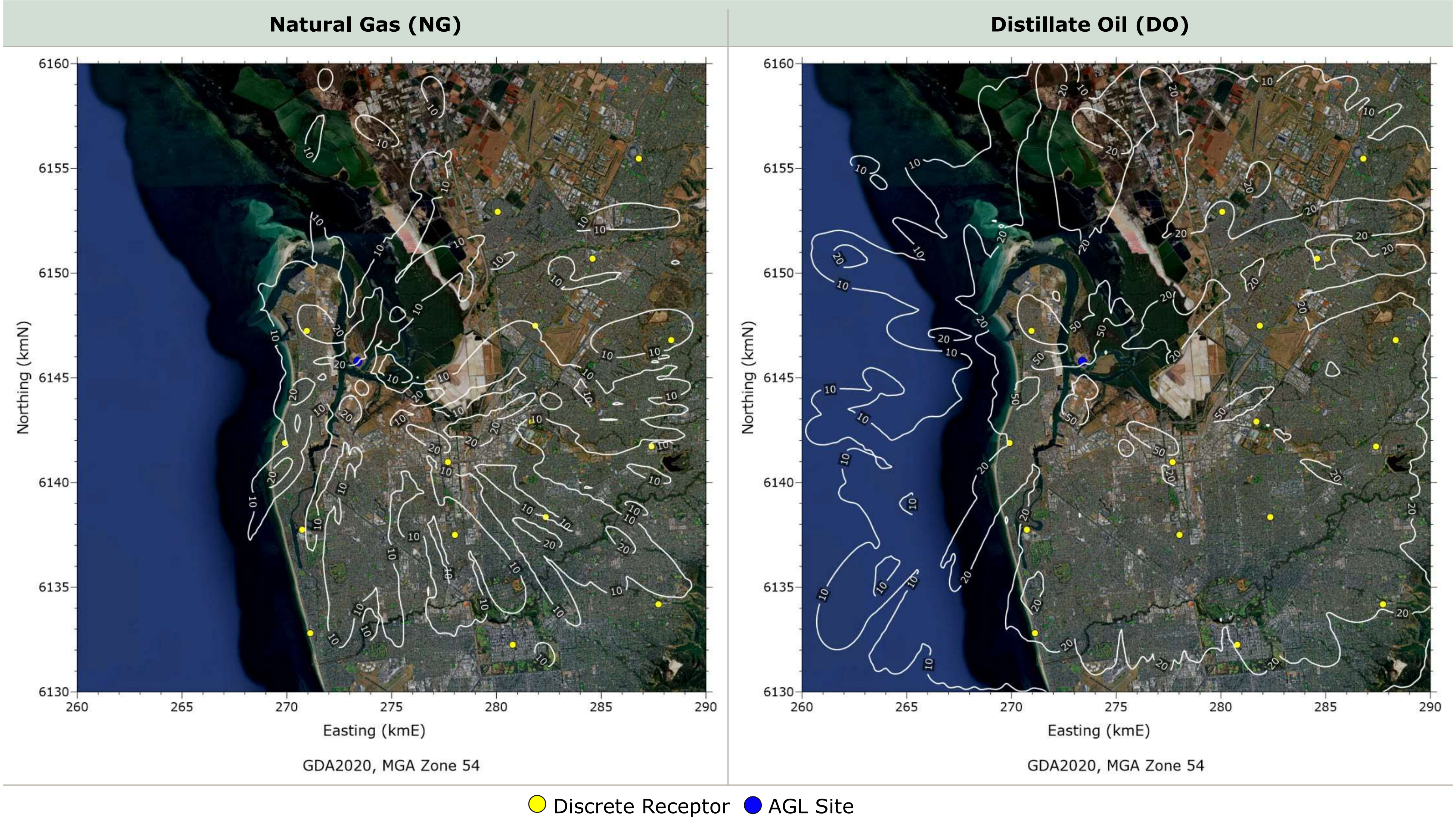
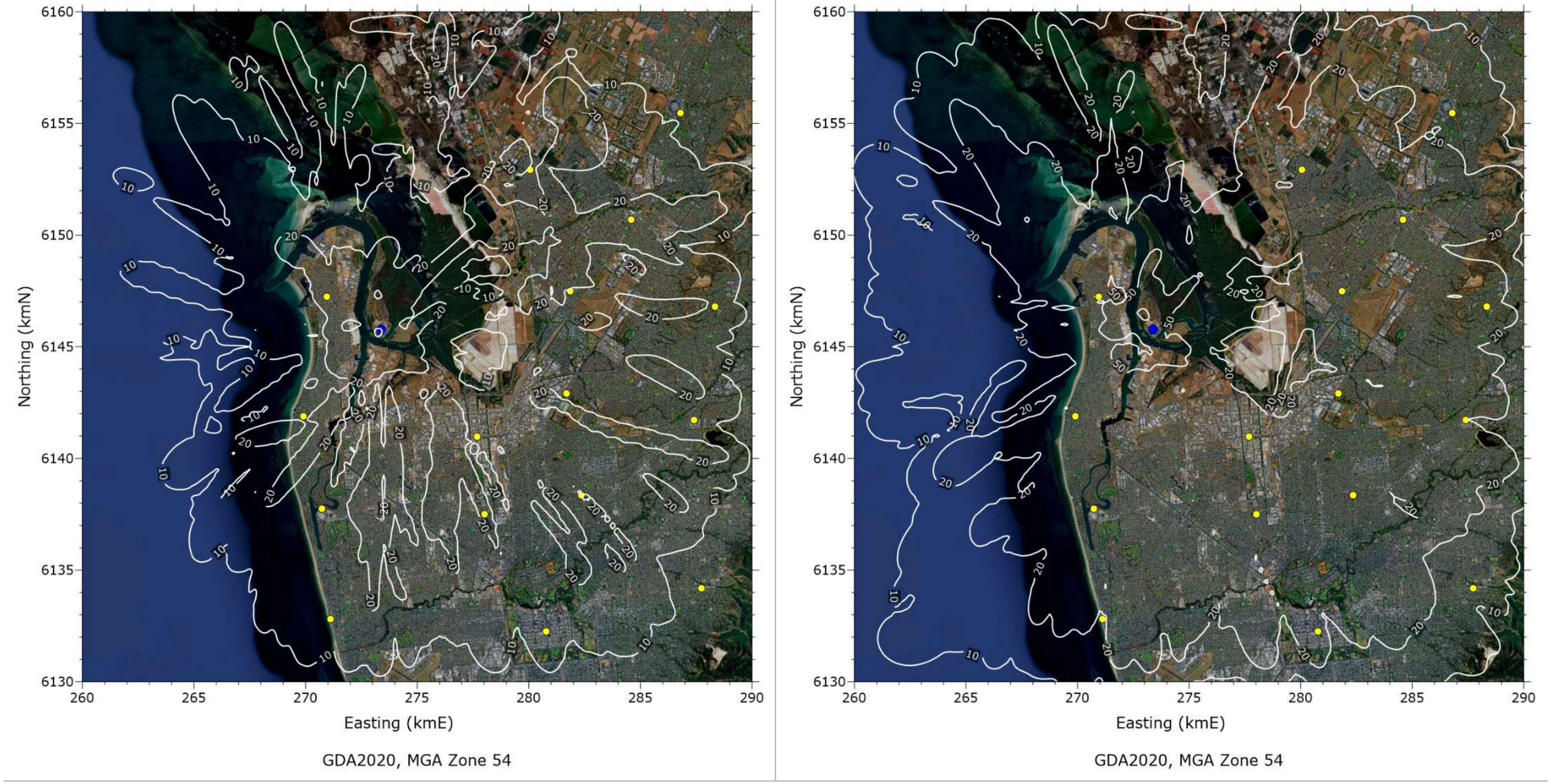
FIGURE 5-4 PLANT OPTION F2: MAXIMUM 1-HOUR AVERAGE INCREMENTAL NO_2 PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)



Notes: Contour levels 10, 20, 50 µg/m³. Cumulative criterion: 164 µg/m³.

FIGURE 5-5 PLANT OPTION AD: MAXIMUM 1-HOUR AVERAGE INCREMENTAL NO_2 PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Natural Gas (NG)	Distillate Oil (DO)

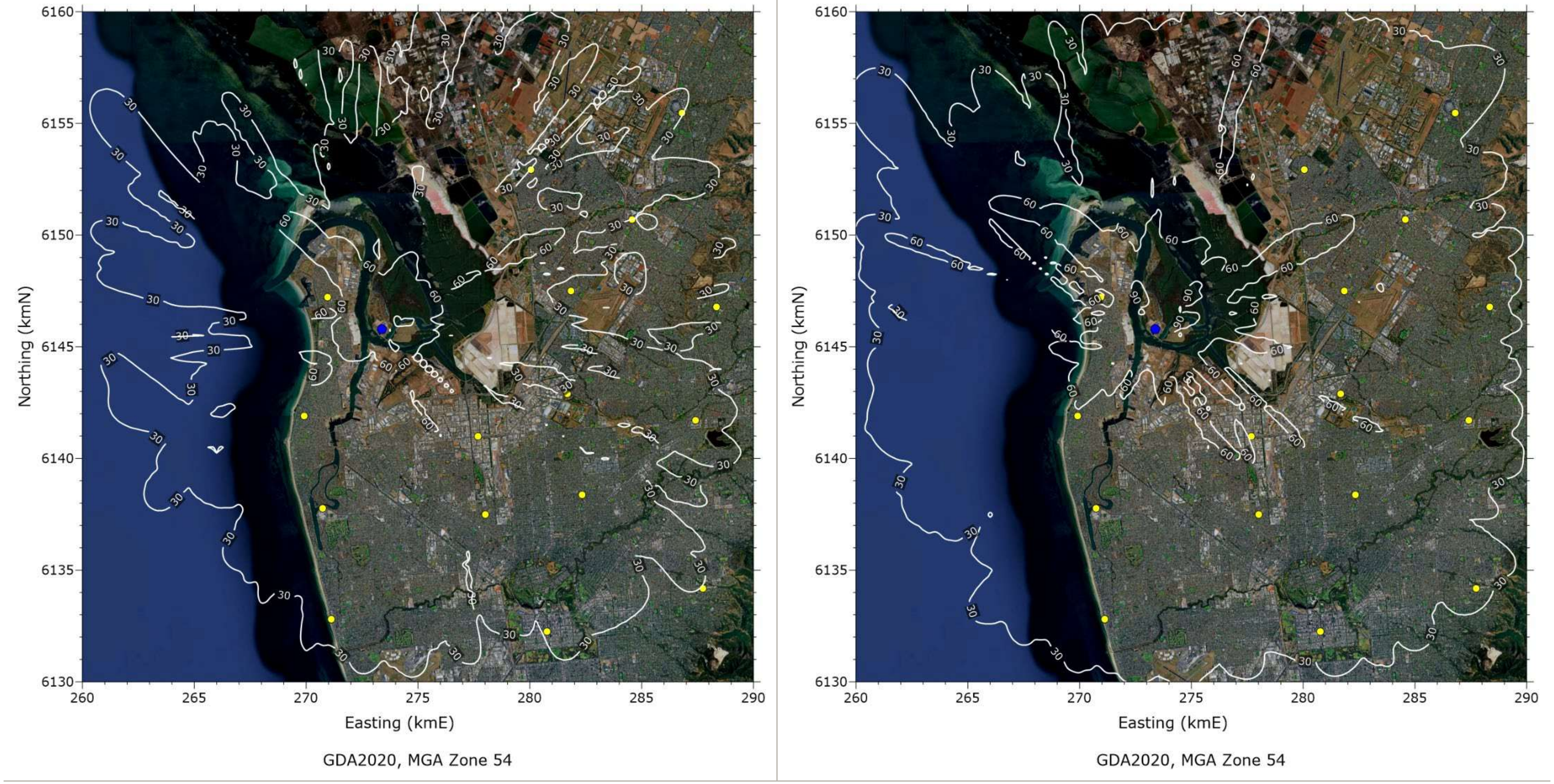


Discrete Receptor AGL Site

Notes: Contour levels 10, 20, 50 µg/m³. Cumulative criterion: 164 µg/m³.

FIGURE 5-6 PLANT OPTION RE: MAXIMUM 1-HOUR AVERAGE INCREMENTAL NO_2 PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) ($\mu g/m^3$)

Natural Gas (NG)	Distillate Oil (DO)

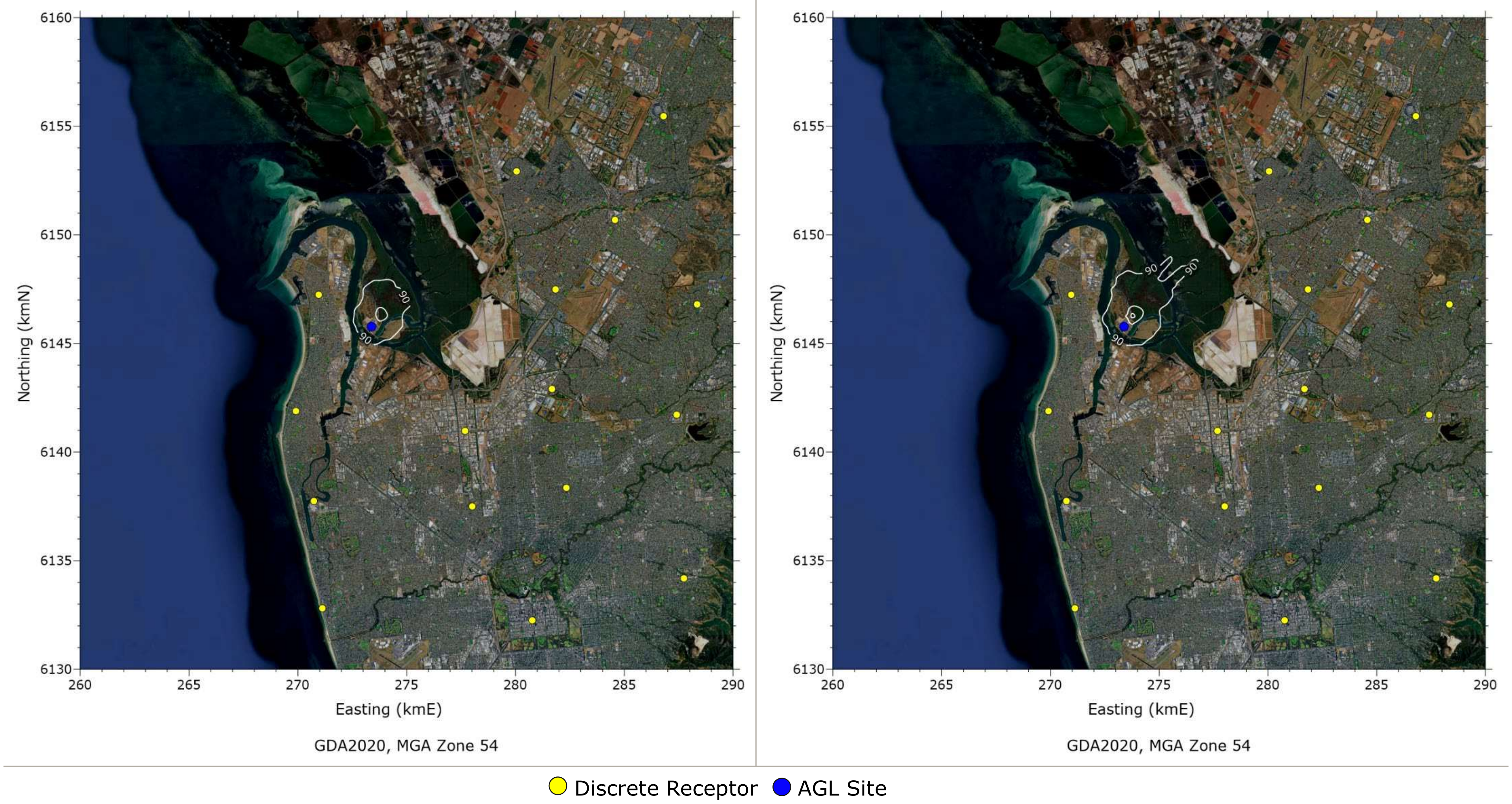


Discrete Receptor AGL Site

Notes: Contour levels 30, 60, 90, 120 µg/m³. Cumulative criterion: 164 µg/m³.

FIGURE 5-7 PLANT OPTION E1: MAXIMUM 1-HOUR AVERAGE CUMULATIVE NO_2 PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (μg/m³)

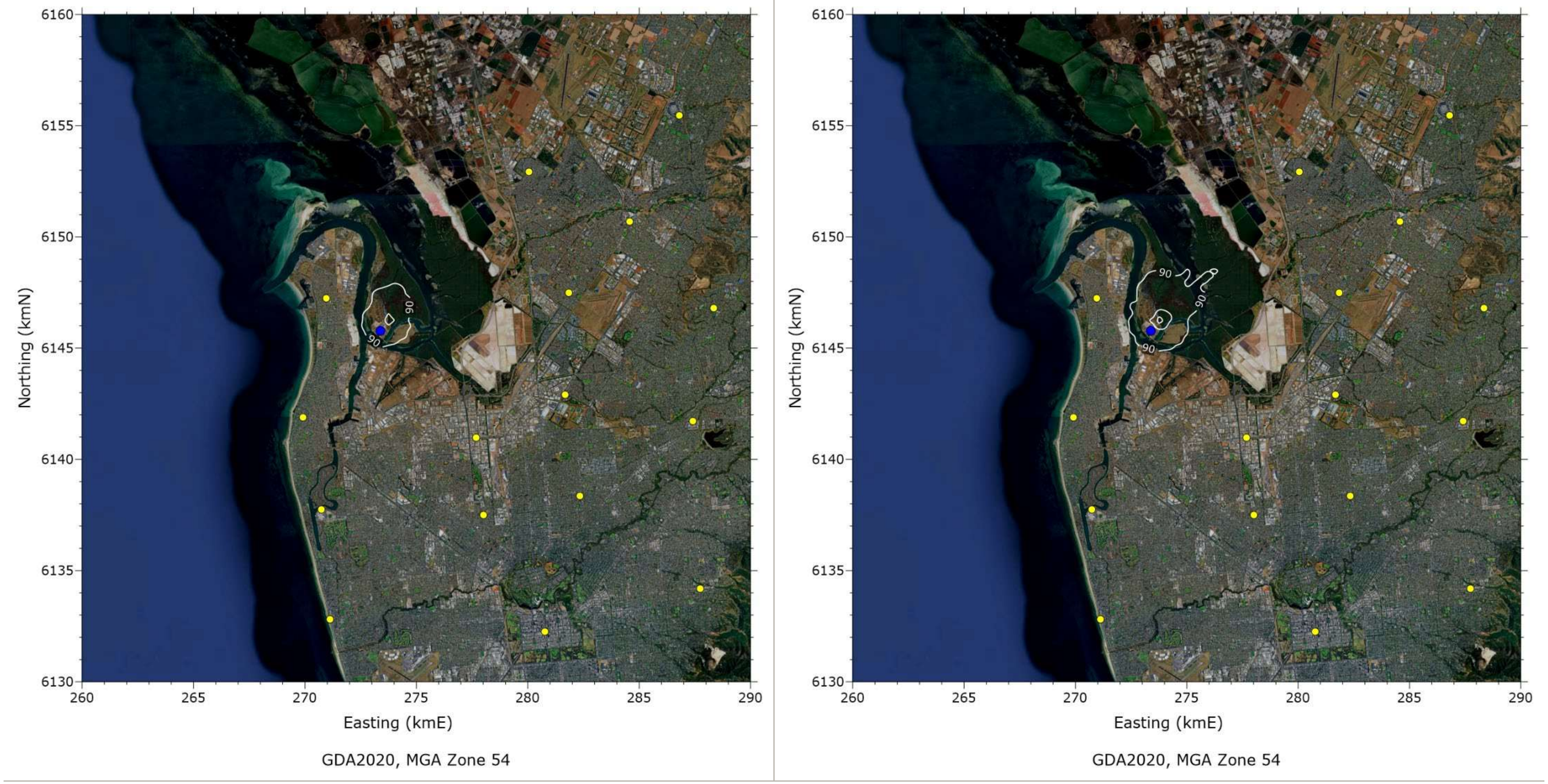
Natural Gas (NG)	Distillate Oil (DO)



Notes: Contour levels 90, 120, 150 μg/m³. Criterion: 164 μg/m³. Contours incorporate maximum (flat) background concentration of 82 μg/m³.

FIGURE 5-8 PLANT OPTION E2: MAXIMUM 1-HOUR AVERAGE CUMULATIVE NO_2 PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) ($\mu g/m^3$)

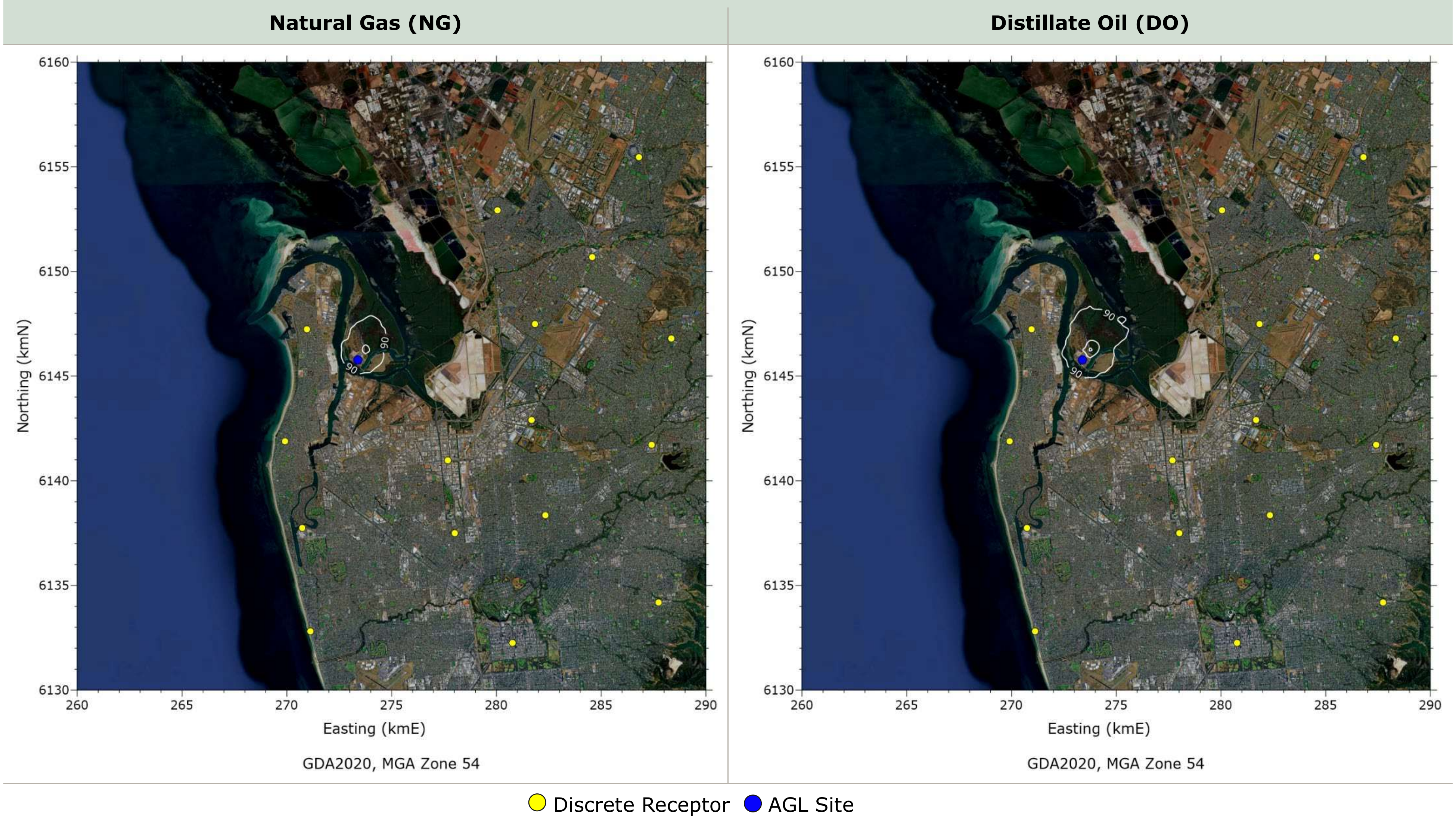
Natural Gas (NG)	**Distillate Oil (DO)**



Discrete Receptor   AGL Site

Notes: Contour levels 90, 120, 150 µg/m³. Criterion: 164 µg/m³. Contours incorporate maximum (flat) background concentration of 82 µg/m³.

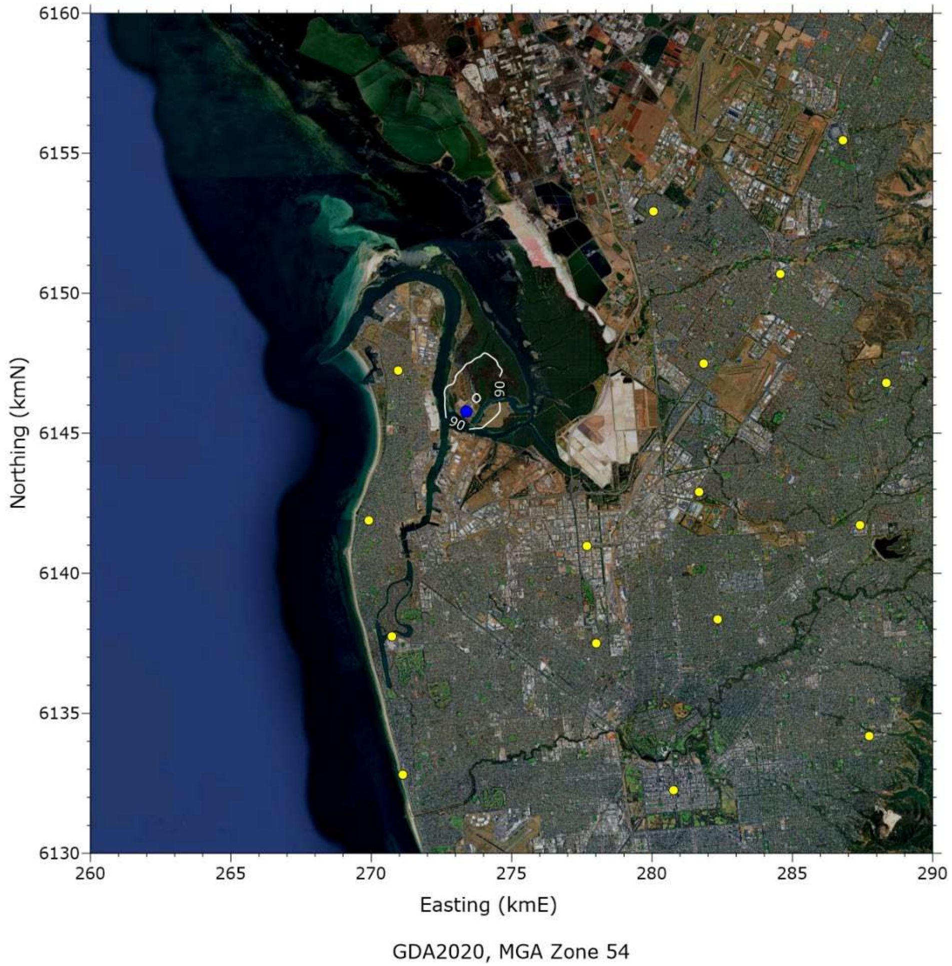
FIGURE 5-9 PLANT OPTION F1: MAXIMUM 1-HOUR AVERAGE CUMULATIVE NO_2 PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

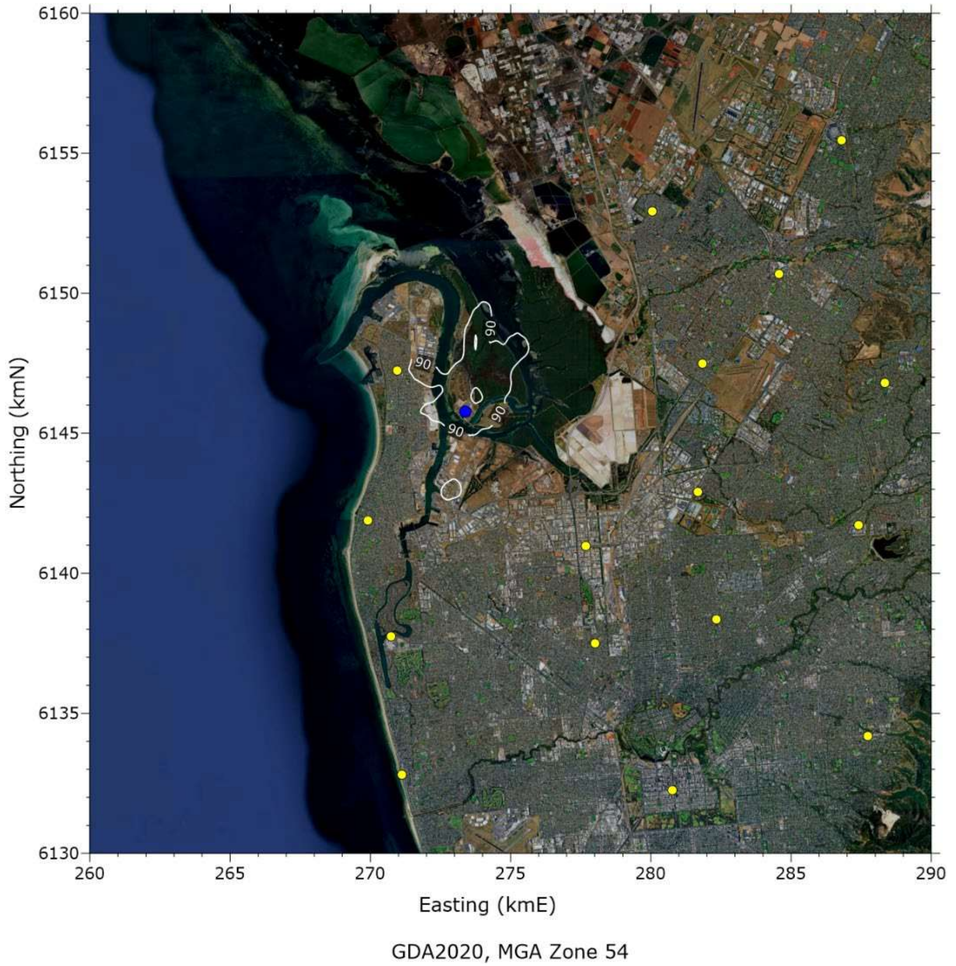


Notes: Contour levels 90, 120, 150 µg/m³. Criterion: 164 µg/m³. Contours incorporate maximum (flat) background concentration of 82 µg/m³.

FIGURE 5-10 PLANT OPTION F2: MAXIMUM 1-HOUR AVERAGE CUMULATIVE NO_2 PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Natural Gas (NG)	Distillate Oil (DO)



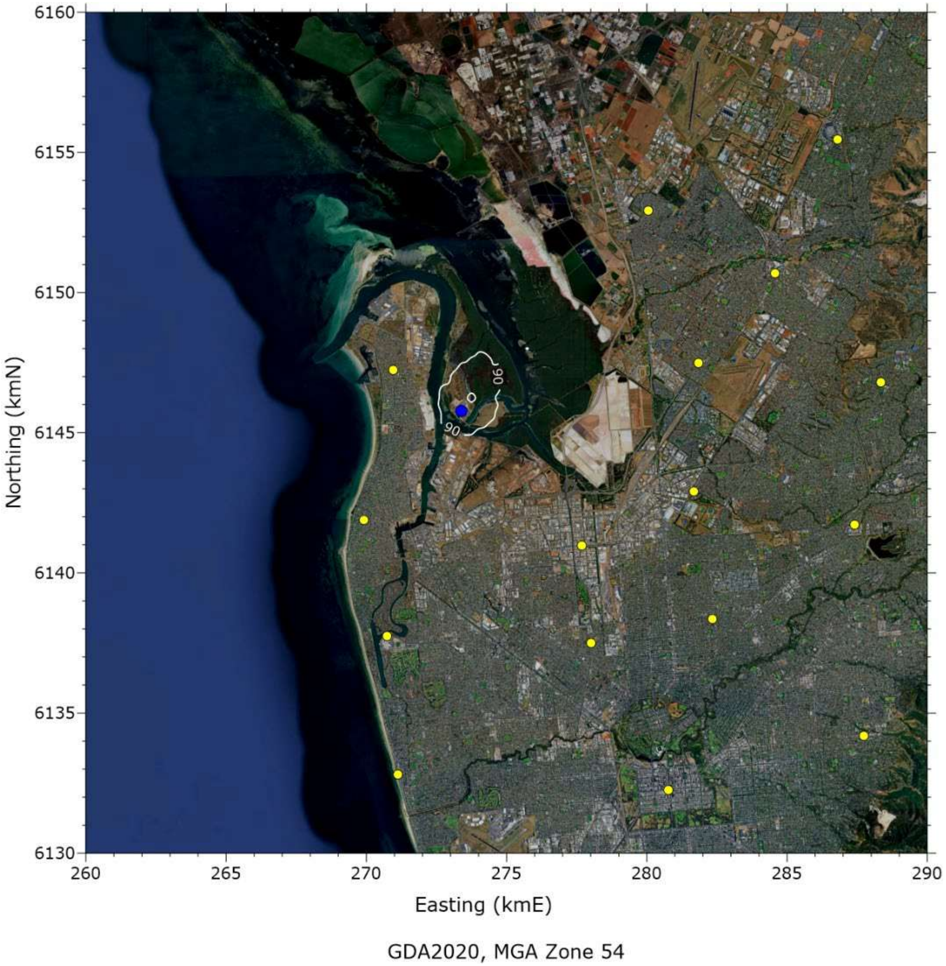


Discrete Receptor AGL Site

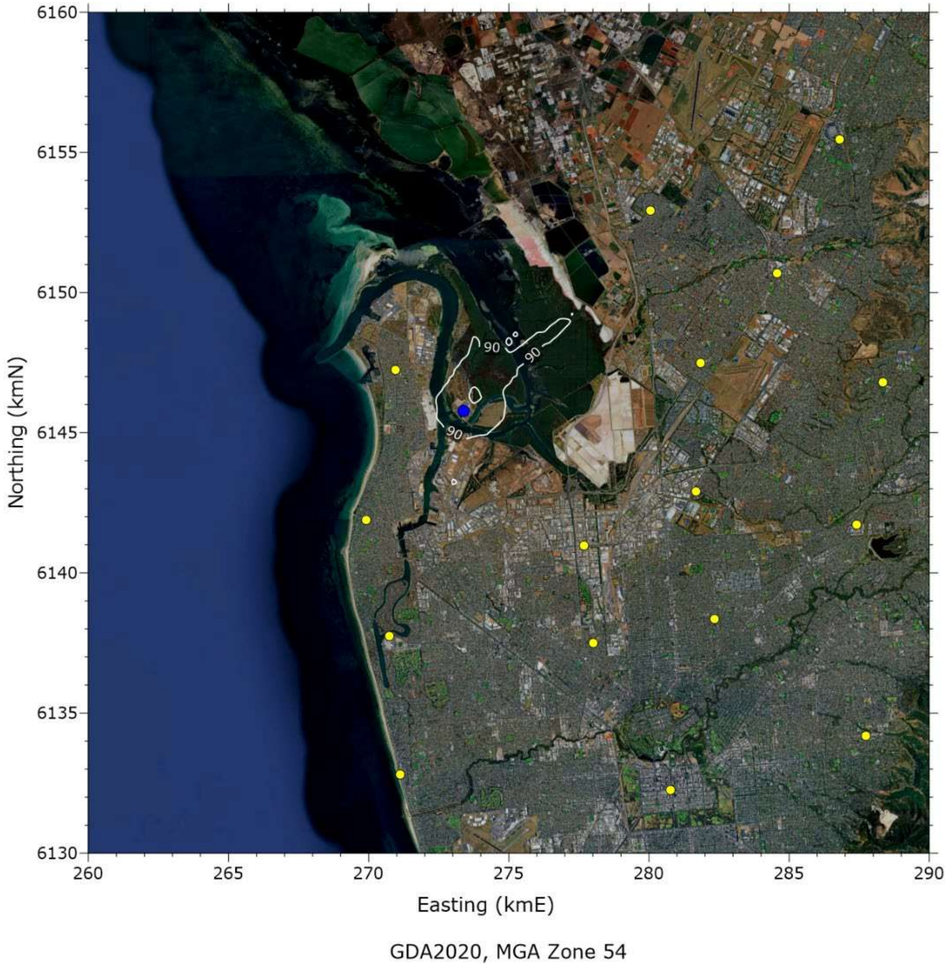
Notes: Contour levels 90, 120 µg/m³. Criterion: 164 µg/m³. Contours incorporate maximum (flat) background concentration of 82 µg/m³.

FIGURE 5-11 PLANT OPTION AD: CUMULATIVE MAXIMUM 1-HOUR AVERAGE NO_2 PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (μg/m^3)

Natural Gas (NG)



Distillate Oil (DO)

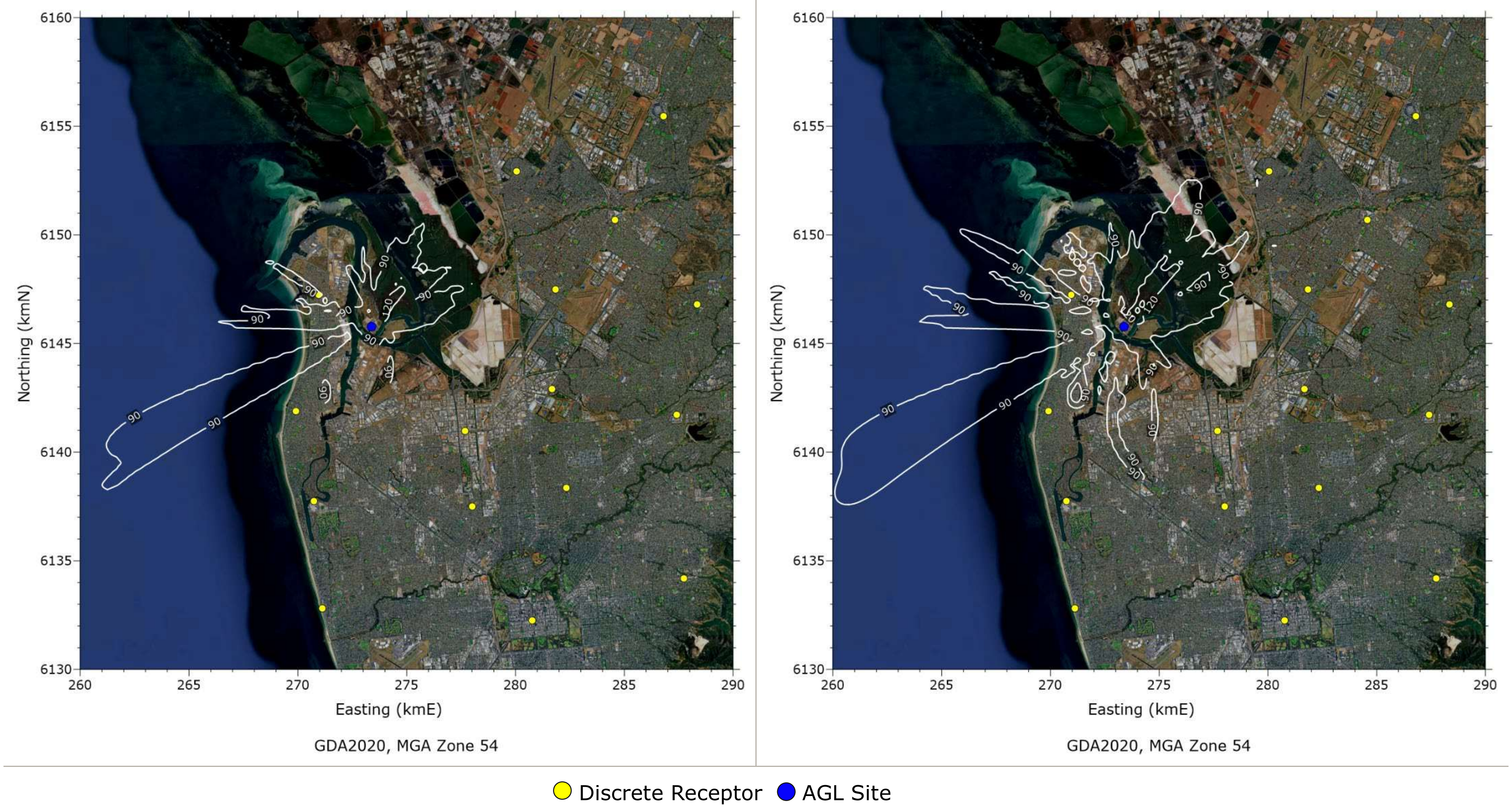


Discrete Receptor AGL Site

Notes: Contour levels 90, 120 μg/m^3. Criterion: 164 μg/m^3. Contours incorporate maximum (flat) background concentration of 82 μg/m^3.

FIGURE 5-12 PLANT OPTION RE: MAXIMUM 1-HOUR AVERAGE CUMULATIVE NO_2 PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) ($\mu g/m^3$)

Natural Gas (NG)	Distillate Oil (DO)



Notes: Contour levels 90, 120, 150 µg/m³. Criterion: 164 µg/m³. Contours incorporate maximum (flat) background concentration of 82 µg/m³.

5.2 PARTICULATE MATTER (PM)

Within this assessment, all PM emissions are assumed to be less than 2.5 microns in aerodynamic diameter. Accordingly, $PM_{2.5}$ emissions are also equal to PM_{10} emissions, thus allowing reporting of modelling predictions as PM.

Table 5-10 to **Table 5-12** present the maximum 24-hour PM predictions for each plant scenario with addition to adopted background concentrations and assessment against $PM_{2.5}$ and PM_{10} criteria. Gridded receptor predictions for PS1 and PS3 have been reviewed to identify the maximum cumulative prediction at a sensitive location (shown in square brackets).

Table 5-15 to **Table 5-15** present the annual average PM predictions for each plant scenario, with assessment against the $PM_{2.5}$ criterion.

Figure 5-13 through to **Figure 5-18** present the maximum 24-hour average PS1 incremental PM predictions for each of the plant options.

Figure 5-19 through to **Figure 5-24** present the maximum 24-hour average PS3 incremental PM predictions for each of the plant options.

All predictions are compliant with respective assessment criteria:

- A peak 24-hour sensitive receptor PM prediction of 3 µg/m³ is reported for distillate operation of the aeroderivative plant option for Plant Scenario 3. When added to the corresponding background $PM_{2.5}$ concentration, the cumulative prediction is compliant, equating to approximately half of the 25 µg/m³ criterion. It is noted that this scenario has been based on continuous operation of BIPS 1 and BIPS 2 on distillate fuel, and TIPS B operating on natural gas, with all plant operating at 100% of available plant load. This provides a conservative basis for assessment given the intermittent operation of these facilities and use of natural gas.
- Annual average $PM_{2.5}$ predictions are low relative to criterion of 8 µg/m³, with the various BIPS 2 plant options contributing a grid maximum of 0.1 µg/m³. Accordingly, the significance of BIPS 2 to annual average $PM_{2.5}$ concentrations is considered negligible. Annual average predictions for Plant Scenario 3 are also low, with maximum sensitive gridded receptor predictions equal to or less than 0.1 µg/m³.

TABLE 5-10 MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	<1	<1	1	1	<1	1	**1**
R02	<1	<1	<1	<1	<1	<1	<1	<1	1	1	<1	1	**1**
R03	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	**1**
R04	<1	<1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
R05	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	**1**
R06	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	**1**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	**1**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	**1**
R09	<1	1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
R10	<1	<1	<1	<1	<1	<1	<1	<1	1	1	<1	1	**1**
R11	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	**1**
R12	<1	<1	<1	<1	<1	<1	<1	<1	1	1	<1	<1	**1**
R13	<1	<1	<1	<1	<1	<1	<1	<1	1	1	1	1	**1**
R14	<1	<1	<1	<1	<1	<1	<1	1	1	1	<1	1	**1**
R15	<1	<1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
R16	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	**1**
Maximum by Receptor Type													
Discrete	<1	1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
Gridded*	2 [<1]	3 [1]	1 [<1]	2 [<1]	1 [<1]	2 [1]	1 [1]	1 [1]	2 [1]	3 [3]	1 [1]	3 [2]	**3**

Assessment Against Criterion		
Pollutant	$PM_{2.5}$	PM_{10}
Background Concentration	10	36
Maximum Cumulative (Gridded sensitive receptor)	13	39
Criterion	***25***	***50***

Notes: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.
Maximum gridded sensitive receptor predictions shown in square brackets. All PM assumed present as $PM_{2.5}$. Accordingly, for all model predictions: PM = $PM_{2.5}$ = PM_{10}

TABLE 5-11 MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
R02	<1	<1	<1	<1	<1	<1	<1	<1	1	1	<1	1	**1**
R03	<1	1	<1	1	<1	1	<1	1	<1	1	<1	1	**1**
R04	<1	<1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
R05	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	**1**
R06	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	**1**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	**1**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	**1**
R09	<1	1	<1	1	<1	1	1	1	1	2	1	1	**2**
R10	<1	1	<1	1	<1	1	<1	1	1	1	<1	1	**1**
R11	<1	<1	<1	<1	<1	<1	<1	1	<1	1	<1	1	**1**
R12	<1	<1	<1	<1	<1	<1	<1	<1	1	1	<1	1	**1**
R13	<1	1	<1	<1	<1	<1	<1	1	1	1	1	1	**1**
R14	<1	1	<1	1	<1	1	<1	1	1	1	<1	1	**1**
R15	<1	<1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
R16	<1	<1	<1	<1	<1	<1	<1	1	<1	1	<1	1	**1**
Maximum by Receptor Type													
Discrete	<1	1	<1	1	<1	1	1	1	1	2	1	2	**2**
Gridded*	4	10	4	10	4	10	4	10	4	10	4	10	**10**
Assessment Against Criterion													
Pollutant												**$PM_{2.5}$**	**PM_{10}**
Background Concentration												10	36
Maximum Cumulative												20	46
Criterion												***25***	***50***

Notes: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.
All PM assumed present as $PM_{2.5}$. Accordingly, for all model predictions: PM = $PM_{2.5}$ = PM_{10}

TABLE 5-12 MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
R02	<1	<1	<1	<1	<1	<1	<1	1	1	1	<1	1	**1**
R03	<1	1	<1	1	<1	1	<1	1	1	1	<1	1	**1**
R04	<1	1	<1	<1	<1	<1	<1	1	1	2	1	1	**2**
R05	<1	1	<1	<1	<1	<1	<1	1	<1	1	<1	1	**1**
R06	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	**1**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	**1**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	**1**
R09	1	1	<1	1	<1	1	1	1	1	2	1	2	**2**
R10	1	1	<1	1	<1	1	<1	1	1	1	1	1	**1**
R11	<1	1	<1	<1	<1	<1	<1	1	1	1	<1	1	**1**
R12	<1	1	<1	<1	<1	<1	<1	1	1	1	<1	1	**1**
R13	<1	1	<1	1	<1	1	<1	1	1	2	1	1	**2**
R14	<1	1	<1	1	<1	1	<1	1	1	1	<1	1	**1**
R15	<1	1	<1	1	<1	1	1	1	1	2	1	1	**2**
R16	<1	<1	<1	<1	<1	<1	<1	1	<1	1	<1	1	**1**
Maximum by Receptor Type													
Discrete	1	1	<1	1	<1	1	1	1	1	2	1	2	**2**
Gridded*	4 [1]	10 [2]	4 [1]	10 [2]	4 [1]	10 [2]	4 [1]	10 [2]	4 [2]	10 [3]	4 [1]	10 [3]	**[3]**
Assessment Against Criterion													
Pollutant												**$PM_{2.5}$**	**PM_{10}**
Background Concentration												10	36
Maximum Cumulative												13	39
Criterion												***25***	***50***

Notes: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.
Maximum gridded sensitive receptor predictions shown in square brackets. All PM assumed present as $PM_{2.5}$. Accordingly, for all model predictions: PM = $PM_{2.5}$ = PM_{10}

TABLE 5-13 ANNUAL AVERAGE $PM_{2.5}$ PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<0.1**
R02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R03	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<0.1**
R06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<0.1**
R07	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<0.1**
R08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<0.1**
R09	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<0.1**
Maximum by Receptor Type													
Discrete	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
Gridded*	0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	**0.1**
Assessment Against Criterion													
Background Concentration													5.9
Maximum Cumulative													6.0
Criterion													***8.0***

Note: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.

TABLE 5-14 ANNUAL AVERAGE $PM_{2.5}$ PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R03	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	**0.1**
R04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	**0.1**
R05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R07	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<0.1**
R09	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	**0.1**
R10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	0.1	**0.1**
R16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
Maximum by Receptor Type													
Discrete	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	**0.1**
Gridded*	0.2	0.7	0.2	0.6	0.2	0.6	0.2	0.6	0.2	0.6	0.2	0.6	**0.7**
Assessment Against Criterion													
Background Concentration													5.9
Maximum Cumulative													6.6
Criterion													***8.0***

Note: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.

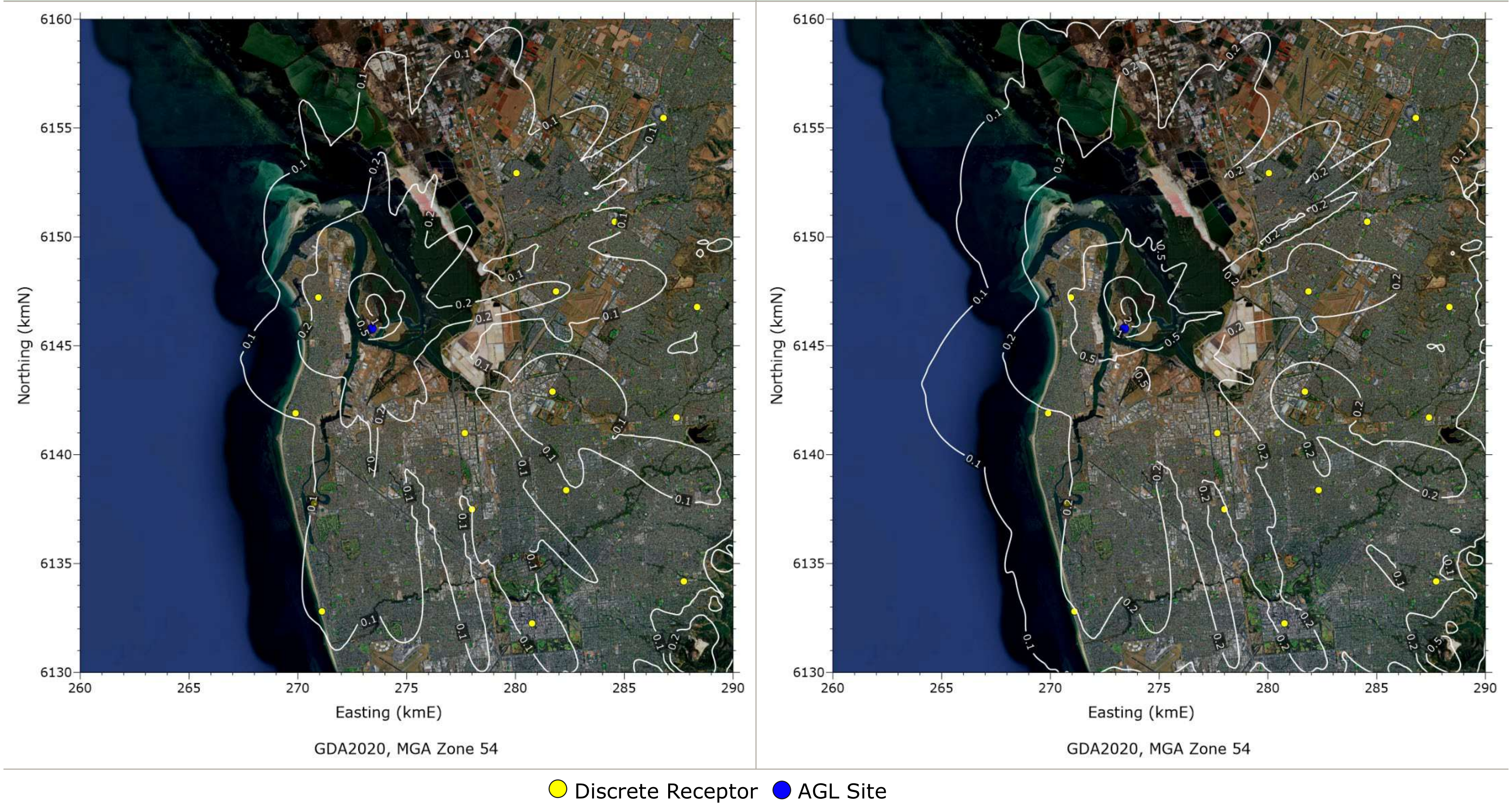
TABLE 5-15 ANNUAL AVERAGE $PM_{2.5}$ PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R03	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	**0.1**
R04	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	0.1	**0.1**
R05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R07	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	**0.1**
R08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<0.1**
R09	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	0.1	**0.1**
R10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	**0.1**
R14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
R15	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	**0.1**
R16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	**0.1**
Maximum by Receptor Type													
Discrete	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	**0.1**
Gridded*	0.3 [<0.1]	0.7 [0.1]	0.2 [<0.1]	0.7 [0.1]	0.2 [<0.1]	0.7 [0.1]	0.2 [<0.1]	0.6 [0.1]	0.2 [0.1]	0.7 [0.1]	0.2 [0.1]	0.7 [0.1]	**[0.1]**
Assessment Against Criterion													
Background Concentration													5.9
Maximum Cumulative													6.0
Criterion													***8.0***

Note: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.

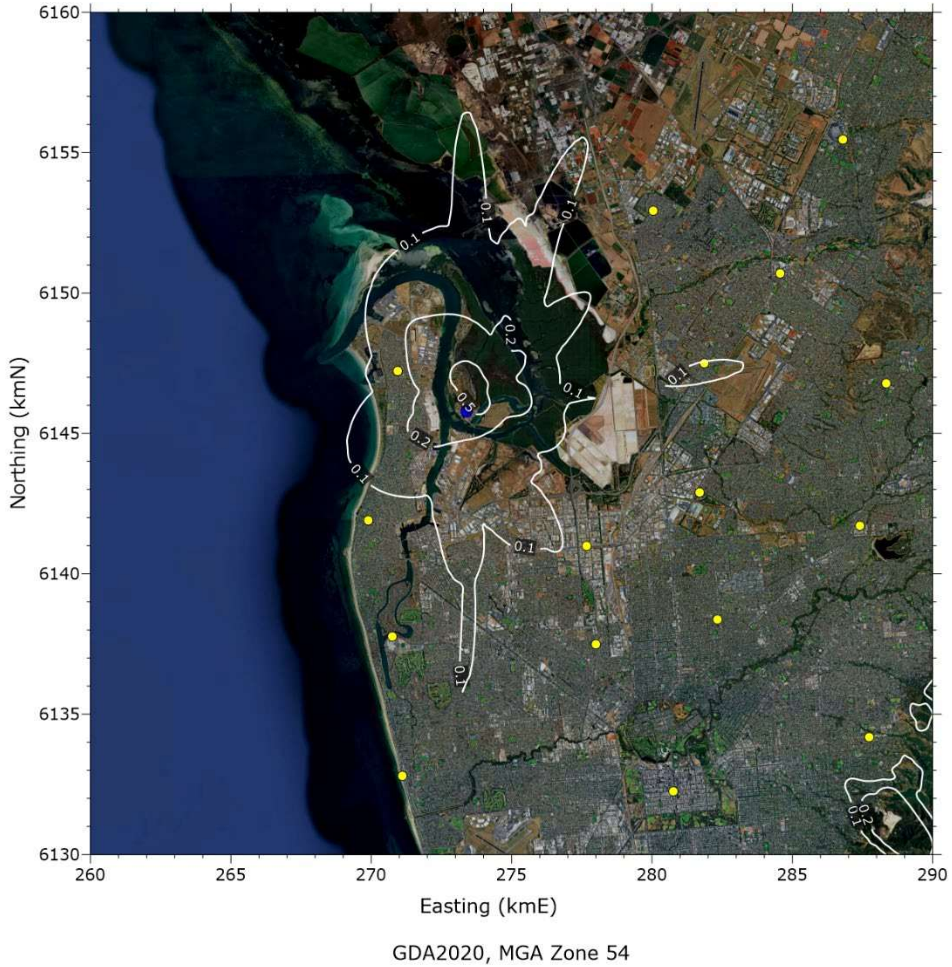
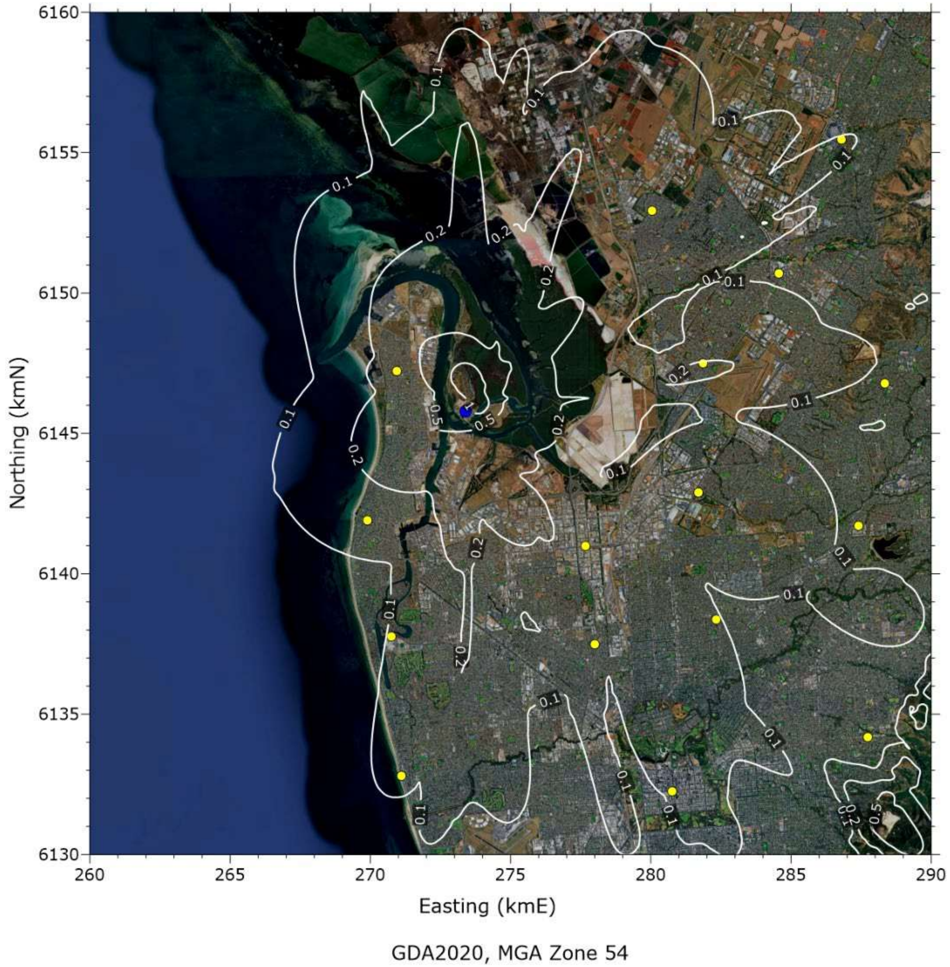
FIGURE 5-13 PLANT OPTION E1: MAXIMUM 24-HOUR AVERAGE INCREMENTAL PM PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Natural Gas (NG)	Distillate Oil (DO)



Notes: Contour levels 0.1, 0.2, 0.5, 1, 2 µg/m³. Cumulative criterion: 25 µg/m³. All PM assumed present as $PM_{2.5}$.

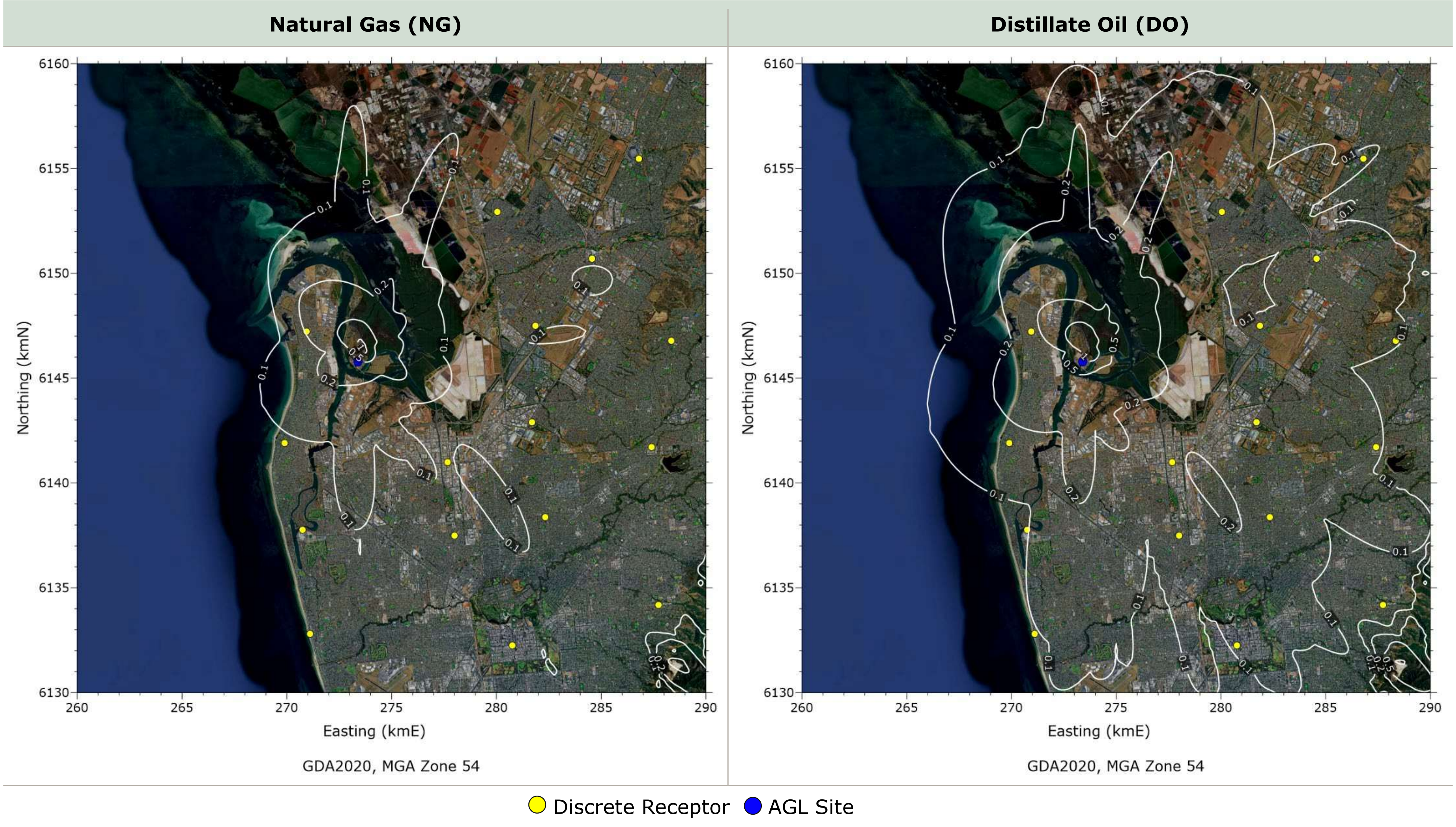
FIGURE 5-14 PLANT OPTION E2: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Natural Gas (NG)	Distillate Oil (DO)
	

Discrete Receptor AGL Site

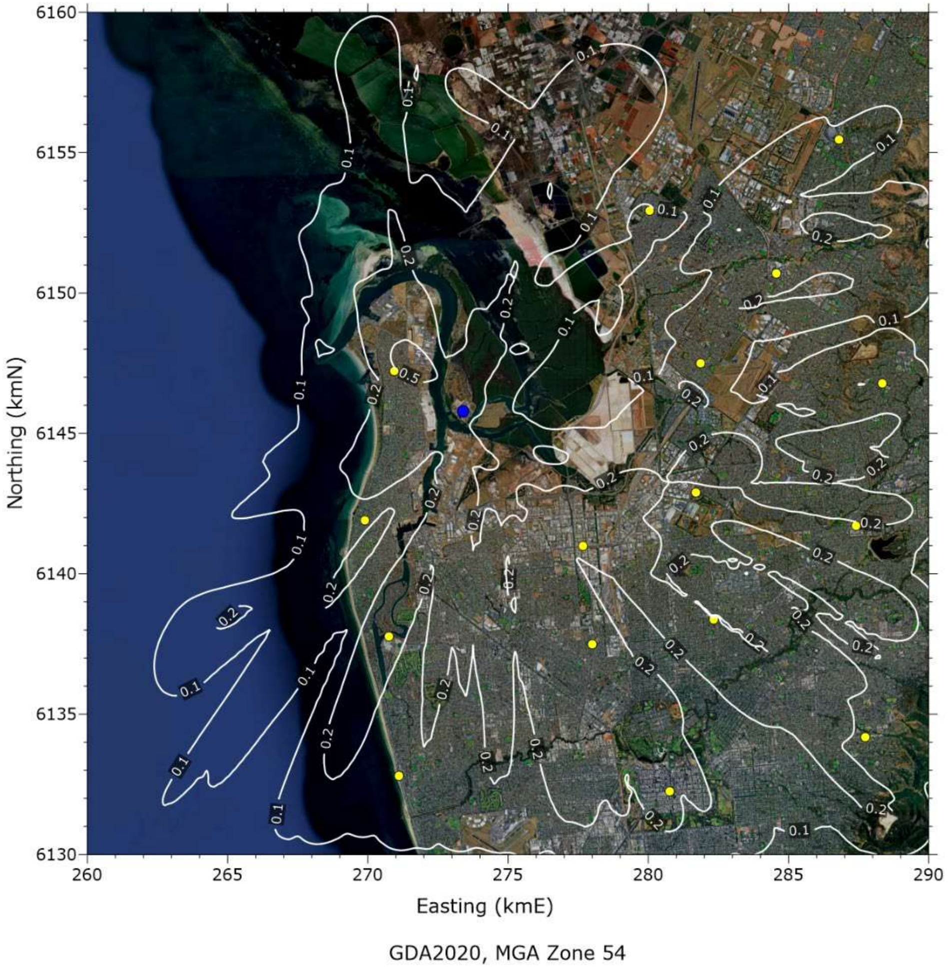
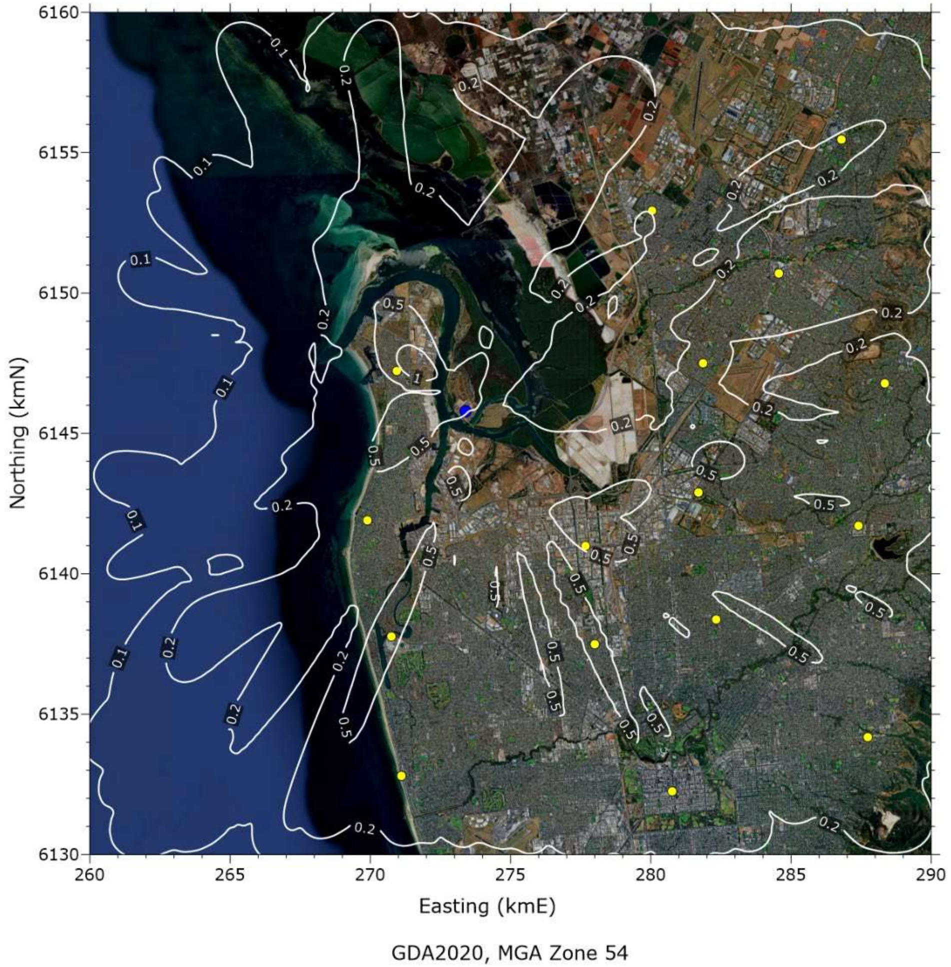
Notes: Contour levels 0.1, 0.2, 0.5, 1 µg/m³. Cumulative criterion: 25 µg/m³.

FIGURE 5-15 PLANT OPTION F1: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)



Notes: Contour levels 0.1, 0.2, 0.5, 1 µg/m^3. Cumulative criterion: 25 µg/m^3.

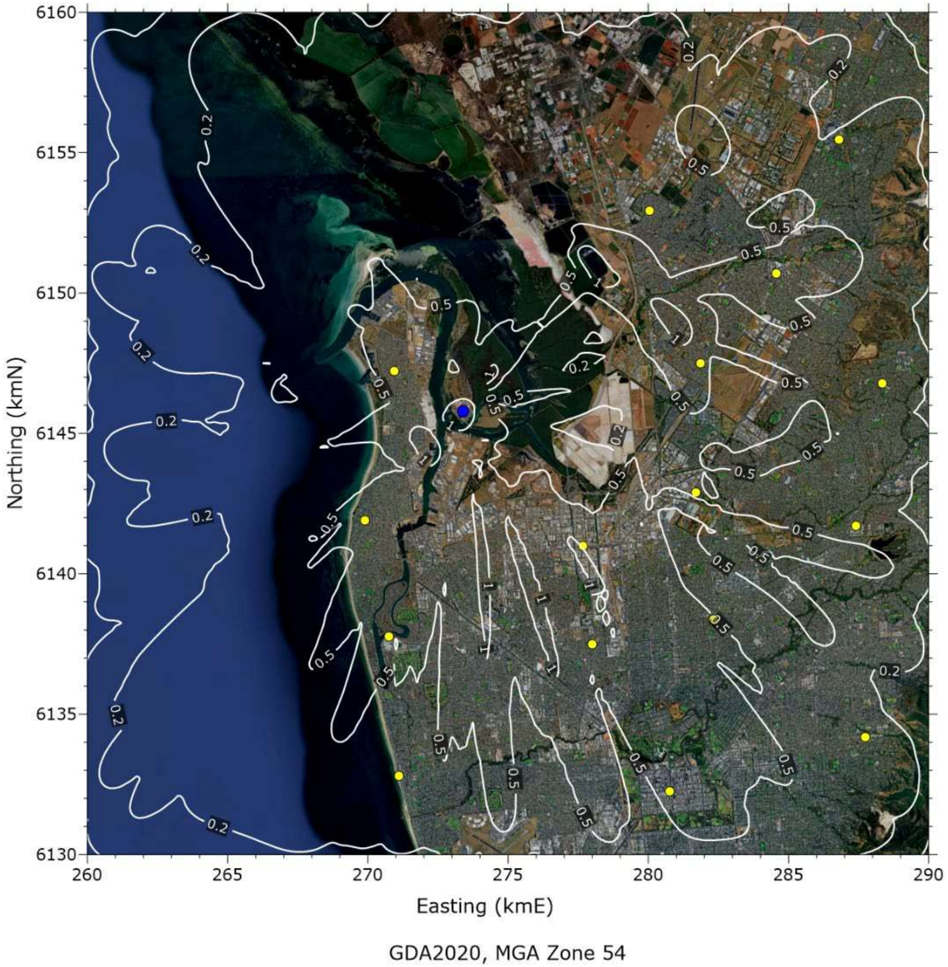
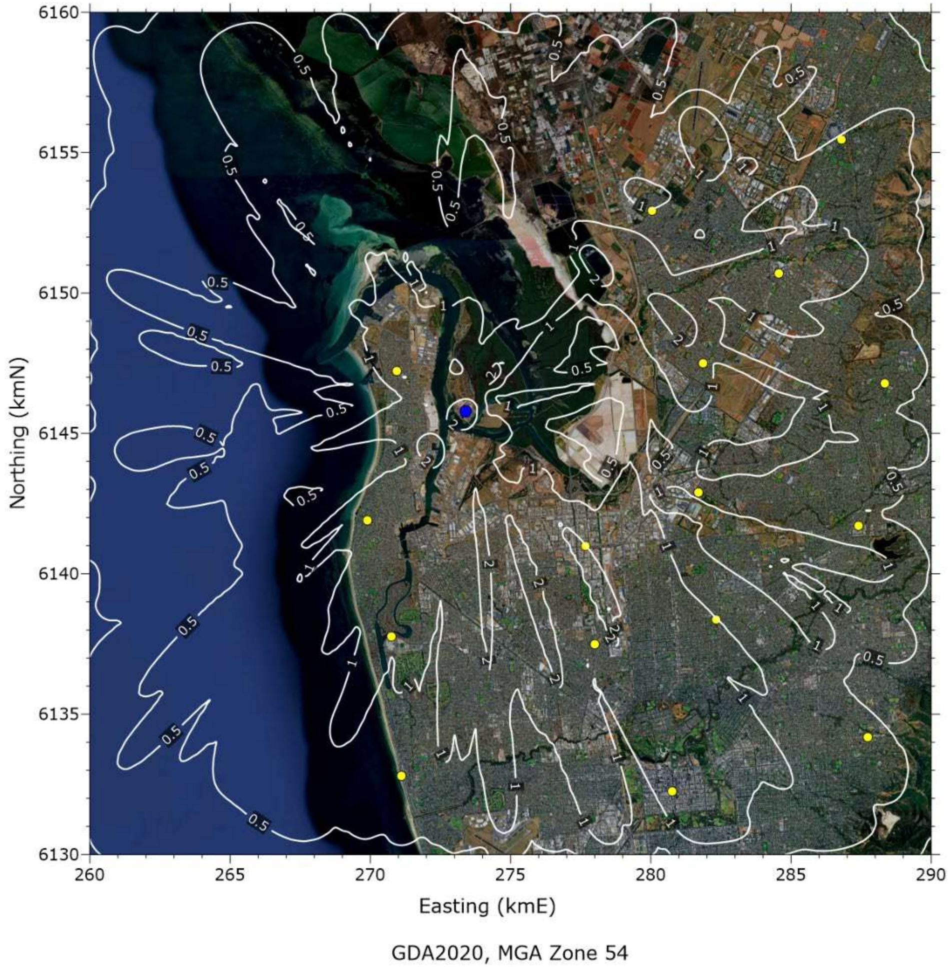
FIGURE 5-16 PLANT OPTION F2: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Natural Gas (NG)	Distillate Oil (DO)
	

Discrete Receptor AGL Site

Notes: Contour levels 0.1, 0.2, 0.5, 1 µg/m³. Cumulative criterion: 25 µg/m³.

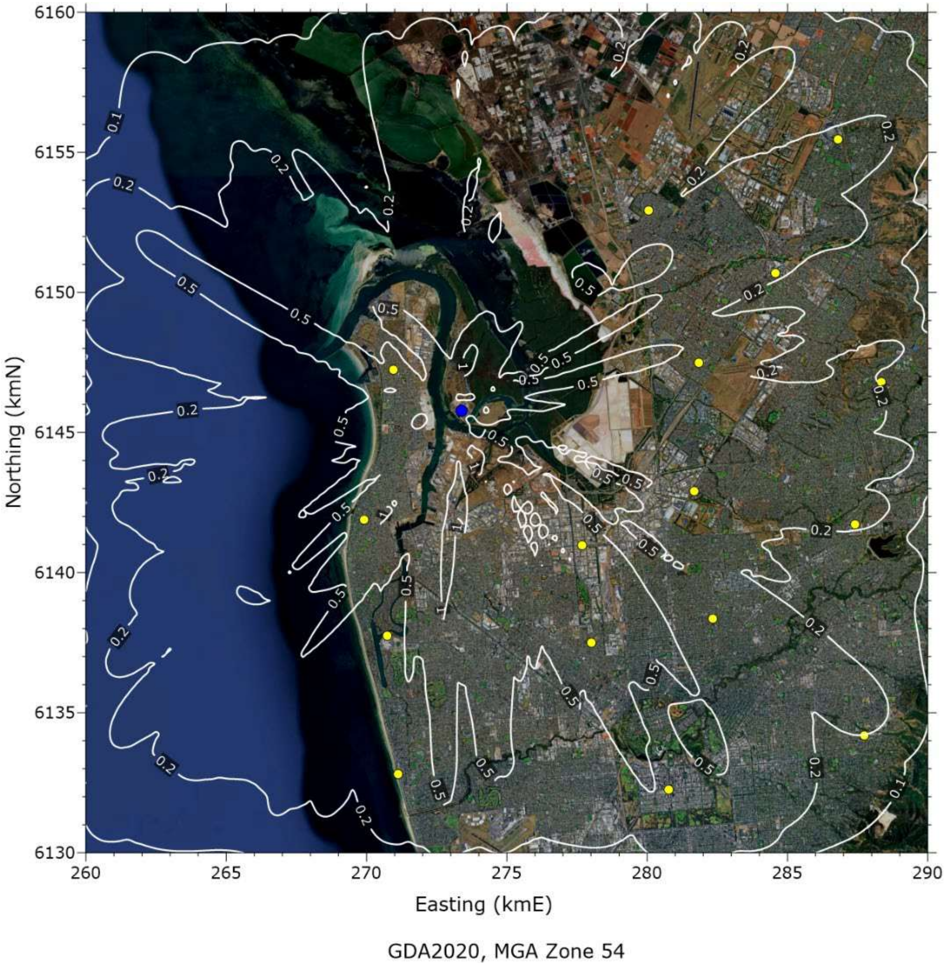
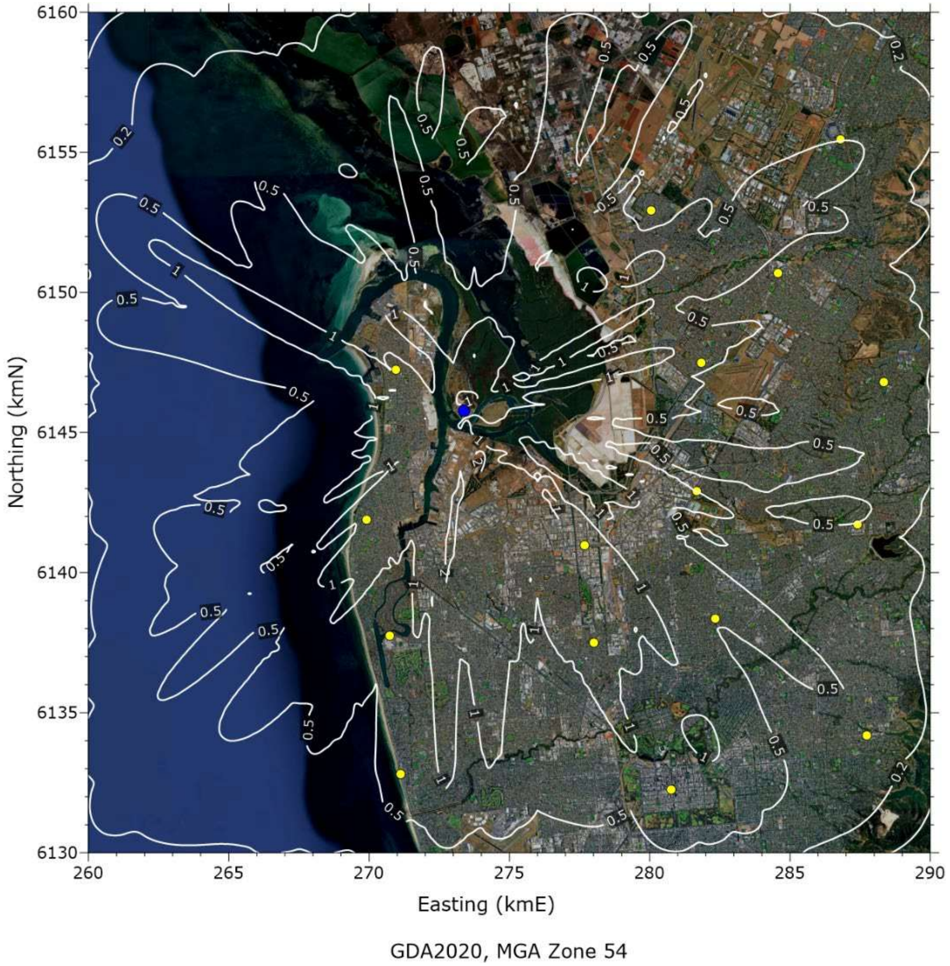
FIGURE 5-17 PLANT OPTION AD: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Natural Gas (NG)	Distillate Oil (DO)
	

Discrete Receptor AGL Site

Notes: Contour levels 0.1, 0.2, 0.5, 1, 2 µg/m³. Cumulative criterion: 25 µg/m³.

FIGURE 5-18 PLANT OPTION RE: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (μg/m³)

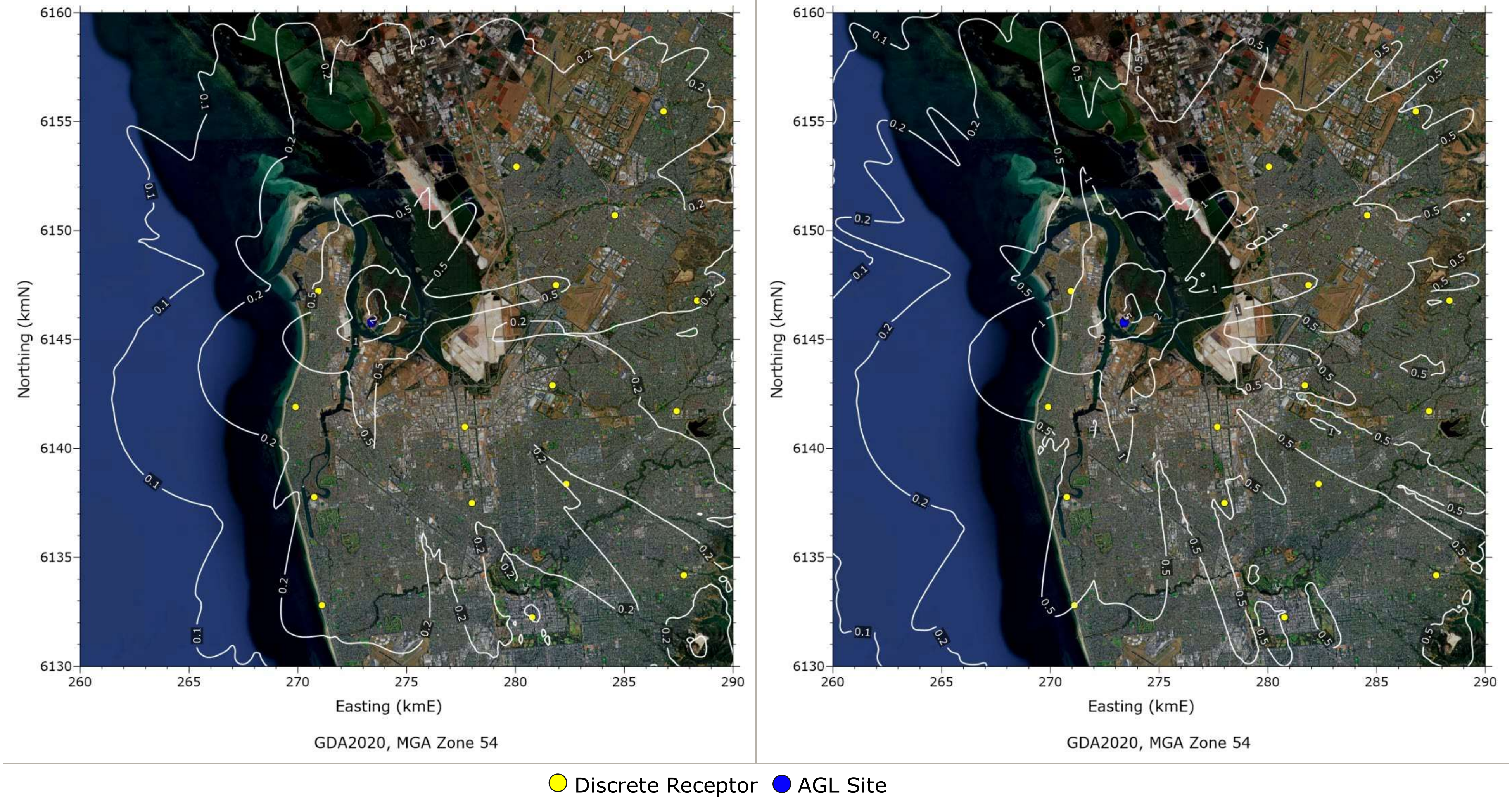
Natural Gas (NG)	Distillate Oil (DO)
	

Discrete Receptor AGL Site

Note: Contour levels 0.1, 0.2, 0.5, 1, 2 μg/m³. Cumulative criterion: 25 μg/m³.

FIGURE 5-19 PLANT OPTION E1: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

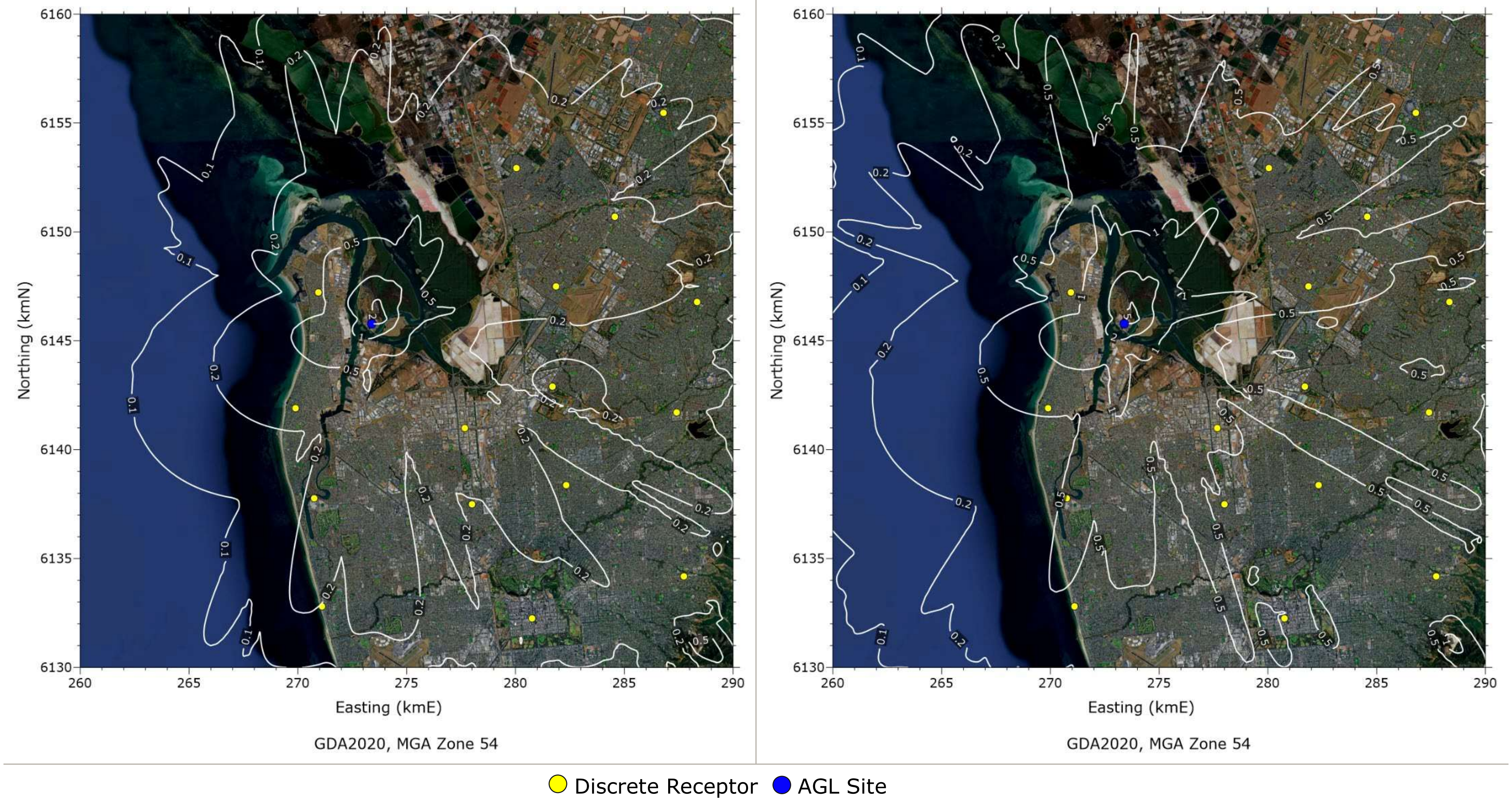
Natural Gas (NG)	Distillate Oil (DO)



Notes: Contour levels 0.1, 0.2, 0.5, 1, 2, 5, 10 µg/m³. Criterion: 25 µg/m³.

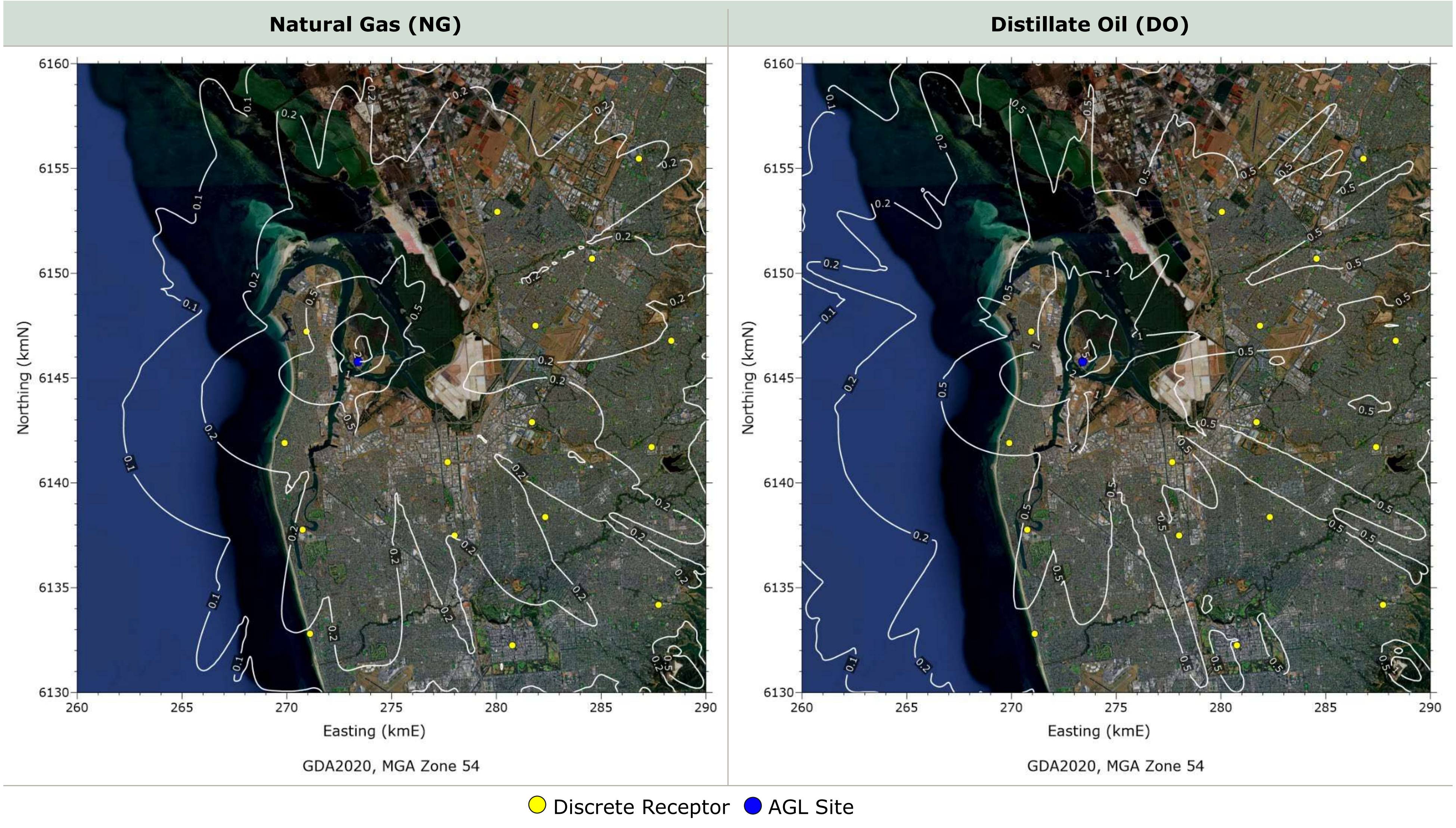
FIGURE 5-20 PLANT OPTION E2: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Natural Gas (NG)	Distillate Oil (DO)



Notes: Contour levels 0.1, 0.2, 0.5, 1, 2, 5, 10 µg/m³. Criterion: 25 µg/m³.

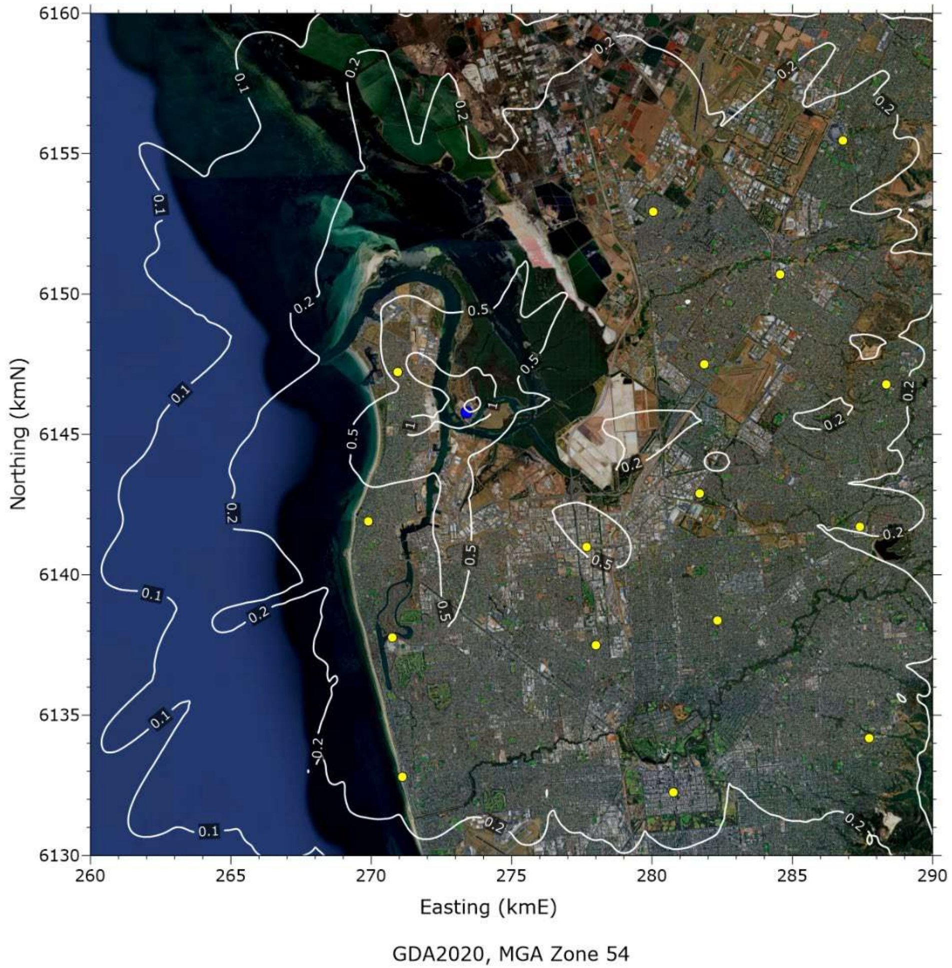
FIGURE 5-21 PLANT OPTION F1: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)



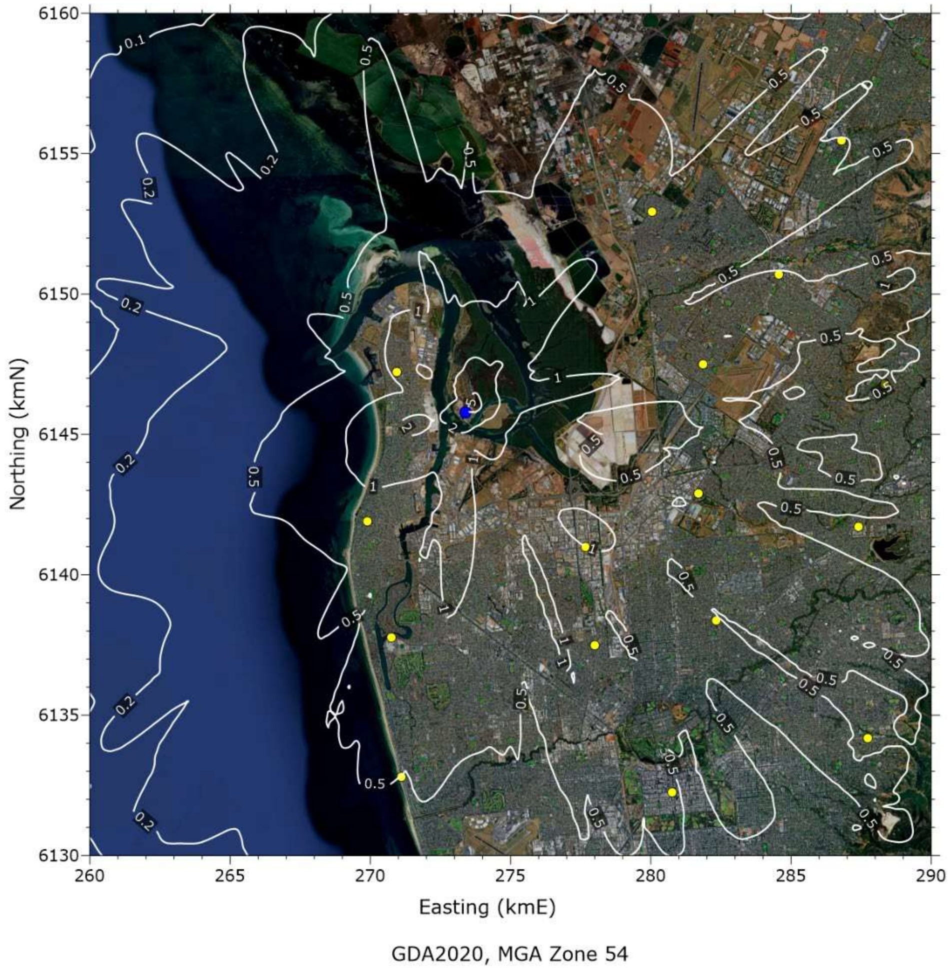
Notes: Contour levels 0.1, 0.2, 0.5, 1, 2, 5, 10 µg/m³. Criterion: 25 µg/m³.

FIGURE 5-22 PLANT OPTION F2 – MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Natural Gas (NG)



Distillate Oil (DO)

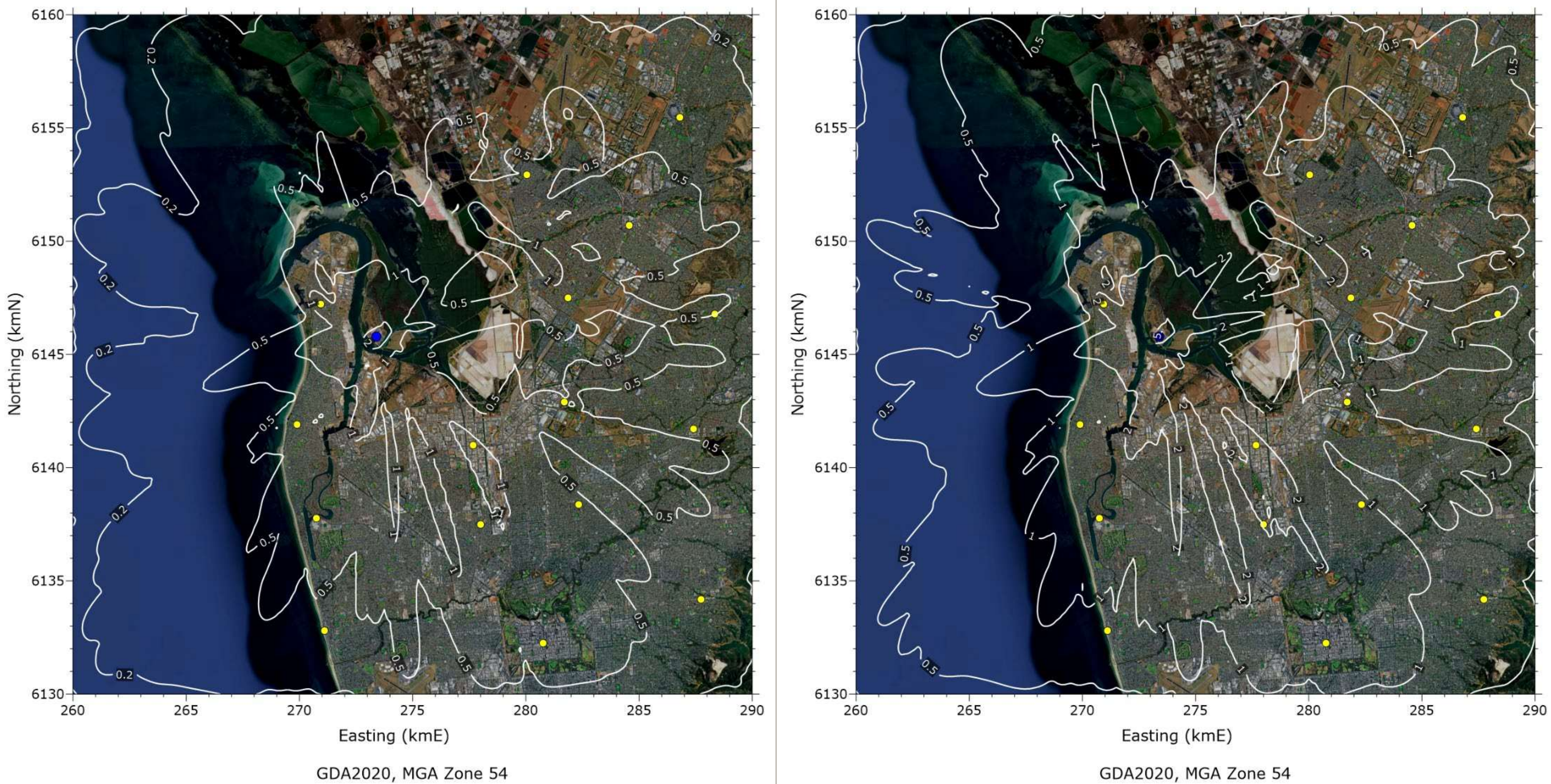


Discrete Receptor AGL Site

Notes: Contour levels 0.1, 0.2, 0.5, 1, 2, 5, 10 µg/m³. Criterion: 25 µg/m³.

FIGURE 5-23 PLANT OPTION AD: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Natural Gas (NG)	Distillate Oil (DO)

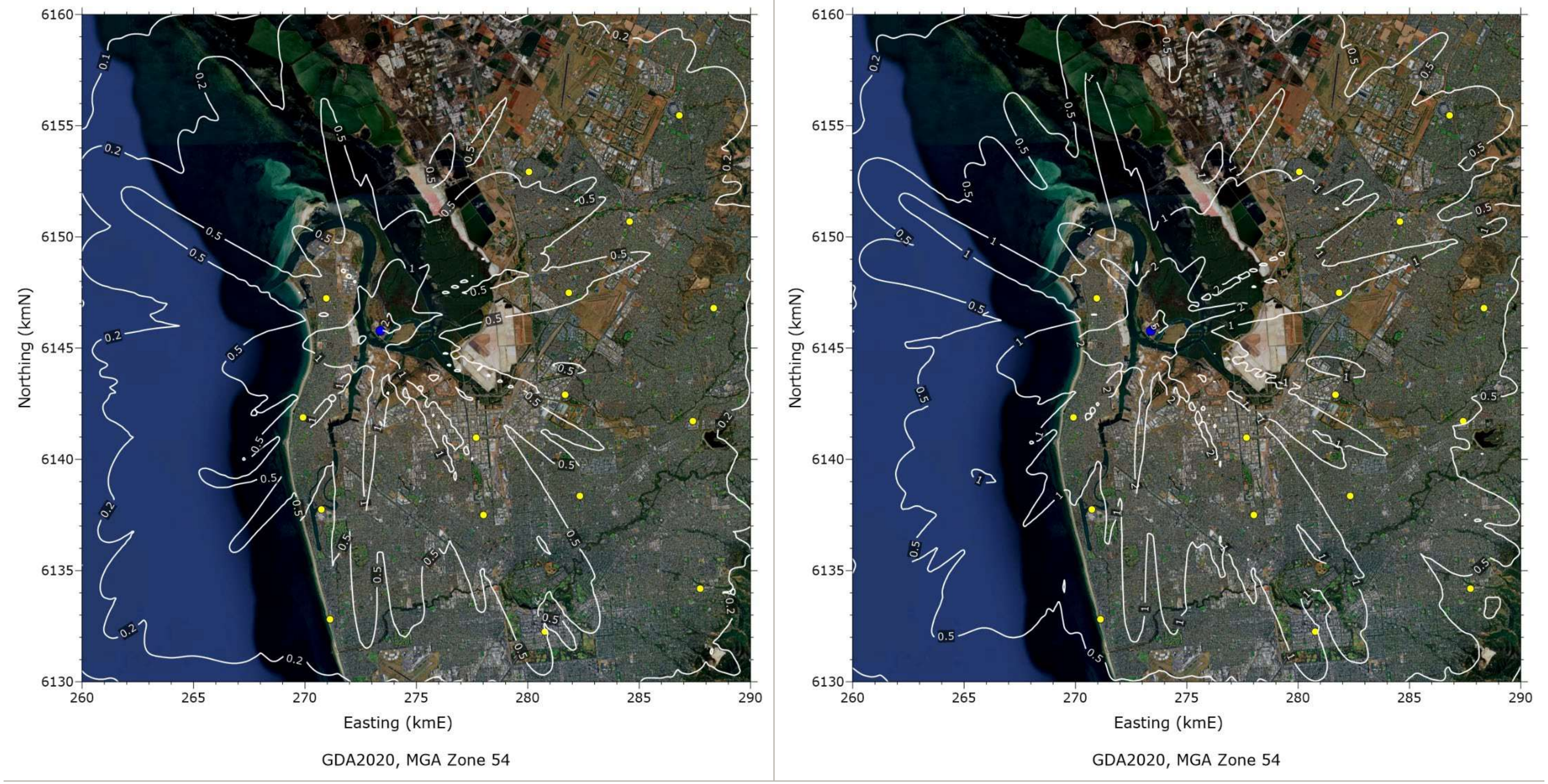


Discrete Receptor AGL Site

Notes: Contour levels 0.1, 0.2, 0.5, 1, 2, 5, 10 µg/m³. Criterion: 25 µg/m³.

FIGURE 5-24 PLANT OPTION RE: MAXIMUM 24-HOUR AVERAGE PM PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (μg/m³)

Natural Gas (NG)	Distillate Oil (DO)



Discrete Receptor AGL Site

Notes: Contour levels 0.1, 0.2, 0.5, 1, 2, 5, 10 μg/m³. PM2.5 criterion: 25 μg/m³.

5.3 FORMALDEHYDE

Table 5-16 to **Table 5-18** present the maximum 3-minute average formaldehyde predictions for each plant scenario, with assessment against the impact assessment criterion.

As shown in these results, all predictions are within the criterion, with BIPS 2 contributing up to 52% of the criterion under natural gas operation. Predictions for all other plant options are an order of magnitude lower.

Figure 5-25 and **Figure 5-26** present the modelling predictions for the reciprocating engine (RE) plant option under natural gas operation for plant scenarios PS1 and PS3 (respectively).

5.4 OTHER POLLUTANTS

Modelling predictions for CO, SO_2, benzene and PAHs were all significantly below criteria. **Appendix B** provides a detailed summary of assessment results for these pollutants with comparison against respective criteria.

TABLE 5-16 MAXIMUM 3-MINUTE AVERAGE FORMALDEHYDE PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	**2**
R02	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	**2**
R03	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	**2**
R04	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5	<1	**5**
R05	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	**2**
R06	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	**4**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	**4**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	**1**
R09	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	**4**
R10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	**2**
R11	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	**2**
R12	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	<1	**1**
R13	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5	<1	**5**
R14	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	**4**
R15	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5	<1	**5**
R16	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	**1**
Maximum by Receptor Type													
Discrete	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	5	<1	**5**
Gridded*	1	<1	1	<1	1	<1	1	<1	2	1	23	<1	**23**
Criterion													***44***
Max. % of Criterion	3%	1%	1%	1%	1%	1%	2%	1%	4%	2%	52%	1%	**52%**

Note: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.

TABLE 5-17 MAXIMUM 3-MINUTE AVERAGE FORMALDEHYDE PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	1	<1	1	<1	1	<1	1	<1	1	<1	3	<1	**3**
R02	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R03	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R04	1	<1	1	<1	1	<1	1	<1	1	<1	5	<1	**5**
R05	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R06	1	<1	1	<1	1	<1	1	<1	1	<1	4	<1	**4**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	**4**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	**1**
R09	2	<1	2	<1	2	<1	2	<1	3	<1	5	<1	**5**
R10	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R11	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R12	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R13	1	<1	1	<1	1	<1	1	<1	1	<1	5	<1	**5**
R14	1	<1	1	<1	1	<1	1	<1	1	<1	4	<1	**4**
R15	1	<1	1	<1	1	<1	1	<1	1	<1	5	<1	**5**
R16	2	<1	2	<1	2	<1	2	<1	2	<1	2	<1	**2**
Maximum by Receptor Type													
Discrete	2	<1	2	<1	2	<1	2	<1	3	<1	5	<1	**5**
Gridded*	15	<1	15	<1	15	<1	15	<1	15	1	23	<1	**23**
Criterion													***44***
Max. % of Criterion	33%	1%	33%	1%	33%	1%	33%	1%	33%	2%	52%	1%	**52%**

Note: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.

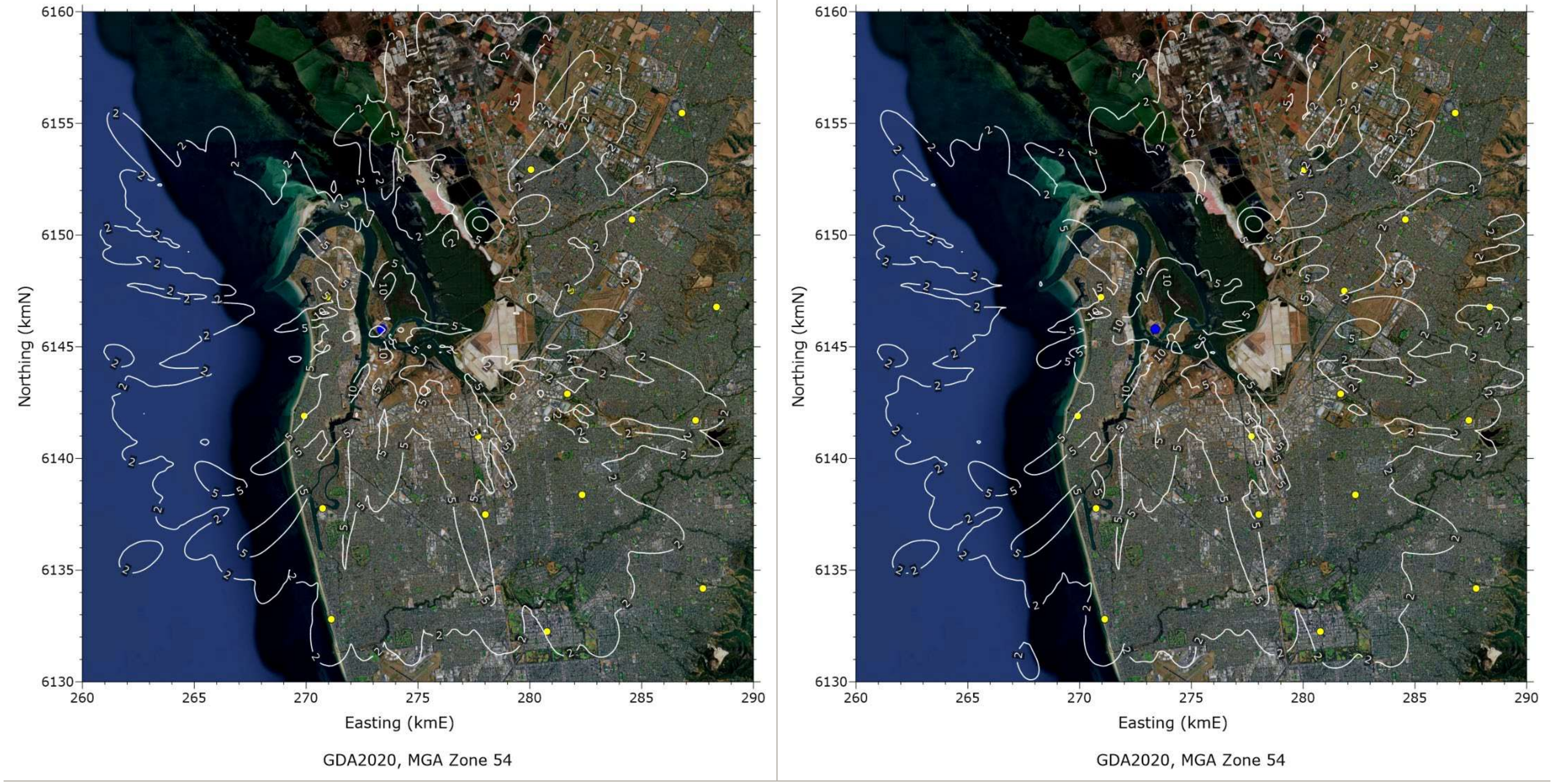
TABLE 5-18 MAXIMUM 3-MINUTE AVERAGE FORMALDEHYDE PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	1	<1	1	<1	1	<1	1	<1	1	<1	3	<1	**3**
R02	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R03	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R04	1	<1	1	<1	1	<1	1	<1	1	<1	5	<1	**5**
R05	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R06	1	<1	1	<1	1	<1	1	<1	1	<1	4	<1	**4**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	**4**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	**1**
R09	2	<1	2	<1	2	<1	2	<1	3	<1	5	<1	**5**
R10	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R11	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R12	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R13	1	<1	1	<1	1	<1	1	<1	1	<1	5	<1	**5**
R14	1	<1	1	<1	1	<1	1	<1	1	<1	4	<1	**4**
R15	1	<1	1	<1	1	<1	1	<1	1	<1	5	<1	**5**
R16	2	<1	2	<1	2	<1	2	<1	2	<1	2	<1	**2**
Maximum by Receptor Type													
Discrete	2	<1	2	<1	2	<1	2	<1	3	<1	5	<1	**5**
Gridded*	15	1	15	<1	15	<1	15	<1	15	1	23	<1	**23**
Criterion													***44***
Max. % of Criterion	33%	1%	33%	1%	33%	1%	33%	1%	33%	2%	52%	1%	**52%**

Note: *Maximum gridded receptor prediction over land, inclusive of the site and other areas where sensitive receptors may not be present.

FIGURE 5-25 RE NG – MAXIMUM 3-MIN AVERAGE FORMALDEHYDE PREDICTIONS (µg/m³)

Plant Scenario 1	Plant Scenario 3



Discrete Receptor   AGL Site

Notes: Contour levels 2, 5, 10, 20 µg/m³. Assessment criterion: 44 µg/m³.

6. GREENHOUSE GAS (GHG) EMISSIONS

A detailed greenhouse gas assessment (GHGA) was prepared for the DA and is documented in PEL (2017b). Relative to the approved project, the variation involves the following changes to BIPS 2 that are relevant to the consideration of greenhouse gas emissions:

- use of either gas turbines or reciprocating engines (instead of reciprocating engines only as currently approved); and
- an increase the proposed output of BIPS 2 to up to 280 MW (instead of the currently approved 210 MW), representing an increase in BIPS capacity of up to approximately 17%.

This section provides a brief analysis of GHG emissions associated with the variation.

6.1 BIPS 1 OPERATIONS

BIPS 1 commenced operation in late 2019 and has a total generation capacity of 210 MW. **Table 6-1** presents a summary of annual electrical output in gigawatt hours (GWh), and associated capacity factor, which represents the average utilisation of the plant within each financial year.

TABLE 6-1 SUMMARY OF BIPS 1 OUTPUT AND CAPACITY FACTOR

Financial Year (FY)	Electrical Output (GWh)	Capacity Factor
FY21	387	21%
FY22	309	17%
FY23	294	16%
Average	**330**	**18%**

As shown in Table 6-1, BIPS 1 has operated between 16% and 21% of each financial year, with an average capacity factor of 18%. BIPS 1 operates with a Scope 1 emission intensity of approximately 0.6 tonnes of carbon dioxide (equivalent) per megawatt hour of electrical output (CO_2-e/MWh).

6.2 BIPS 2 EMISSION ESTIMATES

AGL intend to operate the updated BIPS 2 plant for a purpose consistent with that of the DA, with intermittent generation occurring during conditions when the electricity market requires addition supply, including times renewable generation output is reduced and grid demand is high.

Given the transitions currently occurring in the electricity market, significant uncertainties exist in relation to future demand for scheduled generation sources such as BIPS 2. BIPS 2 GHG estimates have been developed to provide an indicative scale of potential emissions from the variation. The estimates have assumed a capacity factor of 18%, being equal to that of BIPS 1 during FY21-FY23. This simplified approach assumes that capacity factor is consistent across all plant sizes, and thus produces larger emission estimates for plants of higher output.

6.2.1 FUEL CONSUMPTION

Table 6.2 provides estimates of annual generator output and fuel consumption with operation of each plant at a capacity factor of 18%. Thermal efficiencies have been referenced from manufacturer specifications. Fuel consumption has been estimated as a function of thermal efficiency and electrical output. In practice, increases in fuel consumption will arise due to variation in plant performance associated with items such as site conditions, plant degradation, and operational factors such as part-load generation as well as fuel consumption associated with startup, shutdown and maintenance and powering of auxiliary equipment. This simplistic approach assumes that electrical loads of significance are powered of the main generator bus, and that other Scope 2 emissions (from imported electricity) are not material to the analysis.

A margin of 10% has been applied to fuel consumption estimates to collectively account for these factors.

TABLE 6-2 ESTIMATE OF GENERATION OUTPUT AND FUEL CONSUMPTION FOR EACH PLANT OPTION

Option ID	Capacity[1] (MW)	Generation (GWh)	Thermal Efficiency (% HHV)	Annual Gas Consumption[2] (TJ)
E1	300	470	34%	5,543
E2	200	320	33%	3,855
F1	280	440	35%	5,012
F2	330	520	35%	5,923
AD	280	440	36%	4,828
RE	250	390	44%	3,543[3]

Notes: [1] Approval is sought for up to 280 MW of generation capacity. Options assessed range up to 330 MW.
[2] Gas consumption incorporates a 10% efficiency penalty to account for operational factors detailed above.
[3] Pilot diesel quantity (~1%) treated as natural gas for the purpose of these estimates.

Emission estimates have been performed using emission factors from government references, including:

- *Australian National Greenhouse Accounts Factors*, 2024 (DECCEEW, 2024)
- *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, 'The NGER Measurement Determination' (AG, 2024).

The NGER Measurement Determination has been referenced for Scope 1 methane emissions for reciprocating engines, noting that this factor is considered the most relevant default factor available. In practice, factors such as specific engine tuning and the use of oxidation catalysts may render this estimate to be conservative.

Table 6-3 provides a summary of the emission factors applied in this analysis.

TABLE 6-3 SUMMARY OF ADOPTED EMISSION FACTORS

Capacity (MW)	GHG Component	Emission Factor by Plant Option (kg CO2-e/GJ)	
		Gas Turbine	Reciprocating Engine
Scope 1	CO_2	51.4*	
	CH_4	0.1*	13.8**
	N_2O	0.03*	
	CO_2-e	51.53	65.23
Scope 3	-	10.6	

Capacity (MW)	GHG Component	Emission Factor by Plant Option (kg CO2-e/GJ)	
		Gas Turbine	Reciprocating Engine
Scope 1 + 3	-	62.13	75.83

Notes: *Source: NGA Factors, **Source NGER (Measurement) Determination factor for 4-stroke lean burn gas engine.

Table 6-4 provides a summary of the emission factors applied to each plant option, the corresponding emission estimates, and operational emission intensities. The estimated operational emission intensity for the RE option aligns with that reported for BIPS 1, which also features reciprocating engines. As outlined in **Section 6.2.1**, these emission intensities include a 10% margin to account for operational factors and auxiliary loads and should be acknowledged when comparing against emission intensities that reflect short-term operation of plant at design conditions.

TABLE 6-4 SUMMARY OF GHG EMISSION ESTIMATES

Plant Option	Emission Scope		
	Scope 1	Scope 3	Scope 1 + 3
Emission Factors (t CO_2-e/TJ)			
E1	51.53	10.6	62.1
E2	51.53	10.6	62.1
F1	51.53	10.6	62.1
F2	51.53	10.6	62.1
AD	51.53	10.6	62.1
RE	65.23	10.6	75.8
Emission Estimates (kt CO_2-e)			
E1	286	59	344
E2	199	41	239
F1	258	53	311
F2	305	63	368
AD	249	51	300
RE	231	38	269
Minimum	***199***	***38***	***239***
Maximum	***305***	***63***	***368***
Operational Emission Intensity (t/MWh)			
E1	0.61	0.13	0.73
E2	0.62	0.13	0.75
F1	0.59	0.12	0.71
F2	0.59	0.12	0.71
AD	0.57	0.12	0.68
RE	0.59	0.10	0.69

Plant Option	Emission Scope		
	Scope 1	Scope 3	Scope 1 + 3
Minimum	***0.57***	***0.10***	***0.68***
Maximum	***0.62***	***0.13***	***0.75***

6.3 SUMMARY

As shown in **Table 6-4**, Scope 1 greenhouse gas emissions have been estimated to range between approximately 200–300 kt CO_2-e per annum, at Scope 1 and Scope 3 emission intensities of 0.6 and 0.7 t/MWh. Operational emission intensity was estimated to be consistent among plant options, with the range in emissions arising from the range of generation outputs of 320-520 GWh per annum, as a result of the variation in plant size among the various plant options.

It is also noted that the various plant options possess varying capabilities to accommodate blending of hydrogen into the fuel mix. Where this hydrogen is produced from renewable energy sources, this practice would offer opportunities to further reduce GHG emissions, both through a reduction in Scope 1 emissions, and avoidance of Scope 3 emissions associated with the extraction, processing and distribution of natural gas.

7. CONCLUSIONS

This assessment has considered potential air quality impacts associated with the proposed variation to the Approved Project. The assessment has used a quantitative dispersion modelling analysis to estimate compliance of operational phase emissions with relevant impact assessment criteria, as prescribed within the Air EPP, resulting in the following key findings:

Nitrogen Dioxide (NO_2)

All predictions are within respective assessment criteria:

- A peak 1-hour sensitive receptor cumulative NO_2 prediction of 126 µg/m³ reported for distillate operation of the reciprocating engine plant option under Plant Scenario 3.

  This concentration equates to 76% of the 164 µg/m³ criterion and is based on continuous operation of BIPS 1 and BIPS 2 on distillate fuel, and TIPS B operating on natural gas, with all plant operating at 100% of available plant load.

  This represents a conservative basis for assessment given the intermittent operation of these facilities and use of natural gas, for which peak prediction was approximately 20 µg/m³ lower, and close to the existing ambient background concentrations.
- Annual average NO_2 predictions are low relative to criterion of 30 µg/m³, with maximum cumulative predictions less than half of the standard despite the assumption of continuous operation.

Particulate Matter

All predictions are compliant with respective assessment criteria:

- A peak 24-hour sensitive receptor PM prediction of 3 µg/m³ was reported for distillate operation of the aeroderivative plant option for Plant Scenario 3. When added to the corresponding background $PM_{2.5}$ concentration, the cumulative prediction is compliant, equating to approximately half of the 25 µg/m³ criterion.

  It is noted that this scenario has been based on continuous operation of BIPS 1 and BIPS 2 on distillate fuel, and TIPS B operating on natural gas, with all plant operating at 100% of available plant load. This provides a conservative basis for assessment given the intermittent operation of these facilities and use of natural gas.
- Annual average $PM_{2.5}$ predictions are low relative to criterion of 8 µg/m³, with the various BIPS 2 plant options contributing a grid maximum of 0.1 µg/m³. Accordingly, the significance of BIPS 2 to annual average $PM_{2.5}$ concentrations is considered negligible. Annual average predictions for Plant Scenario 3 are also low, with maximum sensitive gridded receptor predictions equal to or less than 0.1 µg/m³, and thus complies with assessment criteria when existing background concentration is added.

Formaldehyde and other pollutants

- Formaldehyde predictions are compliant with the Air EPP 3-minute criterion of 44 µg/m³, with BIPS 2 contributing up to 52% of the criterion under natural gas operation. Predictions for all other plant options are an order of magnitude lower.
- Predictions for all other pollutants were low and compliant with respective criteria.

Greenhouse gas emissions

Greenhouse gas emissions were estimated based on manufacturer data and generic assumptions around frequency of operation. Scope 1 greenhouse gas emissions have been estimated to range between approximately 200–300 kt CO_2-e per annum, at Scope 1 and Scope 1+3 emission intensities of 0.6 and 0.7 t/MWh (respectively). Operational emission intensity was estimated to be fairly consistent among plant options, with the range in emissions arising from the range of estimated generation outputs (320-520 GWh per annum) as associated with the varying sizes of plant options that were assessed.

Summary

Collectively, the analysis conducted within this assessment predicts that the proposed changes to the Approved Project will comply with Air EPP criteria and indicates that the potential for the variation to generate adverse air quality impacts is low and manageable through effective operation of the proposed plant.

Should AGL elect to progress the reciprocating engine option, it is recommended that emission performance for oxides of nitrogen and formaldehyde are reviewed to assess consistency of the designed emission performance with the assumptions of this analysis, which has assumed performance equivalent to that of BIPS 1. As constructed, BIPS 1 includes selective catalytic reduction and oxidation catalysts for control of these emissions

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APPENDIX A METEOROLOGICAL DATA PREPARATION

This section provides an overview of the processes involved in development of the meteorological dataset that has been used in the dispersion modelling.

A.1. SELECTION OF REPRESENTATIVE YEAR

A statistical assessment of the previous 5 years of meteorological data has been undertaken to select a representative meteorological year for dispersion modelling. Specifically, the 5-year mean frequency and standard deviation has been calculated for each of 96 wind speed / wind direction combinations (wind data 'bins'). The representativeness of each individual year has then been assessed based on the average variance from the 5-year mean, where a lower average standard deviation is indicative of a meteorological year that is more consistent with the 5-year mean.

Table A-1 presents a summary of this analysis for several BoM locations, Adelaide Airport, Edinburgh RAAF, Parafield Airport and one SA EPA location, Birkenhead AQMS. As shown in these data:

- 2019 and 2022 are identified as least representative years across all sites.
- Best performing years are more varied between the sites, and include 2020, 2021 and 2023, with 2021 being the most prevalent best performing year.

The calendar year 2023 has been selected as a suitably representative year given the general consistency with the 5-year mean, presence in best performing year, whilst also noting that 2020 and 2021 are potentially unsuitable due to the influence of COVID on regional emission profiles, inclusive of restricted international air travel and reduced local transport activity.

TABLE A-1 REVIEW OF ANNUAL VARIABILITY IN WINDS

Calendar Year	Avg. Wind Speed (m/s)	Frequency of Calms (%)	Avg. Standard Deviation From 5-Year Mean	
			All Winds	Top 10% of Winds
Adelaide Airport				
2019	4.87	2.2%	0.84	0.83
2020	4.84	2.1%	0.58 (Best Performing)	0.93
2021	4.84	1.9%	0.60	0.60
2022	4.92	1.6%	1.03 (Worst Performing)	0.96 (Worst Performing)
2023	4.76	2.2%	0.71	0.52 (Best Performing)
Average	**4.84**	**2.0%**	**-**	**-**
Edinburgh RAAF				
2019	4.58	1.4%	0.71	1.02 (Worst Performing)
2020	4.46	1.5%	0.77	0.81
2021	4.44	1.2%	0.66 (Best Performing)	0.55
2022	4.43	1.1%	0.93 (Worst Performing)	0.81
2023	4.29	1.5%	0.76	0.45 (Best Performing)
Average	**4.44**	**1.3%**	**-**	**-**
Parafield Airport				
2019	4.20	4.6%	0.79	0.98 (Worst Performing)
2020	4.19	4.8%	0.75	0.82
2021	4.16	4.4%	0.55 (Best Performing)	0.50 (Best Performing)
2022	4.27	3.4%	1.01 (Worst Performing)	0.78
2023	4.02	3.9%	0.70	0.80
Average	**4.17**	**4.2%**	-	-
Birkenhead AQMS				
2019	3.09	0.6%	0.79 (Worst Performing)	0.82
2020	3.09	0.6%	0.56 (Best Performing)	0.72
2021	3.10	0.7%	0.76	0.51 (Best Performing)
2022	3.07	0.6%	0.78	1.06 (Worst Performing)
2023	3.00	0.6%	0.62	0.58
Average	**3.07**	**0.6%**	**-**	**-**

A.2. WRF-ARW MODEL CONFIGURATION

WRF meteorological modelling has been conducted for 2023. The process of developing the WRF datasets involved a nested approach centred on the location of interest. The resolution and extent of each grid is outlined in **Table A-2**. The WRF prognostic model, incorporated available observational data from surrounding observation stations down to a resolution of 3 km, after which the NDOWN program has been executed to increase the modelled resolution to 1km. The output from the prognostic modelling has been processed through CALWRF to obtain the necessary inputs to provide to the CALMET model.

TABLE A-2 WRF MODELLING PARAMETERS

Grid	Resolution	Extent
1	27 km	2700 km X 2700 km
2	9 km	1080 km X 1080 km
3	3 km	216 km X 216 km

A.2.1 INITIALISATION DATASETS

A WRF meteorological dataset has been developed for the period January 2023 to December 2023 inclusive using data from the European Centre for Medium Weather Forecasts (ECMWF) global reanalysis dataset, known as ERA5. Data from the ERA5 dataset is available for the globe once every 3 hours on a 31 km grid.

The ERA5 dataset provides information both for the surface conditions and 137 mandatory vertical levels. There are over 25 different variables including geopotential height, temperature, relative humidity, wind components, etc.

The ERA5 dataset assimilates a great deal of observational data, including surface pressure, sea level pressure, geopotential height, temperature, sea surface temperature, soil values, ice cover, relative humidity, u and v wind components, vertical motion, vorticity, winds and in-situ data such as moisture from radiosondes and pressure from surface observations. Also included in these datasets are additional precipitation data, profiler data, dropsondes, pilot balloons, aircraft temperatures and winds, land surface and moisture data and cloud drift winds from geostationary satellites. To assist in improving the performance of the WRF simulation, the ERA5 dataset has been provided to the WRF Pre-processing System (WPS) stage to provide WRF with more initial guess data both spatially and temporally at the start of the simulation.

A.2.2 GEOSPATIAL WRF INPUTS FOR THE 36/12 KM GRIDS

WRF geospatial inputs are available from the US NCAR with default sets of static data for terrain, vegetation/land use and soil type. NCAR distributes various resolutions of global terrain and land-use data bases to support WRF simulations. The data bases are:

- 5-minute (about 9.25 km in mid-latitudes);
- 2-minute (about 4.00 km in mid-latitudes);
- 30-sec (about 0.900 km in mid-latitudes); and
- 15-sec (about 0.450 km in mid-latitudes), which is only available for MODIS land use categories.

These data were assigned to ERM’s WRF simulations based on the resolution of the simulation domain.

In addition to the above inputs, finer resolution inputs were derived for land use and terrain using local datasets to provide better representation of land use to the model.

A.2.3 GEOSPATIAL WRF INPUTS FOR FINER GRIDS

The conventional approach among the air quality modelling community is that WRF’s highest resolution simulations are performed at 1 km gridded resolution with terrain and land use datasets at 30 arc seconds (approx. 900 m) resolution.

WRF simulations are not conventionally performed at less than 1 km gridded resolution because of the difficulty in utilizing higher resolution datasets in WRF.

A.2.4 LAND USE AND TERRAIN

For this study, an approach to utilise locally sourced land use at 1 km resolution for grids 2, 3 and 4 (10 km, 3 km and 1 km). Land use inputs to the WRF model were obtained from Australian Collaborative Land Use and Management Program (ACLUMP). These land use datasets were then translated into the MODIS 21 category as required by WRF. For terrain, SRTM data at a resolution of 90 m has been used for grids 2, 3 and 4.

A.2.5 WRF OPTIONS

In addition to the domain-wide characteristics noted above, the following discussion describes the physical schemes available within the WRF system and how they were adapted for use by ERM in the modelling analysis. The WRF model user has the choice of numerous options for running the model and its pre-processors. **Table A-3** provides a listing of the primary options and provides notes including the reasoning behind selecting each option.

TABLE A-3 WRF OPTIONS SELECTED

WRF Treatment	Option Selected	Reason & Notes
Microphysics	Thompson	A new bulk microphysical parameterization (BMP) has been developed for use with WRF. Compared to earlier single-moment BMPs, the new scheme incorporates a large number of improvements to both physical processes and employs numerous techniques found in far more sophisticated spectral/bin schemes using look-up tables. This scheme is a new scheme with ice, snow and graupel processes suitable for high-resolution simulations.
Shortwave & Longwave Radiation	Rapid Radiation Transfer Model (RRTMG)	This a recent version of RRTM with random cloud overlap. RRTMG provides more sophisticated cloud treatment and better suited for climate applications than RRTM (option 1). RRTMG also handles cloud fraction whereas RRTM is 1/0. Based on available guidance, this scheme is considered to be highly accurate and efficient method. This scheme also incorporates the effects of the comprehensive absorption spectrum taking water vapour, carbon dioxide and ozone into account. This scheme handles better cloud interactions with Thompson MP scheme.
Land Surface Model	NOAH	To incorporate the air-soil interaction in the WRF simulation, the Noah Land-Surface Model (LSM) has been chosen. Seasonally varying vegetation and soil type are used in the model to handle evapotranspiration. The LSM model also has the effects such as soil conductivity and gravitational flux of moisture. The land-surface model is capable of predicting soil moisture and temperature in four layers (10, 30, 60 and 100 cm thick), as well as canopy moisture and water-equivalent snow depth.
Planetary Boundary Layer (PBL)	Yonsei University (YSU)	This scheme has the enhanced stable boundary layer diffusion algorithm is also devised that allows deeper mixing in windier conditions. It has the ability to predict & simulates vertical mixing. This scheme also seems to show better performance during stable conditions. This scheme has been used for WRF analyses with resolutions less than 1.33 km grid resolution.

WRF Treatment	Option Selected	Reason & Notes
Cumulus Parameterization	Kain-Fritsch in 36 km, 12 km, 4km	This scheme generally focuses on column moisture, temperature tendencies and surface convective rainfall. It is recommended that cumulus parameterization should not be used at grid sizes < 5-10 km, as the smaller grid size is sufficient to resolve updrafts and downdrafts. Therefore, this scheme has been used for WRF analyses with resolutions less than 4 km grid resolution.
Four-dimensional Data Assimilation (FDDA)	Analysis nudging has been applied to winds, temperature & moisture in the 36 & 12 km domains; Temp & moisture nudging has been turned off within the PBL; Obs-nudging has been used for the 4-km resolution WRF analysis.	FDDA is a method of performing WRF simulations with the full-physics model while blending local observations. By doing so, model equations maintain dynamic consistency while at the same time restraining the model's solutions from deviating too strongly from observations or from a gridded analysis and make up for errors and gaps in the initial analysis and deficiencies in model physics. There are two types of nudging in WRF: • Analysis nudging – gently forces the model solution toward gridded fields and also make use of three-dimensional analyses and surface analyses. • Observation nudging ("obs nudging") - gently forces the model solution toward individual observations, with the influence of the observations spread in space and time.

A.2.6 OBSERVED METEOROLOGICAL DATA

Meteorological observations from both upper air and surface were included in the WRF FDDA simulation. Data from the global dataset, which incorporates all available observations into the WRF run to nudge the model towards the measured value.

Upper Air Observational Weather Data are composed of weather reports from radiosondes, pibals and aircraft reports from the Global Telecommunications System (GTS) and satellite data from the National Environmental Satellite Data and Information Service. This dataset includes pressure, geopotential height, air temperature, dew point temperature, wind direction and speed. Data may be available at up to 20 mandatory levels from 1000 hPa to 1 hPa, plus a few significant levels. Report intervals range from hourly to every twelve hours.

Surface meteorological data include variables like pressure, air temperature, dew point temperature, wind direction and speed at the ground level. Report intervals range from hourly to every three hours.

A.3. METEOROLOGICAL MODEL PERFORMANCE EVALUATION

An evaluation of the model diagnosis has been conducted to assess the suitability of the meteorological fields used for the dispersion modelling. The WRF inner-most domain (3km resolution) meteorological fields were processed with the CALWRF tool obtaining the m3d files that were later used as the input to implement CALMET in prognostic mode. The meteorological model evaluation shown in this section was performed using the CALMET processed meteorology. The PRTMET tool was used to extract the meteorological parameters at two locations within the modelling domain where observed meteorological information is available. These sites are the Parafield Airport BoM AWS and the SA EPA La Fevre AQMS.

Table A-4 shows the statistical metrics calculated at the two evaluated sites. For the Parafield Airport BoM AWS wind speed and direction, and temperature were evaluated, while for the SA EPA La Fevre AQMS only wind speed and direction were available to perform the comparison against modelling results.

Table A-4 also contains the recommended benchmarks for each meteorological parameter. At the La Fevre site, the model showed a better performance when it came to reproduce the observed wind speeds compared to the Parafield Airport station. At both sites all the calculated wind field metrics were below the benchmark's suggested values indicating that the CALMET model reproduced observed values accurately and that the fields are suitable to conduct dispersion modelling.

TABLE A-4 COMPARISON OF STATISTICAL METRICS AGAINST RECOMMENDED BENCHMARKS FOR MODEL PERFORMANCE

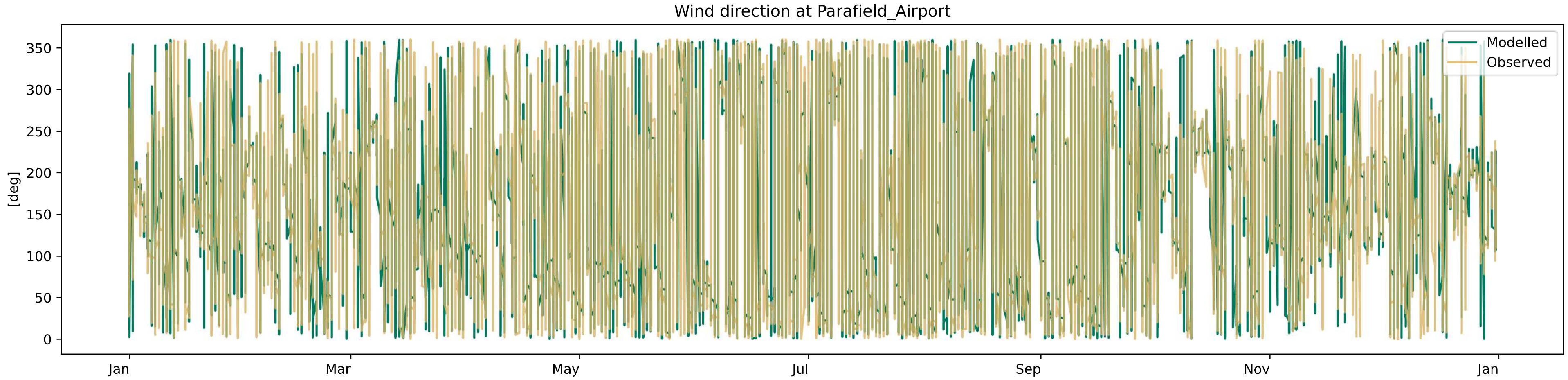
Variable	Metric	Station	Calculated Value	Benchmark	Unit
Wind speed	RMSE	Parafield	1.89	≤2.5	m s^{-1}
		La Fevre	1.03		
	IOA	Parafield	0.88	≥0.6	unitless
		La Fevre	0.99		
	BIAS	Parafield	-1.22	≤±1.5	m s^{-1}
		La Fevre	0.23		
Wind direction	GE	Parafield	2.75	≤55	Deg
		La Fevre	3.34		
	BIAS	Parafield	2.75	≤±10	Deg
		La Fevre	3.34		
Temperature	GE	Parafield	0.58	≤3.5	K
		La Fevre	N/D		
	IOA	Parafield	0.99	≥0.8	unitless
		La Fevre	N/D		
	BIAS	Parafield	-0.58	≤±2	K
		La Fevre	N/D		

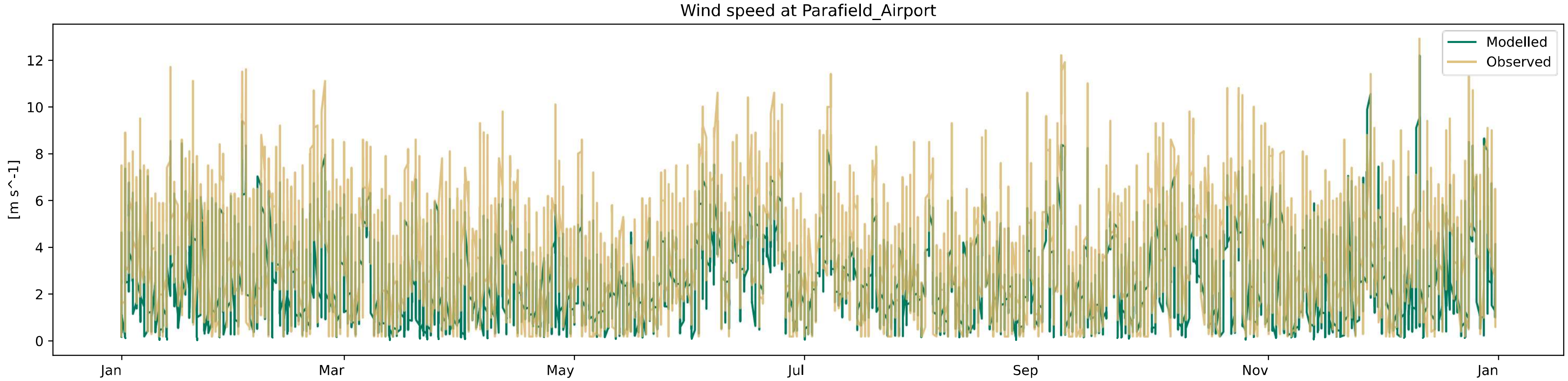
Notes: RMSE: Root Mean Square Error, IOA: Index of Agreement, GE: Gross Error, BIAS: Mean Fractional Bias, N/D: Not observations data available for comparison

Figure A-1 includes the time series of the modelled and observed wind speed, wind direction, and temperature for 2023 at the Parafield airport station. The time series shows that the model has replicated key variations in meteorological fields throughout the year for the three evaluated parameters. In the case of wind speed the modelled values are low biased with model estimates being ~2 m/s lower than the observed values. This is evidenced by the mean fractional bias calculated value of -1.22 m/s at the site. This is expected to be due to the variation in wind instrumentation combined with reduced surface roughness at airport locations which conventionally results in higher wind speed measurements at airport sites.

Regarding modelled temperatures, a small negative bias can be seen in the time series. Particularly, on the first half of the year. However, the model captured the annual temperature fluctuation accurately.

FIGURE A-1 2023 TIME SERIES COMPARISON - PARAFIELD AIRPORT





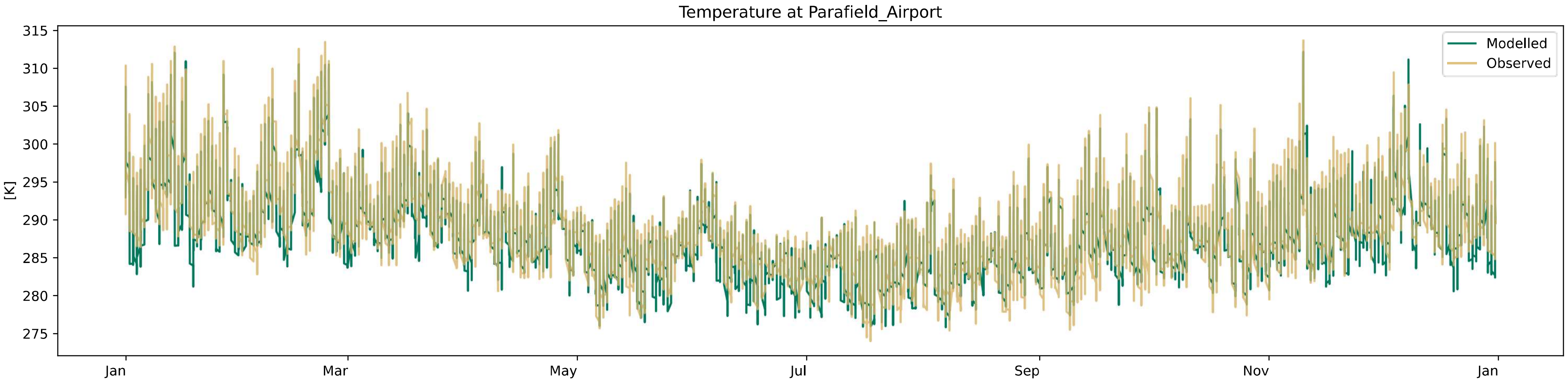
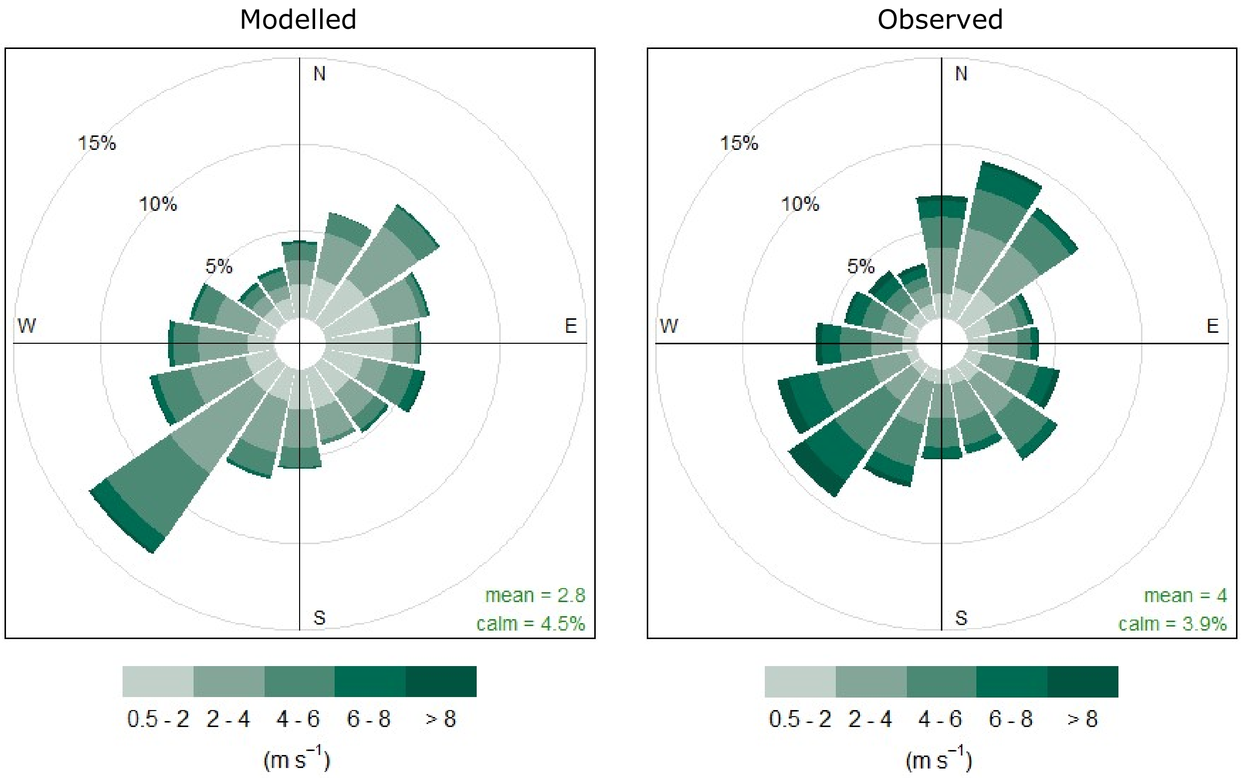

Temperature at Parafield_Airport
Modelled
Observed
[K]
315
310
305
300
295
290
285
280
275
Jan
Mar
May
Jul
Sep
Nov
Jan

Figure A-2 presents wind roses for the at the Parafield Airport Station. These generally align, albeit as described previously, modelled wind speeds were lower than the observed values.

Average annual modelled wind speed values were 2.8 m/s, while the 2023 annual average wind speed was 4 m/s. Regardless of this discrepancy, the modelled values reproduced the predominant South-west winds observed, and the model also captured the North-east winds although with lower frequencies.

FIGURE A-2 COMPARISON OF ANNUAL WIND DISTRIBUTION - PARAFIELD AIRPORT



The modelled and observed wind direction and speed 2023 hourly time series at La Fevre station are shown in **Figure A-3**. At this site, the modelled values also reproduced the observed trend throughout the year. In this site, the model was positively biased for wind speed values as opposed to the modelled values at the Parafield Airport station. The positive bias at La Febre station was consistent throughout the entire modelled year, with most of the differences between modelled and observed values being less than 1.5 m/s.

FIGURE A-3 2023 TIME SERIES COMPARISON – LE FEVRE AQMS

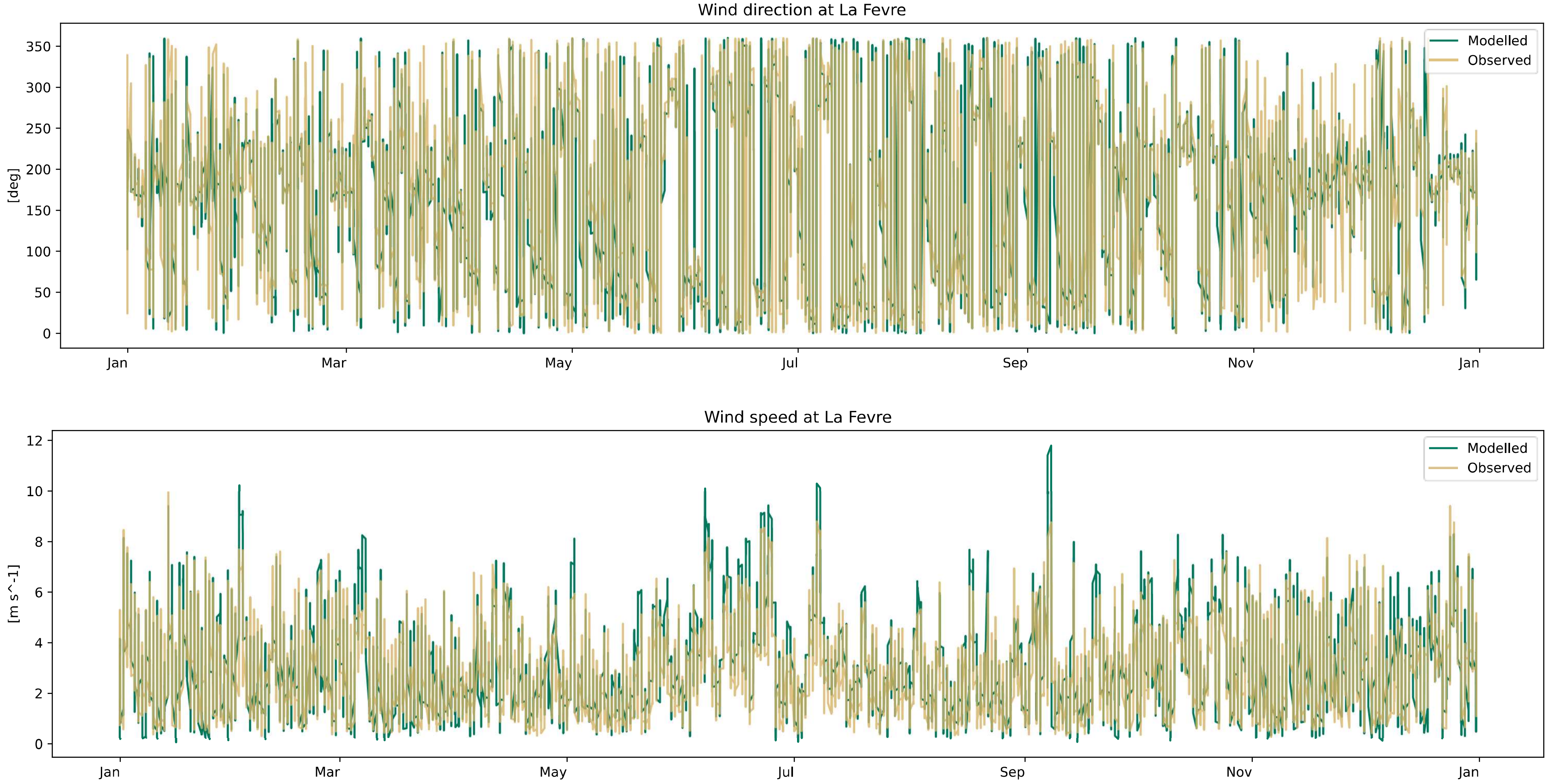
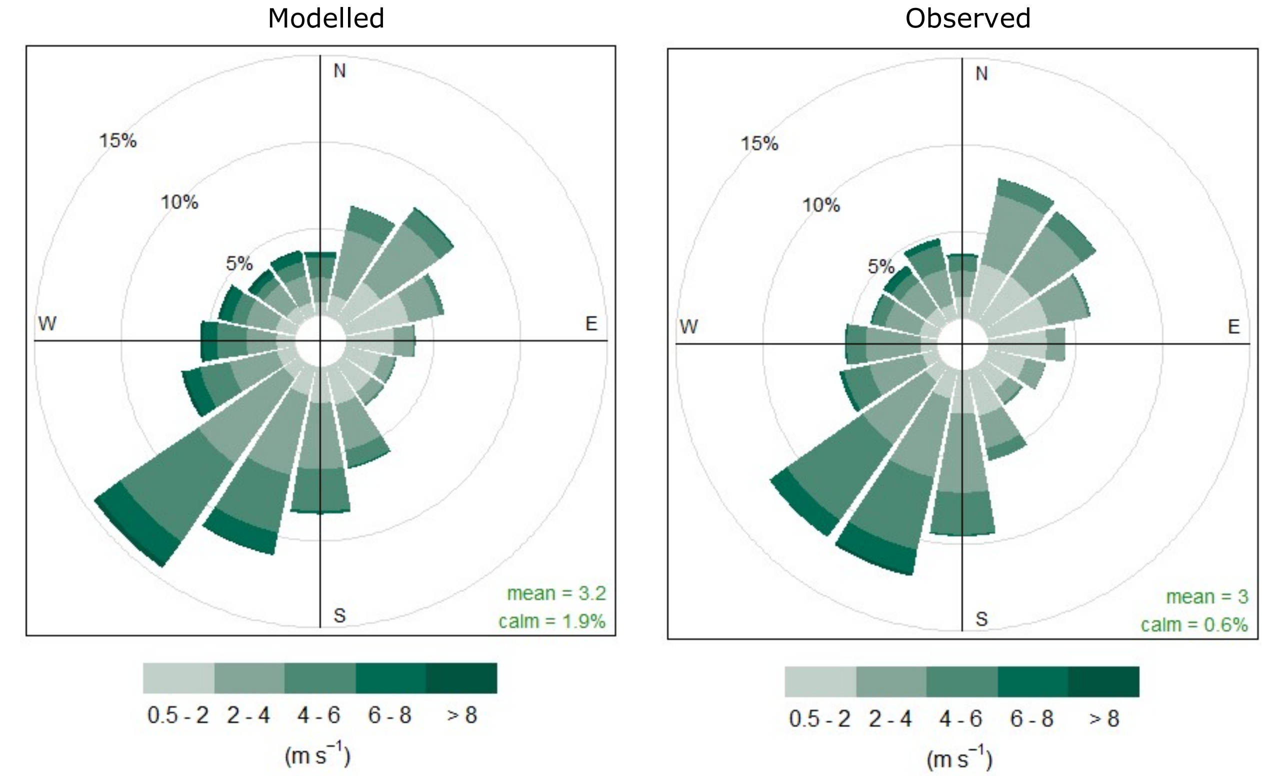


Figure A-4 presents modelled and observed wind roses for the La Fevre Station. As consistent with the Parafield predictions, the La Fevre model captures the predominant South-west wind direction as well as the North-east winds. At La Fevre, the modelled average wind speed of 3.2 m/s, is close to the observed average value of 3.0 m/s.

FIGURE A-4 ANNUAL DISTRIBUTION OF WINDS AT THE LA FEVRE STATION



A.4. CALMET CONFIGURATION

CALMET is a meteorological pre-processor that provides the meteorological inputs required to run the CALPUFF dispersion model (Exponent, 2011). CALMET creates a three-dimensional meteorological field and includes a wind field generator that considers slope flows, terrain effects and terrain blocking effects. CALMET produces fields of wind components, air temperature, relative humidity, mixing height and other micro-meteorological variables for each hour of the modelling period.

CALMET was configured with reference to the NSW EPA guidelines, entitled: "Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia'.

Key parameters used in the CALMET configuration include:

- Domain of 121 x 121 grid cells at 0.25 m spacing. The grid origin is at an Easting of 259.875 m and Northing of 6129.875 m (UTM zone 54 S);
- No-obs mode driven by meteorological data generated by prognostic model WRF used as the initial guess field;
- Froude number adjustments and slope flow effects;
- Gridded cloud cover from prognostic relative humidity at 850mb; and
- Radius of influence of terrain features of 2 km.

A.5. ADDITIONAL WIND ROSES

FIGURE A-5 ANNUAL AND SEASONAL WIND ROSES - BOM ADELAIDE AIRPORT 2019

FIGURE A-6 ANNUAL AND SEASONAL WIND ROSES - BOM ADELAIDE AIRPORT 2020

FIGURE A-7 ANNUAL AND SEASONAL WIND ROSES - BOM ADELAIDE AIRPORT 2021

FIGURE A-8 ANNUAL AND SEASONAL WIND ROSES - BOM ADELAIDE AIRPORT 2022

FIGURE A-9 ANNUAL AND SEASONAL WIND ROSES - BOM ADELAIDE AIRPORT 2023

FIGURE A-10 ANNUAL AND SEASONAL WIND ROSES - BOM EDINBURGH RAAF 2019

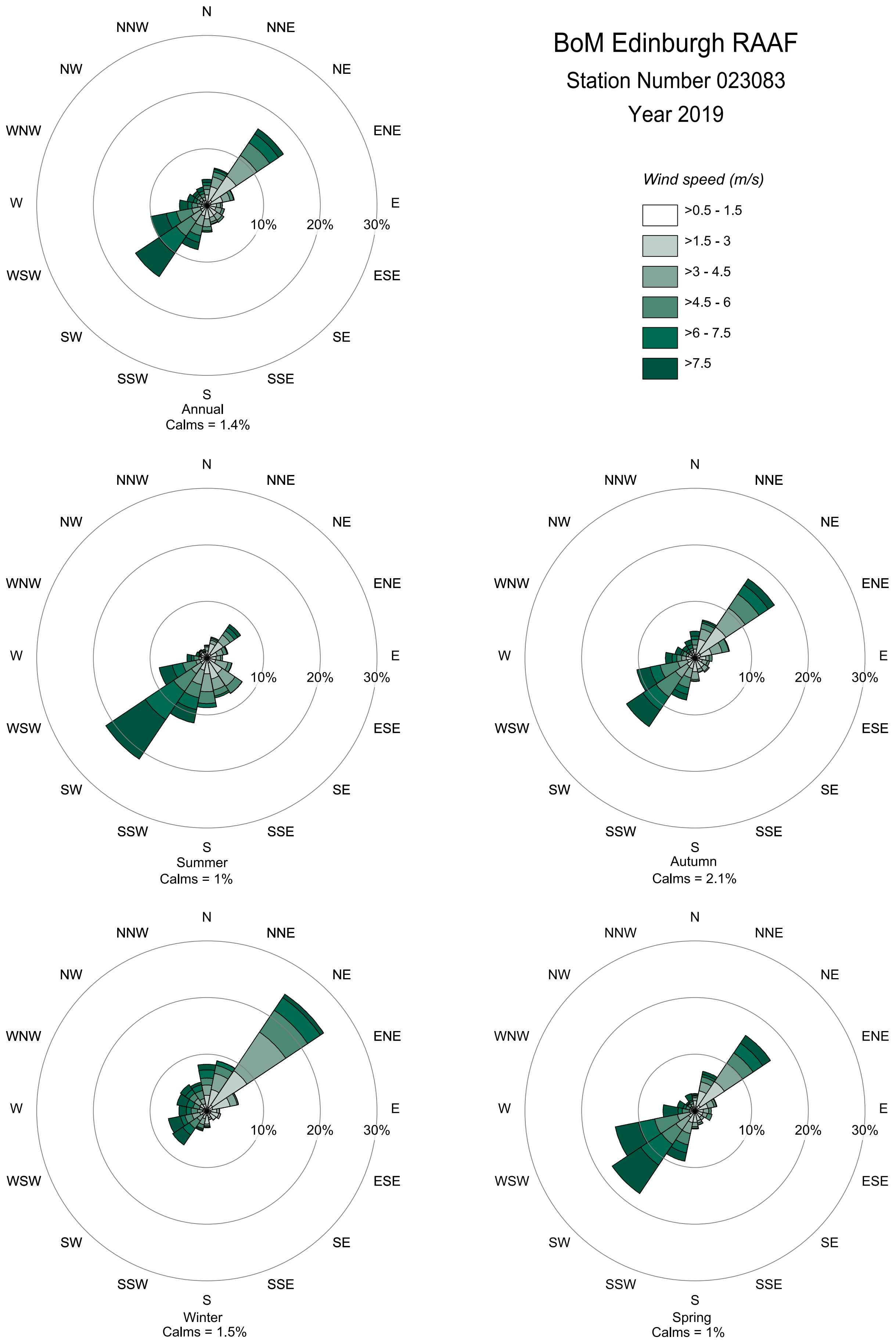


FIGURE A-11 ANNUAL AND SEASONAL WIND ROSES - BOM EDINBURGH RAAF 2020

FIGURE A-12 ANNUAL AND SEASONAL WIND ROSES - BOM EDINBURGH RAAF 2021

FIGURE A-13 ANNUAL AND SEASONAL WIND ROSES - BOM EDINBURGH RAAF 2022

FIGURE A-14 ANNUAL AND SEASONAL WIND ROSES - BOM EDINBURGH RAAF 2023

FIGURE A-15 ANNUAL AND SEASONAL WIND ROSES – PARAFIELD AIRPORT 2019

FIGURE A-16 ANNUAL AND SEASONAL WIND ROSES – PARAFIELD AIRPORT 2020

FIGURE A-17 ANNUAL AND SEASONAL WIND ROSES – PARAFIELD AIRPORT 2021

FIGURE A-18 ANNUAL AND SEASONAL WIND ROSES – PARAFIELD AIRPORT 2022

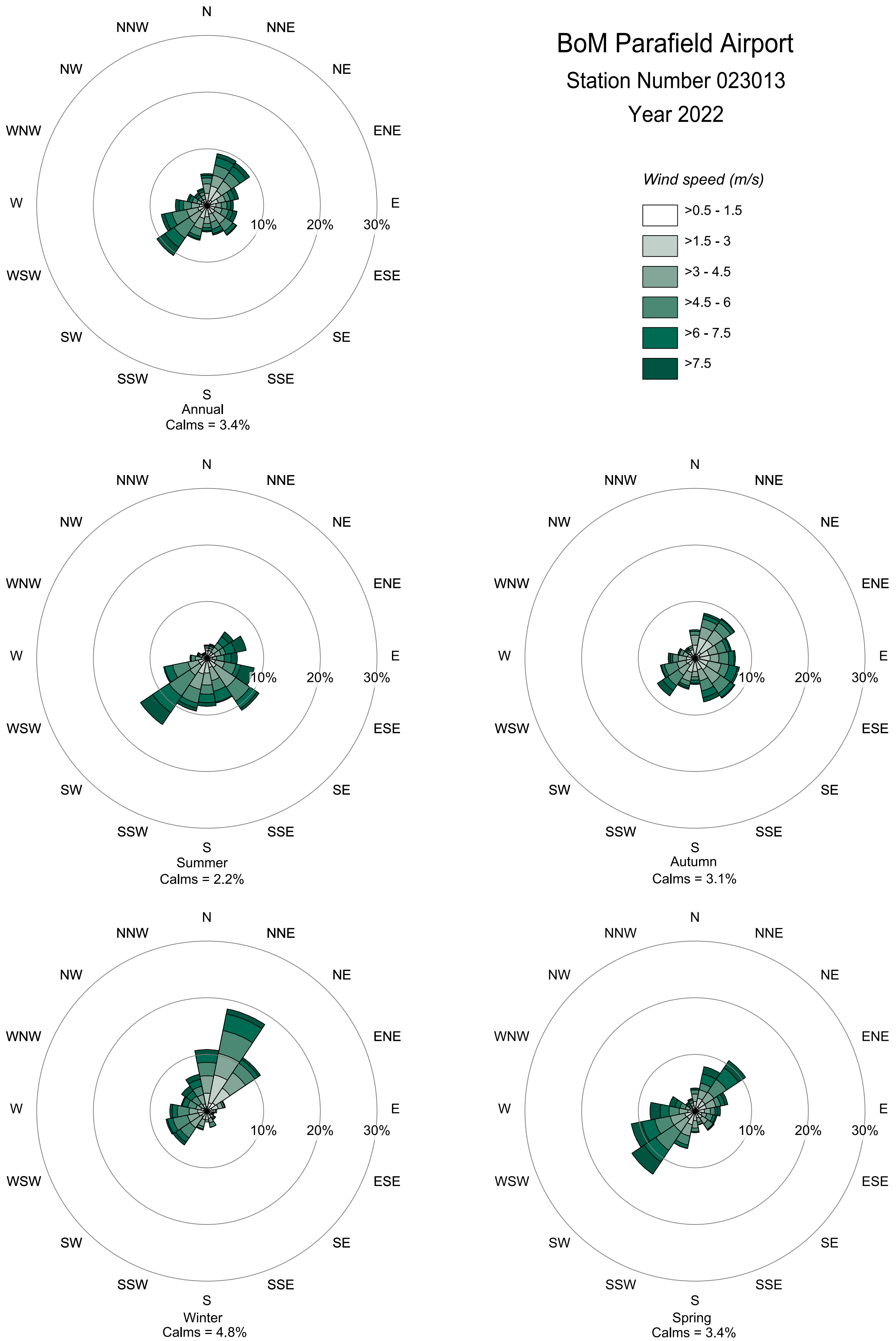


FIGURE A-19 ANNUAL AND SEASONAL WIND ROSES – PARAFIELD AIRPORT 2023

ERM

APPENDIX B ADDITIONAL RESULTS TABLES

- TABLE B-1 – B3: MAXIMUM 1-HOUR AVERAGE INCREMENTAL CO
- TABLE B-4 – B6: MAXIMUM 8-HOUR AVERAGE INCREMENTAL CO
- TABLE B-7 – B9: MAXIMUM 1-HOUR AVERAGE INCREMENTAL SO_2
- TABLE B-10 – B12: MAXIMUM 24-HOUR AVERAGE INCREMENTAL SO_2
- TABLE B-13 – B15: MAXIMUM 3-MINUTE AVERAGE INCREMENTAL BENZENE
- TABLE B-16 – B18: ANNUAL AVERAGE INCREMENTAL BENZENE
- TABLE B-19 – B21: MAXIMUM 3-MINUTE AVERAGE INCREMENTAL PAH
- TABLE B-22 – B24: ANNUAL AVERAGE INCREMENTAL PAH

TABLE B-1 MAXIMUM 1-HOUR AVERAGE CO PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	4	5	7	8	2	2	16	16	16	8	59	11	**59**
R02	7	7	5	6	2	2	18	18	25	12	62	10	**62**
R03	6	6	9	9	3	3	16	16	22	14	42	7	**42**
R04	8	8	8	9	3	3	24	25	26	13	119	21	**119**
R05	2	2	3	3	1	1	9	9	11	5	40	7	**40**
R06	6	6	10	10	4	5	16	16	19	10	111	19	**111**
R07	4	4	6	6	2	2	20	20	17	8	96	18	**96**
R08	2	2	4	4	2	2	15	15	8	4	38	7	**38**
R09	12	12	25	26	8	8	46	47	33	16	113	29	**113**
R10	7	7	8	9	3	3	19	20	29	15	40	7	**40**
R11	6	6	8	8	3	3	16	17	19	10	65	11	**65**
R12	4	4	7	8	5	5	12	12	43	20	39	7	**43**
R13	4	4	5	6	2	2	19	19	37	18	124	21	**124**
R14	6	6	11	12	5	5	48	48	28	14	98	18	**98**
R15	7	7	11	12	3	3	24	24	22	13	122	19	**122**
R16	3	3	6	6	2	2	24	24	19	8	32	6	**32**
Maximum by Receptor Type													
Discrete	12	12	25	26	8	8	48	48	43	20	124	29	**124**
Gridded	53	53	82	89	29	29	86	87	137	67	591	105	**591**
Assessment Against Criterion													
Maximum 1-hour Background													309
Maximum Cumulative													900
Criterion													***31,240***

TABLE B-2 MAXIMUM 1-HOUR AVERAGE CO PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	5	5	7	8	2	2	16	16	16	8	60	12	**60**
R02	7	7	6	6	3	2	18	18	25	12	62	10	**62**
R03	8	7	11	11	4	4	16	16	22	14	43	7	**43**
R04	9	9	9	9	3	3	24	25	26	13	119	21	**119**
R05	3	3	4	4	2	2	9	9	11	5	40	8	**40**
R06	7	7	11	12	6	6	16	16	19	10	111	19	**111**
R07	4	4	6	6	2	2	20	20	17	8	96	18	**96**
R08	2	2	4	4	2	2	15	15	8	4	38	7	**38**
R09	13	13	26	27	8	8	47	47	33	16	113	29	**113**
R10	9	9	10	11	3	3	20	20	29	15	42	8	**42**
R11	6	6	8	9	3	3	17	17	20	10	65	11	**65**
R12	5	4	7	8	5	5	13	13	44	20	40	7	**44**
R13	5	5	6	6	3	3	19	19	37	18	125	22	**125**
R14	8	8	13	13	7	6	48	48	28	14	98	19	**98**
R15	9	8	12	13	3	3	24	24	22	14	122	19	**122**
R16	4	4	7	7	4	3	24	24	19	8	33	6	**33**
Maximum by Receptor Type													
Discrete	13	13	26	27	8	8	48	48	44	20	125	29	**125**
Gridded	65	61	92	97	47	43	87	88	138	67	591	105	**591**
Assessment Against Criterion													
Maximum 1-hour Background													309
Maximum Cumulative													900
Criterion													***31,240***

TABLE B-3 MAXIMUM 1-HOUR AVERAGE CO PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	6	6	9	9	4	4	16	16	16	8	60	12	**60**
R02	7	7	7	7	4	4	18	18	25	12	62	10	**62**
R03	9	9	12	13	6	6	16	16	23	15	43	8	**43**
R04	9	9	10	11	4	4	24	25	26	13	119	21	**119**
R05	3	3	4	4	2	2	9	9	11	5	40	8	**40**
R06	8	8	13	13	7	7	16	16	19	10	111	19	**111**
R07	4	4	6	7	3	3	20	20	17	8	96	18	**96**
R08	3	3	4	5	3	3	15	15	8	4	38	7	**38**
R09	18	17	30	31	12	12	50	51	36	20	113	29	**113**
R10	9	9	10	11	4	4	20	20	29	15	42	9	**42**
R11	7	7	9	10	4	4	18	18	21	11	65	11	**65**
R12	6	6	7	8	5	5	13	13	44	20	40	7	**44**
R13	7	7	7	7	4	4	19	19	37	18	125	22	**125**
R14	9	9	14	14	8	8	48	48	28	14	98	19	**98**
R15	9	9	13	14	5	5	24	24	22	14	122	19	**122**
R16	4	4	7	7	4	3	25	25	19	8	33	6	**33**
Maximum by Receptor Type													
Discrete	18	17	30	31	12	12	50	51	44	20	125	29	**125**
Gridded	68	66	98	102	47	43	91	91	138	67	591	105	**591**
Assessment Against Criterion													
Maximum 1-hour Background													309
Maximum Cumulative													900
Criterion													***31,240***

TABLE B-4 MAXIMUM 8-HOUR AVERAGE CO PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	1	1	1	2	1	1	5	5	7	3	26	4	**26**
R02	1	1	2	2	1	1	7	7	6	3	16	3	**16**
R03	2	2	3	3	1	1	4	4	4	2	16	3	**16**
R04	1	1	2	2	1	1	6	6	10	5	40	7	**40**
R05	1	1	1	2	1	1	3	3	2	1	10	2	**10**
R06	1	1	2	2	1	1	6	6	6	3	28	5	**28**
R07	1	1	2	2	1	1	4	4	4	2	17	3	**17**
R08	1	1	1	1	1	1	6	6	2	1	9	2	**9**
R09	4	4	6	6	3	3	17	17	13	6	37	8	**37**
R10	3	3	4	4	1	1	4	4	9	4	19	3	**19**
R11	2	2	3	3	1	1	5	5	6	3	12	2	**12**
R12	1	1	2	2	1	1	5	5	10	5	12	2	**12**
R13	1	1	2	2	1	1	5	5	7	4	44	8	**44**
R14	1	1	1	2	1	1	12	12	8	4	23	4	**23**
R15	1	1	3	3	1	1	8	8	10	6	34	6	**34**
R16	1	1	2	2	1	1	5	5	4	2	12	2	**12**
Maximum by Receptor Type													
Discrete	4	4	6	6	3	3	17	17	13	6	44	8	**44**
Gridded	22	22	34	36	14	14	29	29	23	11	89	15	**89**
Assessment Against Criterion													
Maximum 1-hour Background													123
Maximum Cumulative													212
Criterion													***11,250***

TABLE B-5 MAXIMUM 8-HOUR AVERAGE CO PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	1	1	2	2	1	1	5	5	7	4	26	5	**26**
R02	1	1	2	2	1	1	7	7	6	3	16	3	**16**
R03	3	2	3	3	2	1	4	4	5	2	16	3	**16**
R04	2	2	3	3	1	1	6	6	10	5	40	7	**40**
R05	1	1	2	2	1	1	3	3	3	1	10	2	**10**
R06	1	1	2	2	1	1	6	6	6	3	28	5	**28**
R07	1	1	2	2	1	1	4	4	4	2	17	3	**17**
R08	1	1	1	1	1	1	6	6	2	1	10	2	**10**
R09	4	4	6	6	3	3	17	17	14	7	37	8	**37**
R10	4	4	5	5	2	2	4	4	9	4	19	3	**19**
R11	2	2	3	3	2	2	6	6	6	3	12	2	**12**
R12	1	1	2	2	1	1	5	5	10	5	12	2	**12**
R13	2	2	3	3	1	1	5	5	7	4	44	8	**44**
R14	1	1	2	2	1	1	12	12	8	4	23	4	**23**
R15	2	2	3	3	2	2	9	9	10	6	34	6	**34**
R16	1	1	2	2	1	1	6	6	4	2	12	2	**12**
Maximum by Receptor Type													
Discrete	4	4	6	6	3	3	17	17	14	7	44	8	**44**
Gridded	33	31	46	45	27	24	29	29	25	15	89	16	**89**
Assessment Against Criterion													
Maximum 1-hour Background													123
Maximum Cumulative													212
Criterion													***11,250***

TABLE B-6 MAXIMUM 8-HOUR AVERAGE CO PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	1	1	2	2	1	1	5	5	7	4	26	5	**26**
R02	2	2	2	2	1	1	7	7	6	3	16	3	**16**
R03	3	3	4	4	2	2	5	5	5	3	16	4	**16**
R04	2	2	3	3	1	1	6	6	10	5	40	7	**40**
R05	2	2	2	2	1	1	3	3	3	2	10	2	**10**
R06	2	2	2	2	1	1	6	6	6	3	28	5	**28**
R07	1	1	2	2	1	1	4	5	4	2	17	3	**17**
R08	1	1	2	2	1	1	6	6	2	1	10	2	**10**
R09	5	5	7	7	4	4	18	19	15	8	37	8	**37**
R10	5	5	6	6	3	3	4	4	9	4	19	4	**19**
R11	3	3	4	4	2	2	6	6	6	4	12	2	**12**
R12	2	2	2	2	2	2	5	5	10	5	12	2	**12**
R13	2	2	3	3	2	2	6	6	7	4	44	8	**44**
R14	2	2	2	2	1	1	12	12	8	4	23	4	**23**
R15	3	3	4	4	2	2	9	9	10	6	34	6	**34**
R16	2	2	2	2	1	1	6	6	4	2	12	2	**12**
Maximum by Receptor Type													
Discrete	5	5	7	7	4	4	18	19	15	8	44	8	**44**
Gridded	35	32	47	47	28	25	31	31	29	17	89	18	**89**
Assessment Against Criterion													
Maximum 1-hour Background													123
Maximum Cumulative													212
Criterion													***11,250***

TABLE B-7 MAXIMUM 1-HOUR AVERAGE SO_2 PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
R02	1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
R03	1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
R04	1	<1	<1	<1	<1	<1	1	<1	1	<1	2	<1	**2**
R05	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	<1	**1**
R06	1	<1	<1	<1	<1	<1	1	<1	1	<1	2	<1	**2**
R07	<1	<1	<1	<1	<1	<1	1	<1	1	<1	2	<1	**2**
R08	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	1	<1	**1**
R09	1	<1	1	<1	1	<1	2	<1	2	<1	2	1	**2**
R10	1	<1	<1	<1	<1	<1	1	<1	2	<1	1	<1	**2**
R11	1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
R12	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	1	<1	**2**
R13	<1	<1	<1	<1	<1	<1	1	<1	2	<1	2	<1	**2**
R14	1	<1	<1	<1	<1	<1	2	<1	1	<1	2	<1	**2**
R15	1	<1	<1	<1	<1	<1	1	<1	1	<1	2	<1	**2**
R16	<1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
Maximum by Receptor Type													
Discrete	1	<1	1	<1	1	<1	2	<1	2	<1	2	1	**2**
Gridded	5	1	3	<1	3	<1	3	<1	7	1	10	2	**10**
Assessment Against Criterion													
Maximum 1-hour Background													14
Maximum Cumulative													24
Criterion													***290***

TABLE B-8 MAXIMUM 1-HOUR AVERAGE SO_2 PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
R02	1	<1	1	<1	1	<1	1	<1	1	<1	1	<1	**1**
R03	1	<1	1	<1	1	<1	1	<1	1	<1	1	<1	**1**
R04	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R05	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	<1	**1**
R06	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R07	<1	<1	<1	<1	<1	<1	1	<1	1	<1	2	<1	**2**
R08	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	1	<1	**1**
R09	1	<1	1	<1	1	<1	2	<1	2	<1	2	1	**2**
R10	1	<1	1	<1	<1	<1	1	<1	2	<1	1	<1	**2**
R11	1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
R12	1	<1	<1	<1	<1	<1	<1	<1	2	<1	1	<1	**2**
R13	1	<1	<1	<1	<1	<1	1	<1	2	<1	2	<1	**2**
R14	1	<1	1	<1	1	<1	2	<1	1	<1	2	<1	**2**
R15	1	<1	1	<1	<1	<1	1	<1	1	<1	2	<1	**2**
R16	1	<1	1	<1	1	<1	1	<1	1	<1	1	<1	**1**
Maximum by Receptor Type													
Discrete	1	<1	1	<1	1	<1	2	<1	2	<1	2	1	**2**
Gridded	8	1	7	1	7	1	7	1	8	1	10	2	**10**
Assessment Against Criterion													
Maximum 1-hour Background													14
Maximum Cumulative													24
Criterion													***290***

TABLE B-9 MAXIMUM 1-HOUR AVERAGE SO_2 PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
R02	1	<1	1	<1	1	<1	1	<1	1	<1	1	<1	**1**
R03	1	<1	1	<1	1	<1	1	<1	1	<1	1	<1	**1**
R04	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R05	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	<1	**1**
R06	1	<1	1	<1	1	<1	1	<1	1	<1	2	<1	**2**
R07	<1	<1	<1	<1	<1	<1	1	<1	1	<1	2	<1	**2**
R08	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	1	<1	**1**
R09	1	<1	1	<1	1	<1	2	<1	2	<1	2	1	**2**
R10	1	<1	1	<1	<1	<1	1	<1	2	<1	1	<1	**2**
R11	1	<1	<1	<1	<1	<1	1	<1	1	<1	1	<1	**1**
R12	1	<1	<1	<1	<1	<1	1	<1	2	<1	1	<1	**2**
R13	1	<1	<1	<1	<1	<1	1	<1	2	<1	2	<1	**2**
R14	1	<1	1	<1	1	<1	2	<1	1	<1	2	<1	**2**
R15	1	<1	1	<1	<1	<1	1	<1	1	<1	2	<1	**2**
R16	1	<1	1	<1	1	<1	1	<1	1	<1	1	<1	**1**
Maximum by Receptor Type													
Discrete	1	<1	1	<1	1	<1	2	<1	2	<1	2	1	**2**
Gridded	8	1	7	1	7	1	7	1	8	1	10	2	**10**
Assessment Against Criterion													
Maximum 1-hour Background													14
Maximum Cumulative													24
Criterion													***290***

TABLE B-10 MAXIMUM 24-HOUR AVERAGE SO_2 PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <1												**All <1**
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <1												**<1**
Gridded	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**
Assessment Against Criterion													
Maximum 1-hour Background													9
Maximum Cumulative													10
Criterion													***60***

TABLE B-11 MAXIMUM 24-HOUR AVERAGE SO_2 PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (μg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <1												**All <1**
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <1												**<1**
Gridded	2	<1	2	<1	2	<1	2	<1	2	<1	2	<1	**2**
Assessment Against Criterion													
Maximum 1-hour Background													9
Maximum Cumulative													11
Criterion													***60***

TABLE B-12 MAXIMUM 24-HOUR AVERAGE SO_2 PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <1												**All <1**
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <1												**<1**
Gridded	2	<1	2	<1	2	<1	2	<1	2	<1	2	<1	**2**
Assessment Against Criterion													
Maximum 1-hour Background													9
Maximum Cumulative													11
Criterion													***60***

TABLE B-13 MAXIMUM 3-MINUTE AVERAGE BENZENE PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R02	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R03	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R04	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R05	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R06	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R09	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R11	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R12	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R13	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R14	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R15	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R16	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
Maximum by Receptor Type													
Discrete	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
Gridded	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	3	**3**
Criterion													***58***
Max. % of Criterion	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	3%	5%	**5%**

TABLE B-14 MAXIMUM 3-MINUTE AVERAGE BENZENE PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (µg/m³)

Receptor	**E1**		**E2**		**F1**		**F2**		**AD**		**RE**		**Max. All Scenarios**
	NG	**DO**	**NG**	**DO**	**NG**	**DO**	**NG**	**DO**	**NG**	**DO**	**NG**	**DO**	
R01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R02	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R03	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R04	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R05	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R06	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R09	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R11	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R12	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R13	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R14	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R15	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R16	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
Maximum by Receptor Type													
Discrete	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
Gridded	4	2	4	2	4	2	4	2	4	2	4	3	**4**
Criterion													***58***
Max. % of Criterion	6%	3%	6%	3%	6%	3%	6%	3%	6%	3%	7%	5%	**7%**

TABLE B-15 MAXIMUM 3-MINUTE AVERAGE BENZENE PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R02	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R03	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R04	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R05	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R06	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R07	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R08	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R09	1	<1	1	<1	1	<1	1	<1	1	<1	1	1	**1**
R10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R11	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R12	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
R13	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R14	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R15	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	**1**
R16	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
Maximum by Receptor Type													
Discrete	1	<1	1	<1	1	<1	1	<1	1	<1	1	1	**1**
Gridded	4	2	4	2	4	2	4	2	4	2	4	3	**4**
Criterion													***58***
Max. % of Criterion	6%	3%	6%	3%	6%	3%	6%	3%	6%	3%	7%	5%	**7%**

TABLE B-16 ANNUAL AVERAGE BENZENE PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <0.1												**All <0.1**
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <0.1												**<0.1**
Gridded	All <0.1												**<0.1**
Criterion													***10***
Max. % of Criterion	All <1%												**<1%**

TABLE B-17 ANNUAL AVERAGE BENZENE PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (μg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <0.1												**All <0.1**
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <0.1												**<0.1**
Gridded	All <0.1												**<0.1**
Criterion													***10***
Max. % of Criterion	All <1%												**<1%**

TABLE B-18 ANNUAL AVERAGE BENZENE PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (μg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <0.1												**All <0.1**
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <0.1												**<0.1**
Gridded	All <0.1												**<0.1**
Criterion													***10***
Max. % of Criterion	All <1%												**<1%**

TABLE B-19 MAXIMUM 3-MINUTE AVERAGE PAH PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (μg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <0.01												All <0.01
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <0.01												**<0.01**
Gridded	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	**0.01**
Criterion													***0.8***
Max. % of Criterion	<1%	1%	<1%	1%	<1%	1%	<1%	1%	<1%	2%	<1%	<1%	**2%**

Note: All predictions prepared on a Benzo(a)Pyrene Toxic Equivalency Quotient (B[a]P TEQ) basis.

TABLE B-20 MAXIMUM 3-MINUTE AVERAGE PAH PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (μg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <0.01												**All <0.01**
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <0.01												**<0.01**
Gridded	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	**0.01**
Criterion													***0.8***
Max. % of Criterion	<1%	1%	<1%	1%	<1%	1%	<1%	1%	<1%	2%	<1%	1%	**2%**

Note: All predictions prepared on a Benzo(a)Pyrene Toxic Equivalency Quotient (B[a]P TEQ) basis.

TABLE B-21 MAXIMUM 3-MINUTE AVERAGE PAH PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (μg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	All <0.01												**All <0.01**
R02													
R03													
R04													
R05													
R06													
R07													
R08													
R09													
R10													
R11													
R12													
R13													
R14													
R15													
R16													
Maximum by Receptor Type													
Discrete	All <0.01												**<0.01**
Gridded	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	**0.01**
Criterion													***0.8***
Max. % of Criterion	<1%	1%	<1%	1%	<1%	1%	<1%	1%	<1%	2%	<1%	1%	**2%**

Note: All predictions prepared on a Benzo(a)Pyrene Toxic Equivalency Quotient (B[a]P TEQ) basis.

TABLE B-22 ANNUAL AVERAGE PAH PREDICTIONS – PLANT SCENARIO 1 (BIPS 2) (μg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R02	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R03	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R04	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R05	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	**<0.00001**
R06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	**<0.00001**
R08	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	**<0.00001**
R09	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R10	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R11	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R12	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R13	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R14	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R15	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
R16	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
Maximum by Receptor Type													
Discrete	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	**0.00001**
Gridded	0.00001	0.00003	<0.00001	0.00002	<0.00001	0.00001	<0.00001	0.00001	<0.00001	0.00002	<0.00001	<0.00001	**0.00003**
Criterion													***0.0003***
Max. % of Criterion	2%	10%	1%	5%	1%	4%	<1%	2%	1%	5%	<1%	1%	**10%**

Note: All predictions prepared on a Benzo(a)Pyrene Toxic Equivalency Quotient (B[a]P TEQ) basis.

TABLE B-23 ANNUAL AVERAGE PAH PREDICTIONS – PLANT SCENARIO 2 (BIPS 2 + BIPS 1) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R02	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R03	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R04	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R05	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
R06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
R08	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
R09	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R10	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R11	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R12	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R13	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R14	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R15	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R16	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
Maximum by Receptor Type													
Discrete	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
Gridded	0.00001	0.00004	<0.00001	0.00002	<0.00001	0.00002	<0.00001	0.00001	<0.00001	0.00002	<0.00001	0.00001	0.00004
Criterion													***0.0003***
Max. % of Criterion	2%	12%	1%	8%	1%	7%	<1%	4%	1%	6%	<1%	3%	12%

Note: All predictions prepared on a Benzo(a)Pyrene Toxic Equivalency Quotient (B[a]P TEQ) basis.

TABLE B-24 ANNUAL AVERAGE PAH PREDICTIONS – PLANT SCENARIO 3 (BIPS 2 + BIPS 1 + TIPS B) (µg/m³)

Receptor	E1		E2		F1		F2		AD		RE		Max. All Scenarios
	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	NG	DO	
R01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R02	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R03	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R04	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R05	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R08	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
R09	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R10	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R11	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R12	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R13	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R14	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R15	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
R16	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
Maximum by Receptor Type													
Discrete	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001
Gridded	0.00001	0.00004	0.00001	0.00003	0.00001	0.00002	<0.00001	0.00001	<0.00001	0.00002	<0.00001	0.00002	0.00004
Criterion													***0.0003***
Max. % of Criterion	3%	13%	2%	9%	2%	8%	1%	5%	2%	7%	1%	4%	13%

Note: All predictions prepared on a Benzo(a)Pyrene Toxic Equivalency Quotient (B[a]P TEQ) basis.

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APPENDIX G
NOISE ASSESSMENT

Barker Inlet Power Station

Environmental Noise Assessment

S3207.2C5

May 2025

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1 INTRODUCTION

An environmental noise assessment has been made of the Barker Inlet Power Station (the **Facility**). The Facility is an electricity generation station comprised of two stages, BIPS 1 and BIPS 2.

AGL Barker Inlet Pty Limited (**AGL**), a wholly owned subsidiary of AGL Energy Limited, owns and operates the existing 210 MW Barker Inlet Power Station (referred to as BIPS 1) at Torrens Island.

BIPS was approved as public infrastructure under section 49 of the *Development Act 1993* by development approval DA 010/V067/17 (Development Approval) granted on 29 January 2018. The Development approval authorises the following, subject to conditions:

> *Construction of a power station (2 stages) comprising a total generation capacity of 420MW. Each Stage will comprise 12 x 18 MW reciprocating engines generating 210 MW.*

Accordingly, the Development Approval authorised both the now operational BIPS 1 and BIPS 2, with both stages having a total generation capacity of 420MW and each stage comprising '12 x 18 MW reciprocating engines generating 210 MW' (**Approved Project**).

AGL is now proposing to develop BIPS 2 on land immediately adjoining BIPS 1. The location of the BIPS 2 site is shown in Figure 1.

To enable the development of BIPS 2, AGL is proposing variations to the Approved Project and the conditions of the Development Approval under section 128 the *Planning Development and Infrastructure Act 2016* (SA) (PDI Act).

BIPS 2 is intended to be a peaking power station and AGL is seeking approval to update the configuration of BIPS 2 to one of the following:

- Up to 12x ~15-25MW reciprocating gas engine generators
- 6x ~50-70MW aero-derivative gas turbine generators (**GTG**s)
- 2x ~140-180MW GTGs
- 1x ~250-400MW GTG.

The Environmental Noise Assessment is intended to provide indicative results for shortlisted configuration options under consideration. The assessment will support the Crown development application for variations to the Approved Project and the conditions imposed on the Development Approval to accommodate the updates proposed for BIPS 2. The final selection of generation option will be made by AGL following a tender process with Original Equipment Manufacturers (**OEM**s) for each of the options.

The assessment compares predicted receiver noise levels for each configuration against the applicable noise criteria for the Facility. It advises likely outcomes against the noise criteria for each configuration, and where a compliance issue could occur for a generator configuration, outlines likely required mitigation strategies.

The assessment is based upon the following information:

- Site layout drawings provided by AECOM:
  - Wartsila drawing: *AGL – Master Layout Power Plant Site*, dated 13 December 2024.
  - GE Power drawing: *Plant Layout 6x LM6000 BIPS2* Revision A, dated 20 October 2023.
  - Aurecon drawing: *Barker Inlet Power Station Stage 2 (BIPS2) Expansion – 2x 9E 04 General Arrangement*, Revision A.01, dated 21 January 2025.
  - Aurecon drawing: *Barker Inlet Power Station Stage 2 (BIPS2) Expansion – General Arrangement*, Revision A.03, dated 31 January 2025.
- Sound power level data for various manufacturers of electricity generation infrastructure, including GE Vernova, Siemens, Mitsubishi Heavy Industries, and Wärtsilä.

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Figure 1: Site layout, nearest receiver areas and zoning

2 CRITERIA

2.1 Planning and Design Code

The Site is located within the *Infrastructure Zone* of the South Australian Planning and Design Code (the **Code**). The nearest noise sensitive receivers are within the *Suburban Neighbourhood Zone*.

Performance *Outcome 4.1* (PO 4.1) of the Code requires that noise from the development *not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers)*. The Deemed to Satisfy provision for PO 4.1 specifically references achieving the criteria of the *Environment Protection (Commercial and Industrial Noise) Policy 2023* (the **Policy**), which provides objective criteria for the assessed noise sources at the site.

2.2 Environment Protection (Commercial and Industrial Noise) Policy 2023

As referenced by the Code, the Policy provides indicative noise levels to be achieved at noise sensitive receivers from commercial/industrial activity.

The Policy is underpinned by the World Health Organisation *Guidelines for Community Noise (1999)* and provides an objective measure of acceptable noise levels for residential amenity. That is, achieving the relevant requirements of the Policy at surrounding noise sensitive receivers for noise from the subject site is considered to provide suitable amenity in relation to noise.

For most on-site activity, the Policy provides goal noise levels to be achieved at sensitive receivers based on the zones in which the noise source (the Facility) and the sensitive receivers (residences) are located. However, the closest receivers to the Site are in a zone separated from the Infrastructure Zone by an intermediate zone (Coastal Waters and Offshore Islands Zone). As such, the Indicative Noise Levels for these receivers are based upon the Indicative Noise Factor for the receiver zone only. For a Development, Part 5 of the Policy provides goal noise levels for the new activity, which are 5 dB(A) more onerous than those that would otherwise apply.

The South Australian Environment Protection Authority document: *Indicative Noise Factor Guidelines for the Environment Protection (Commercial and Industrial Noise) Policy 2023* states that the 'Residential' Land Use Category is applicable to *Suburban Neighbourhood zone*, in which the nearest receivers to the Facility are located.

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As a peaking power station, operation of the Facility may occur at any time on a 24-hour basis when there is sufficient demand in the National Electricity Market. Noise criteria applicable to the Facility (i.e. BIPS 1 and BIPS 2) for the day and night periods are provided in Table 1.

Table 1: Noise criteria for the Facility

Receiver	**Noise criteria [dB(A)]**		
	Day period (7:00am to 10:00pm)	**Night period (10:00pm to 7:00am)**	
	Average ($L_{eq, 15 min}$)	**Average ($L_{eq, 15 min}$)**	**Maximum (L_{max})**
Suburban Neighbourhood Zone	47	40	60

For large-scale electricity generation infrastructure, the nature of the noise emitted is relatively steady state during operational times. Where the L_{eq} criterion can be met for this type of noise source, it follows that the L_{max} criterion will also be satisfied. As such, specific analysis against the L_{max} criterion has not been considered for the assessment.

Measurements were taken of BIPS 1 previously to confirm operational noise levels after completion of construction. Under worst-case propagation conditions, for full load operation and all fans and ancillary equipment set to full run speeds, BIPS 1 was found to contribute a noise level 3 dB(A) lower than the relevant noise criterion, equivalent to 37 dB(A) at the nearest receiver at night.

Therefore, for the Facility (BIPS 1 and BIPS 2 combined) to achieve the criteria from Table 1, the relevant noise criteria to be achieved by BIPS 2 are provided in Table 2.

Table 2: Noise criteria for BIPS 2 component of the Facility

Receiver	**Noise criteria [dB(A)]**	
	Day period (7:00am to 10:00pm)	**Night period (10:00pm to 7:00am)**
	Average ($L_{eq, 15 min}$)	**Average ($L_{eq, 15 min}$)**
Suburban Neighbourhood Zone	44	37

The assessment has been undertaken against the 37 dB(A) criterion applicable to the night period as this is the most onerous. It is noted that under the Policy, if a Development Application was to be submitted for a standalone BIPS 2 Facility, rather than an amended approval for a combined BIPS 1 and BIPS 2 facility, the criteria from Table 1 would be applicable to BIPS 2.

When measuring or predicting noise levels for comparison with the Policy, adjustments are sometimes made to the average (equivalent) noise levels for each ‘annoying’ characteristic of noise, being either a tonal, impulsive, intermittent, low frequency, or modulating characteristic. The characteristic must be considered dominant in the acoustic environment over the assessment period and therefore application of a penalty varies depending on the assessment location and time of day.

It is noted that receiver noise levels from BIPS 1 were found to not require adjustment for noise character. The application of penalties is discussed further in the assessment section where relevant.

3 ASSESSMENT

3.1 Methodology

SoundPLAN Noise modelling software has been used to predict operational noise levels for BIPS 2.

Noise propagation was calculated based on worst-case propagation conditions to all receivers, and the following model inputs:

- Terrain elevation data from the South Australian Government Department for Environment and Water dataset Elevation – Adelaide Metro LiDAR 2022.
- CONCAWE propagation algorithm using weather category 6 for propagation to all receivers.
- Acoustically-reflective ground within site compounds and for water bodies; soft ground for other areas.
- Shielding from existing buildings and structures in the vicinity of the Facility, such as Torrens Island BESS. Structures associated with Torrens Island Power Station have not been included, to account for future demolition of this site after decommissioning.

Inputs specific to the generation options are summarised below. The sound power levels used are the highest of those provided by the various OEMs servicing each generation option.

3.1.1 Reciprocating gas engines option

The model of the reciprocating engine generation option includes:

- Layout based upon the provisions for the BIPS 2 layout included in BIPS 1 project drawings, including generator hall, exhaust ducting, site buildings and transformer fire barriers.
- Noise from 12x 15-25MW reciprocating engine generators housed within a generator hall building (internal sound pressure level of 112 dB(A)).
- The following external noise sources:
    - 12x Charge air intakes, positioned at 4m height on northern side of the generator hall
    - 12x Exhaust ducts
    - 12x Exhaust stack outlets (32m height)
    - 3x transformers
- Sound power data provided by Generator OEMs including Wärtsilä and MAN.
- Generation hall constructed from double steel sandwich panels (as used for BIPS1).

3.1.2 6x 50-70MW Aeroderivative GTG option

The model of the 6x 50-70MW aeroderivative GTG option includes:

- Noise from 6 GTGs and ancillary infrastructure, with equipment located externally in the turbine yard.
- Sound power data provided by GTG OEMs (Siemens and General Electric Vernova.)
- Site layout provided by AGL, model considers the shielding provided from on-site structures.

3.1.3 2x 140-180MW GTG option

The model of the 2x 140-180MW GTGs option includes:

- Noise from 2 GTGs and ancillary infrastructure, with equipment located externally in the turbine yard.
- Sound power data provided by GTG OEMs (General Electric Vernova, Mitsubishi Heavy Industries)
- Site layout provided by AGL, model considers the shielding provided from on-site structures.

3.1.4 1x 250-400MW GTG option

The model of the 1x 250-400MW GTG option includes:

- Noise from the GTG and ancillary infrastructure, with equipment located externally in the turbine yard.
- Sound power data provided by GTG OEMs (Siemens and General Electric Vernova.)
- Site layout provided by AGL, model considers the shielding provided from on-site structures.

Sound power levels for each of the noise sources considered in the assessment are provided in Appendix A.

3.2 Results

Predicted noise levels for each generation option are shown in Table 3. The reported results are the highest predicted noise level within the receiver areas identified in Figure 1.

Table 3: Predicted noise levels by generation option

Predicted noise levels by generation option [$L_{eq,15min}$ dB(A)]				
Generation Option	**12x 15-25MW Reciprocating Gas Engine Option**	**6x 50-70MW Aeroderivative GTG option**	**2x 140-180MW GTG option**	**1x 250-400MW GTG option**
Highest predicted receiver noise level	47	58	60	58

The predicted noise levels indicate that each generation option will require noise mitigation measures in order to comply with the 37 dB(A) night time noise criterion.

3.3 Mitigation requirements for Noise Policy compliance

The required noise attenuation for each generation option is provided in Table 4.

Table 4: Mitigation requirements by generation option

Required noise attenuation by generation option [dB(A)]				
Generation Option	**12x 15-25MW Reciprocating Gas Engine Option**	**6x 50-70MW Aeroderivative GTG option**	**2x 140-180MW GTG option**	**1x 250-400MW GTG option**
Required noise attenuation	10	21	23	21

Note that the required noise attenuation values provided in Table 4 will increase if noise characteristics are found to be applicable. For example, if one characteristic (such as low frequency noise character) is predicted to occur at the receivers, the required level of noise attenuation would increase by 5 dB(A). The applicability of characteristics will be dependant on the final selection of generation option and equipment supplier.

3.3.1 12x 15-25MW reciprocating gas engine option noise mitigation

The highest contributing noise sources for the reciprocating gas engine option are provided in Table 5.

Table 5: Reciprocating gas engine generation option - Noise source contribution

Rank	Noise source
1	Generator hall – Roof
2	Fin fan banks
3	Generator hall – walls
4	Transformers
5	Charge air intakes (including noise treatment)

The highest predicted receiver noise levels for the reciprocating gas engine generation option are controlled by noise breakout from the generator hall and from the radiator cooling fan banks. The required 10 dB(A) reduction could be achieved in practice through a combination of the following mitigation approaches:

- Selecting generator units which produce lower internal noise levels within the generator hall.
- Increasing the transmission loss of the generator hall roof and walls.
- Reducing the sound power levels of the radiator cooling fan banks, through strategies such as:
    - Selecting quieter fans than those used in the OEM noise data.
    - Using Variable Speed Drives for the fans, to reduce fan speeds (and subsequentially noise levels), particularly at night.

3.3.2 6x 50-70MW Aeroderivative GTG

The highest contributing noise sources for the 6x aeroderivative GTG generation option are provided in Table 6.

Table 6: 6x aeroderivative GTG generation option - Noise source contribution

Rank	Noise source
1	GTG exhaust stacks
2	GTG ventilation ducts
3	GTG intakes
4	GTG generator
5	GTG turbine exhaust fan

The highest predicted receiver noise levels for the 6x aeroderivative GTG generation option are controlled by noise from the GTG exhaust stacks. The required 21 dB(A) reduction could be achieved through a combination of the following mitigation approaches:

- Use of acoustic attenuators to reduce exhaust stack noise emissions (the exhaust stack is the highest contributing GTG component).
- Using acoustic attenuators to reduce noise from other significant contributing components such as the GTG VBV ducts and air intakes.

3.3.3 2x 140-180MW GTG

The highest contributing noise sources for the 2x 140-180MW GTG generation option are provided in Table 7.

Table 7: 2x 140-180MW GTG generation option - Noise source contribution

Rank	Noise source
1	GTG exhaust stacks
2	GTG ventilation ducts
3	GTG intake
4	GTG transformer
5	GTG fin fan cooler

The highest predicted receiver noise levels for the 2x 140-180MW GTG generation option are controlled by noise from the GTG exhaust stacks. The required 23 dB(A) reduction could be achieved through a combination of the following mitigation approaches:

- Use of acoustic attenuators to reduce exhaust stack noise emissions (the exhaust stack is the highest contributing GTG component).

- Using acoustic attenuators to reduce noise from other significant contributing components such as the generator vents and air intakes.
- Selection of low noise fin fan coolers.

3.3.4 1x 250-400MW GTG

The highest contributing noise sources for the 1x 250-400MW GTG generation option are provided in Table 7.

Table 8: 1x 250-400MW GTG generation option - Noise source contribution

Rank	Noise source
1	GTG exhaust stacks
2	GTG generator
3	Transformers
4	GTG fin fan cooler
5	GTG enclosure vents

The highest predicted receiver noise levels for the 1x 250-400MW GTG generation option are controlled by noise from the GTG exhaust stack. The required 21 dB(A) reduction could be achieved through a combination of the following mitigation approaches:

- Use of acoustic attenuators to reduce exhaust stack noise emissions (the exhaust stack is the highest contributing GTG component).
- Using acoustic attenuators to reduce noise from other significant contributing components such as the generator vents.
- Selection of low noise fin fan cooler.

4 DISCUSSION

Uncertainty in gas turbine noise modelling

Uncertainty of predictions of noise from gas turbines is now a well-known acoustic phenomenon. Research undertaken by University of Adelaide (Cazzolato et al, 2021)[1] identified that under certain environmental conditions, noise from gas turbine exhaust stacks at far-field locations may be measured between 5 to 10 dB(A) above predicted levels from the CONCAWE algorithm for adverse (worst-case) conditions (excluding any correction for the documented CONCAWE prediction uncertainty). The ISO-9613 prediction algorithm was also found to underpredict receiver noise levels compared to research findings.

The result at receivers could be an increase of +10 dB(A) to the noise source levels at receivers. To account for this phenomenon, the gas turbine exhaust stack sound power levels used in this assessment have been increased by 10 dB(A) above the exhaust stack sound power levels provided by GTG OEMs. The mitigation recommendations presented in the assessment therefore account for this phenomenon.

Suggested changes to Conditions of Approval For BIPS

Conditions 14-16 of the Previous Approval for the Facility provide requirements for noise source selections, engine hall construction and ventilation pathways. As these requirements have been implemented into BIPS 1 and may not be relevant to changes to the BIPS 2 configuration it is suggested that the variation to the approval seeks to amend these conditions to address BIPS 1 only.

Condition 17 States that *"The low noise 7-fan radiator must not exceed 87% capacity during the night time hours (10pm-7am) as specified in the Environmental Noise Assessment, prepared by Sonus, dated November 2017 (reference S3207C8)"*. It is noted that post-construction noise testing found that noise levels from BIPS 1 complied with criteria with fans at 100% speed, and as such this Condition of Approval is no longer required and should be removed by the variation to the approval.

[1] Cazzolato, B., Leav, O., & Howard, C. (2021, February). Sound directivity from a 250kW gas turbine exhaust system. In *Proceedings of Acoustics* (Vol. 8, No. 10).

5 CONCLUSION

An environmental noise assessment has been undertaken for the Barker Inlet Power Station to allow AGL to vary the current development approval to accommodate an updated design for BIPS 2 with consideration of alternative generation options.

The noise assessment considered noise from four conceptual generation options for BIPS 2 and compared predicted noise levels based upon the highest sound power level data available for each generation option to criteria determined from the *Environment Protection (Commercial and Industrial Noise) Policy 2023*.

Noise mitigation will be required for each generation option in order to achieve compliance with the Policy, and key noise sources requiring mitigation have been outlined for each generation option. For the generation option utilising reciprocating gas engines, the key noise source is predicted to be cooling fans array on the radiators. For gas turbines, the key noise sources are exhaust stacks, intakes, and ventilation openings. The level of noise mitigation required for each generation option is considered to be achievable based upon currently available technology.

It is understood that final selection of a generation option and equipment supplier will take place after a tender evaluation process by AGL. Once the generation option and equipment is confirmed the final noise mitigation strategy will be confirmed.

APPENDIX A: SOUND POWER DATA

Table 9: Sound power levels – 12x 15-25MW reciprocating gas engine generation option

Item	Octave Band Sound Power Level [dB]									Total [dB(A)]
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
Generator hall internal noise level(1)	115	116	112	111	110	107	103	99	93	112
Exhaust stack noise (per genset)	115	109	96	87	85	82	80	83	86	92
Intake air opening (per genset)	133	126	112	92	64	69	68	68	98	103
Radiator fans (per genset)	-	118	112	109	107	105	102	95	87	107
Transformer (each)	100	108	106	103	100	93	81	76	73	100

Notes:

(1) Reverberant sound pressure level inside generator hall.

Table 10: Sound power levels – 6x 50-70MW aeroderivative gas turbine generation option

Item	Octave Band Sound Power Level [dB]									Total [dB(A)]
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
Air filter house (per GTG)	114	108	99	106	102	100	96	99	84	106
Generator (per GTG)	115	122	117	105	92	88	84	79	81	103
Stack outlet (per GTG)	143	141	133	123	116	101	91	85	77	121(1)
Turbine enclosure (per GTG)	102	99	95	95	95	90	87	87	85	97
Turbine exhaust (per GTG)	104	104	104	104	98	94	91	88	80	101
Transformer (each)	100	108	106	103	100	93	81	76	73	100
Enclosure vent (per GTG)	122	114	111	112	106	101	105	112	109	116

Notes:

(1) Exhaust stack sound power level includes +10 dB(A) uncertainty adjustment as discussed in Section 4.

Table 11: Sound power levels – 2x 140-180MW gas turbine generation option

Item	Octave Band Sound Power Level [dB]									Total [dB(A)]
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
Generator (per GTG)	121	114	111	109	104	96	92	83	77	105
Generator coupling (per GTG)	121	114	111	109	104	96	92	83	77	105
Intake air opening (per GTG)	111	113	108	106	104	101	98	95	86	107
Stack outlet (per GTG)	132	128	128	125	128	122	114	115	107	128(1)
Turbine body (per GTG)	117	118	113	107	106	103	102	108	99	112
Transformer (each)	100	108	106	103	100	93	81	76	73	100
Vents (per GTG)		104	106	112	119	114	103	97	85	118

Notes:

(1) Exhaust stack sound power level includes +10 dB(A) uncertainty adjustment as discussed in Section 4.

Table 12: Sound power levels – 1x 250-400MW gas turbine generation option

Item	Octave Band Sound Power Level [dB]									Total [dB(A)]
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
Generator (per GTG)	104	108	124	115	115	111	106	94	104	117
Generator load compartment (per GTG)	93	99	99	93	93	99	100	94	84	104
Intake air opening (per GTG)	116	111	100	92	86	89	90	94	91	99
Stack outlet (per GTG)	135	138	132	131	125	127	117	108	110	130(1)
Turbine body (per GTG)	107	104	101	96	97	98	101	106	64	109
Transformer (each)	100	108	106	103	100	93	81	76	73	100
Vents (per GTG)	102	102	110	101	98	95	94	98	95	104

Notes:

(1) Exhaust stack sound power level includes +10 dB(A) uncertainty adjustment as discussed in Section 4.

APPENDIX H
TRAFFIC IMPACT ASSESSMENT

aecom.com

Prepared for
AGL Barker Inlet Pty Limited
ABN: 37 622 351 660

Barker Inlet Power Station Stage 2 - Traffic Impact Assessment

02-Jun-2025

Barker Inlet Power Station Stage 2 - Traffic Impact Assessment

Client: AGL Barker Inlet Pty Limited

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Checker/s	Tom Hateley

Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
0	2-Jun-2025	Final	Tom Hateley Associate Director - Planning	[signature]

Glossary of Abbreviations

Acronym	Description
BIPS	Barker Inlet Power Station
CV	Commercial Vehicle
DIT	Department for Infrastructure and Transport
GML	General Mass Limit
HML	Higher Mass Limit
NHVR	National Heavy Vehicle Regulator
OSOM	Over-size Over-mass Vehicles
PBS	Performance-Based Standards
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan

References

- DPTI (now DIT) *A Functional Hierarchy for South Australia's Land Transport Network* *A_Functional_Hierarchy_for_SAs_Land_Transport_Network.pdf (www.sa.gov.au)*
- Location SA Viewer, available at *Location SA Viewer*
- NHVR *| NHVR*

Table of Contents

Executive Summary

AECOM Australia Pty Ltd (AECOM) have been commissioned by AGL Barker Inlet Pty Ltd (AGL) to undertake a Traffic Impact Assessment (TIA) of the traffic and transport impacts associated with a proposed variation of the existing Development Approval (DA) for the AGL Barker Inlet Power Station (BIPS). AGL are seeking to modify the DA to permit a wider range of plant options for Stage 2 of the BIPS (BIPS 2), including:

- to enable BIPS 2 to use either gas turbines or reciprocating engines (instead of reciprocating engines only as currently approved); and
- to increase the proposed output of BIPS 2 to up to 280 MW (instead of the currently approved 210 MW)

The report assesses the impacts of the proposed changes to the Approved Project on construction and operational traffic, particularly the impacts associated with the operation of over-size and over-mass vehicles (OSOM).

BIPS 2 is proposed to be located approximately 14km north of the Adelaide CBD, on Torrens Island within the Barker Inlet Power Station site. Access to Torrens Island is restricted by the existing causeway and bridge extending from the mainland via the adjacent Garden Island, and subject to motorists passing through the checkpoint operating on the eastern edge of Torrens Island. The nearby Grand Trunkway from which motorists access the causeway abuts an expanding industrial precinct and provides direct access to the Port River Expressway and onward to the national highway network.

To facilitate the mobilisation of the various power plant components for BIPS 2, the following three (3) routes were assessed for construction vehicles:

- Route A = Ocean Steamers Road – Eastern Parade – Grand Trunkway
- Route B = Victoria Road – Port River Expressway – Jenkins Street / Eastern Parade– Grand Trunkway
- Route C = Port River Expressway – Jenkins Street / Eastern Parade – Grand Trunkway

Each of these three routes facilitate the delivery of equipment or materials to site from three respective origin points. While Route A facilitates the delivery of imported items from the nearby Berth 19 in the Inner Harbor and Route B facilitates the delivery of imports from Outer Harbor, Route C provides general access from all domestic locations that can be reached along the national highway network.

While there are varying restrictions on the vehicle sizes that can traverse each of the roads along these routes, the project accessibility is ultimately controlled by the limits on the Grand Trunkway which provides the only access from the mainland to Torrens Island. This restricts the allowable OSOM vehicles to those classified as PBS Level 3A, and these vehicles must travel under appropriate permits to be obtained from NHVR and DIT.

Assessing the potential road network impacts due to the changes proposed to the Approved Project to accommodate the design changes to BIPS 2, including all project construction activities (requiring 200 additional workers over a period spanning up to 18 months), required the distribution of total generated traffic volumes into the following classifications:

- Light vehicles (e.g. Cars, Utes, Four-wheel drives) typically used by the daily workforce
- Heavy Commercial Vehicles (e.g. >2-tonne Trucks, Semi-Trailers, Tipper Trucks, Concrete Ag-Trucks, Buses, Waste and Septic disposal trucks, etc) typically used for most material deliveries
- Over Size / Over Mass Vehicles exceeding the general access dimensions, limited to travel along Restricted Access routes under NHVR and DIT permits

The estimated traffic generated for each vehicle class during the construction period for BIPS 2 is summarised below.

Table 1 Traffic generated during construction (one-way)

Vehicle Type	Total Generated Traffic	Traffic during peak construction period (assumed 80% of Total Generate Traffic)	Peak daily traffic (assumed 6x working days over 72 weeks)
Light Vehicles	3,130	2,504	6 trips/day
Heavy Commercial Vehicles	3,337	2,670	7 trips/day
OSOM	62	50	1 trip/day
Total	6,529	5,224	14 trips/day

Assessing these generated vehicle volumes in the context of the existing network traffic volumes, it can be concluded that the project will have a relatively minor impact on the daily functionality of these surrounding State-maintained roads. With the proportionate increase ranging from 0.1% to 8.9%, it is expected that the effects of the construction-phase traffic can be managed through close coordination and consultation with key stakeholders, including DIT, the City of Port Adelaide Enfield and Flinders Ports.

While the identified routes are expected to accommodate the projected vehicle traffic volumes and movements, it should be noted that the suitability of these routes are subject to detailed turn path and road geometry assessments during the preparation of appropriate Traffic Management Plans (TMP). This TIA has already identified the following likely modifications to the road network which were identified during the 2018 implementation of the TMP that facilitated the construction of BIPS 1:

- Modify the Jenkins Street / Eastern Parade / Grand Trunkway intersection to facilitate larger turning movements than can be allowed by the existing geometry
- Modify the access gate on the Torrens Island causeway to facilitate wider vehicles than can be accommodated on a single lane
- Raise individual power lines to maintain adequate clearances to the road surface

1.0 Introduction

1.1 Project Context

AGL Barker Inlet Pty Ltd (AGL) own and operate the existing 210 MW Barker Inlet Power Station (referred to as BIPS 1) at Torrens Island, adjacent the existing Torrens Island Power Station (referred to as TIPS). AGL have already commissioned BIPS 1 to commence the replacement of the ageing units of TIPS Section A (referred to as TIPS 1) and are now seeking to implement Stage 2 of the Barker Inlet Power Station (referred to as BIPS 2) to finalise this strategy.

While BIPS 1 was commissioned in January 2020 and comprises 12x 18MW Reciprocating Engines to provide a 210 MW output, BIPS 2 was delayed due to market conditions. AGL is seeking to modify the DA to authorise a number of changes to the Approved Project to accommodate the design changes for BIPS 2 which include:

- Enabling the potential use of either Reciprocating Engines (as with BIPS 1) or the alternate use of Gas Turbines
- Increasing the proposed output to 280MW (as opposed to the 210MW that was previously approved for each of BIPS 1 and BIPS 2)

1.2 Project Description

AECOM have been engaged by AGL to provide a Traffic Impact Assessment (TIA) to support the variation Development Application for BIPS 2.

The key changes to the Approved Project include:

- Enabling the use of either Reciprocating engines or Gas Turbines for BIPS 2 and increasing the output to 280MW;
- Associated civil works, including a Stormwater Pond
- Additional Diesel Storage Capacity
- Revisions to the locations of the laydown areas, site access, internal roads and carparking
- Connection to the ElectraNet switchyard and the laying of associated underground connection cables
- Gas blending station and associated connections

The project construction is expected to commence in 2026 and be operational in 2028, ensuring ongoing energy security and reliability in South Australia by firming the existing renewable wind and solar generation capacity. Representing a $500 million investment in the South Australian Energy network, the BIPS 2 project will generate up to 200 construction sector jobs during 2026-2028 and approximately ten (10) new permanent jobs during the operational phase.

1.3 Project Overview

This TIA has been prepared to support the proposed variation of the existing DA to accommodate the BIPS 2 design changes. It outlines the traffic and transport implications arising from the proposed changes for both Phase 1 (Construction) and Phase 2 (Operation), while also providing recommendations on managing these impacts. It should be noted that the future Phase 3 (Decommission) has been omitted from this TIA and can be developed at a later stage noting that road conditions may have changed in the interim.

This TIA comprises the professional view of AECOM in accordance with the details that were available during the assessment. It must be taken as a guide on the matters to be considered during the development of the Traffic Management Plan (TMP) required under condition 23 of the DA.

All observations of the transport routes contained herein were made using Nearmap and Google Street View, and although every effort has been made to ensure accuracy it must be acknowledged that various conditions may have changed since the time of the assessment for reasons including road modifications and maintenance by the relevant authorities, adverse weather and general deterioration.

1.4 Previous Works

This TIA will closely resemble the documentation that was previously prepared to facilitate the construction of BIPS 1 in 2020. Due to the similar scope and near-identical transportation routes to mobilise construction workers and equipment, it is expected that the key outcomes and requirements will be similar for BIPS 2.

- The assessment of the BIPS 1 traffic requirements fundamentally identified that the transportation of materials and workers could generally be facilitated by the surrounding road network
- Similar components to those required for BIPS 1 will again be mobilised along the same routes for BIPS 2, noting that their performance demonstrated no significant constraints
- While the pinch points identified in the previous BIPS 1 TMP have again been flagged and subjected to a high-level review in this report, another detailed assessment should be completed during the future development of the BIPS 2 TMP to confirm whether treatments such as the previous sign removals, raising of power lines and clearing of a temporary access route to facilitate large turning paths should be repeated

Noting that the construction and operation of BIPS 1 have been achieved without any significant traffic-related issues, it is expected that BIPS 2 can also be effectively managed as per the conclusions contained within this TIA.

2.0 Existing Area Conditions

2.1 Locality

The project site for BIPS 2 is located on Torrens Island within the Barker Inlet, approximately 14km north of the Adelaide CBD and adjacent the existing Torrens Island Power Station.

The land surrounding the site on Torrens Island was previously cleared and prepared during the BIPS 1 development, as shown in Figure 3, while the surrounding locality contains a mix of industrial and environmental sites and the following key features:

- Causeway connecting Torrens Island and Garden Island to Grand Trunkway on the mainland from the south
- Port River Expressway providing vehicular access to the national highway network
- Garden Island Boat Club and Yacht Club
- Adelaide Dolphin Sanctuary
- Torrens Island Quarantine Power Station (2.5km north of BIPS and operated by Origin Energy)

Figure 1: Project Area and Setting relative to Adelaide

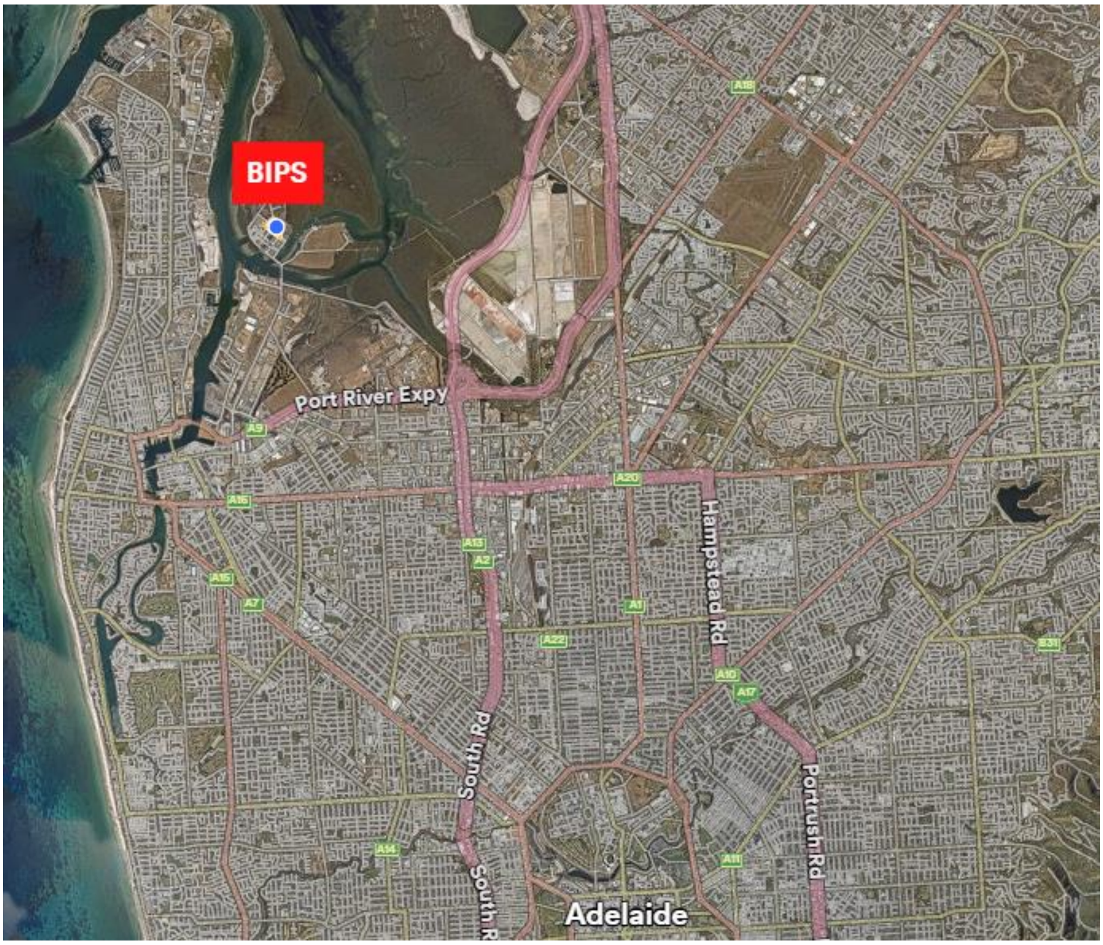


Figure 2: Project Area and Locality

Figure 3: Revised Project Site Layout (BIPS 1 shown in Blue, BIPS 2 in Red, Laydown Areas in Green, and Potential Stormwater Basin in Yellow)

2.2 Proposed Site Subject Land

The specific BIPS 2 project area comprises a generally flat surface, with the extents of the BIPS 2 site having already been cleared and prepared during the prior BIPS 1 development.

In addition to the causeway connecting the site's road infrastructure to the Grand Trunkway on the mainland, the site is currently connected to the wider power distribution network by the following high-voltage transmission lines that distribute electricity generated from the existing TIPS and BIPS 1 sites:

- 3x 275kV ElectraNet Transmission Lines extending to the east
- 1x 275kV ElectraNet Transmission Line extending north towards the Osborne Defence Precinct
- 2x 66kV ElectraNet Transmission Lines extending north towards the Osborne Defence Precinct and the nearby Quarantine Power Station

Additionally, the following high pressure gas pipelines traverse the site to transport gas to the facilities:

- SEA Gas Pipeline from Otway Basin
- EPIC Pipeline from Moomba

2.3 Existing Accessibility

The BIPS 2 project site comprises 1.5 hectares with access to the site from the surrounding road network being provided to the south by the existing causeway, and by the Torrens Island Bridge over North Arm that was refurbished in 2004/05 with sufficient structural capacity to withstand a maximum gross vehicle weight of 400 tonnes.

Figure 4: AGL BIPS 2 Site Plan (Grand Trunkway shown connecting the mainland to the south)

Source: NearMap, 2024

3.0 Routes Assessment

3.1 Transport Routes

It is assumed that the majority of the BIPS 2 components will be brought to Australia through the nearby Inner Harbour Berth 19 (as per the TMP previously prepared for BIPS 1) or the Outer Harbor Container Terminal, before being loaded onto trucks and transported directly to the site.

The key transport routes connecting the BIPS 2 project area to the nearby Berth 19 and Outer Harbor Container Terminal traverse some of the same roads which also provide access to the national highway network from which other project components may be transported from domestic locations.

- Route A – Imported through Berth 19
- Route B – Imported through Outer Harbor Container Terminal
- Route C – Transported domestically from within Australia

Figure 5: Major road routes connecting to the project site

Route A – Inner Harbour Berth 19

- Eastbound along Eastern Parade from gates on Morialta Road or Ocean Steamer Road
- Northbound along the Grand Trunkway and across the North Arm bridge to the western point of Garden Island
- Westbound over the causeway to access Torrens Island

Route B – Outer Harbor Container Terminal

- Southbound along Victoria Road
- Cross the Port Adelaide River along the Tom 'Diver' Derrick Bridge
- Eastbound along Port River Expressway, before turning north along either of the following depending on the size of the vehicle being used:
  - Route B1 = Perkins Drive
  - Route B2 = Eastern Parade

- Northbound along the Grand Trunkway and across the North Arm bridge to the western point of Garden Island
- Westbound over the causeway to access Torrens Island

Route C – Domestic Transportation

Regardless of the precise originating point of the deliveries, it is expected that all vehicles will enter the Port River Expressway at the existing interchange with the North-South Corridor, from which they will travel:

- Westbound along the Port River Expressway, turning north along either of the following two roads (as with Route B):
  - Route C1 = Perkins Drive
  - Route C2 = Eastern Parade
- Northbound along the Grand Trunkway and across the North Arm bridge to the western point of Garden Island
- Westbound over the causeway to access Torrens Island

3.1.1 Arterial Road Network

The tables below summarise the traffic data for the respective routes, as sourced from Location SA and noting the roads are owned and maintained by the Department for Infrastructure and Transport (DIT).

Table 2 Route A - Key Routes Classification

Road	Surface	Traffic Volume Estimate	CVs (%)	Year
Ocean Steamers Road	Sealed	850	42.5	2024
Eastern Parade, between Ocean Steamers Road and Grand Trunkway)	Sealed	2300	43.5	2021
Grand Trunkway	Sealed	3300	18	2022

Table 3 Route B - Key Routes Classification

Road	Surface	Traffic Volume Estimate	CVs (%)	Year
Victoria Road, between Outer Harbor and Nelson Street (noting the greater CV proportion features closest to Outer Harbor)	Sealed	3600-32,100	10.5-43	2020-2022
Port River Expressway (PRExy), between Victoria Road and Perkins Drive and Eastern Parade	Sealed	28,600	10-14	2015-2020
Perkins Drive, between PRExy and Grand Trunkway	Sealed	4000	29	2022
Eastern Parade, between PRExy and Grand Trunkway	Sealed	3600	39	2021
Grand Trunkway	Sealed	3300	18	2022

Table 4 Route C - Key Routes Classification

Road	Surface	Traffic Volume Estimate	CVs (%)	Year
Port River Expressway, between N-S Corridor and Eastern Parade / Perkins Drive	Sealed	30,900-46,000	10-15.5	2015-2020
Perkins Drive, between PRExy and Grand Trunkway	Sealed	4000	29	2022
Eastern Parade, between PRExy and Grand Trunkway	Sealed	3600	39	2021
Grand Trunkway	Sealed	3300	18	2022

3.1.2 Local Road Network

The ‘last-mile’ access over the causeway from the western tip of Garden Island into the Torrens Island project area is not under the control of DIT and does not have publicly accessible data. However, the Coffey 2017 Environmental and Social Impact Assessment Report documented approximately 284 vehicles accessing the island each day.

Although this report was prepared in 2017, it must be noted that:

- The same facilities that were in operation during 2017 are still operating
- Public access along the road is restricted by a security checkpoint on the causeway
- Apart from the commissioning of BIPS 1 in 2020, there has not since been any additional facility constructed on Torrens Island that would significantly modify the vehicle volumes traversing the causeway

Taking these points into consideration, a conservative 10% increase has been applied to the 2017 volumes to assume a daily traffic volume of approximately 315 vehicles in 2024/2025.

Figure 6: Torrens Island Causeway with access gate visible in the background, facing west from the western tip of Garden Island

Source: Google Street View, October 2021

3.2 Functional Hierarchy

Noting that the various materials and components of the BIPS 2 project will be primarily transported on the South Australian Arterial Road Network, the *Functional Hierarchy for South Australia's Land Transport Network* has been assessed to identify which corridors are appropriate for this operation.

The Functional Hierarchy for Freight Routes notes that *"The role of freight routes is to cater safely and efficiently for freight vehicles for up to 24 hours a day, seven days a week. These routes need to provide optimal travel efficiency and reliability of travel times throughout the day for heavy vehicles, especially when freight and commuter peak periods coincide"*. Additionally, the Desired Outcomes for such routes include allowing for:

- Safe, efficient and reliable movement at all times of the day
- Priority of movement at intersections
- Minimal impact from stationary buses or turning traffic
- Limited side friction from adjacent land uses
- Appropriate areas provided for cyclists and pedestrians
- The ability to cater for Restricted Access Vehicles (that is, heavy vehicles that are subject to restrictions on where they can travel on public roads)

It is noted that these key functions are covered by Victoria Road, Port River Expressway, Eastern Parade, Jenkins Street and Grand Trunkway, and that these roads can accommodate the expected heavy vehicles that will transport materials and components from Berth 19, Outer Harbor and the N-S Corridor.

3.3 Approved Heavy Vehicle Routes

The various components of the BIPS 2 project are expected to be imported through Berth 19 or the Outer Harbor Container Terminal, or transported domestically from the N-S Corridor, and the key State routes in the vicinity of the project area that will carry these freight movements are summarised in the tables below. This data was obtained from the National Heavy Vehicle Regulator (NHVR) National Network Map which displays the state-based heavy vehicle networks for different vehicle types, including:

- GML (General Mass Limit)
- HML (Higher Mass Limit)
- OSOM (Over Size Over Mass Vehicle)
- PBS (Performance-Based Standards)

Table 5 Maximum allowable heavy vehicles by road

Major Road	Road Authority	Surface	Maximum Allowable Vehicle
Victoria Road, between Outer Harbor and Nelson Street	DIT	Sealed	• GML / HML: - 36.5m Road Train - Road Train Converter Dolly - 23m Vehicle Carrier - Rigid Truck and Dog (23m) • OSOM: - 4.6m Wide Load Carrying Vehicle - 25m 59.5t Low Loader - Controlled Access Bus up to 14.5m - 5 Axle Crane Network – Level Two - 6 Axle – Day Travel - 40t Special Purpose Vehicle Network • PBS:

Major Road	Road Authority	Surface	Maximum Allowable Vehicle
			- Level 3B, greater than 36.5m up to 42m
Port River Expressway	DIT	Sealed	• GML / HML: - 36.5m Road Train - Road Train Converter Dolly - 23m Vehicle Carrier - Rigid Truck and Dog (23m) • OSOM: - 4.6m Wide Load Carrying Vehicle - 25m 59.5t Low Loader - Controlled Access Bus up to 14.5m - 5 Axle Crane Network – Level Two - 6 Axle Crane – Day Travel - 40t Special Purpose Vehicle Network • PBS - Level 3B, greater than 36.5m up to 42m
Perkins Drive, between PRExy and Grand Trunkway	DIT	Sealed	• GML / HML: - 36.5m Road Train - Road Train Converter Dolly • OSOM: - 4.0m Wide Load Carrying Vehicle - 25m 59.5t Low Loader - 5 Axle Crane Network – Level One - 6 Axle Crane – Day Travel - 40t Special Purpose Vehicle Network • PBS: - Level 3A, up to 36.5m
Ocean Steamers Drive	DIT	Sealed	• GML/HML: - 36.5m Road Train - Road Train Converter Dolly - 23m Vehicle Carrier - Rigid Truck and Dog (23m) • OSOM: - 4.6m Wide Load Carrying Vehicle - Controlled Access Bus up to 14.5m - 5 Axle Crane Network – Level Two - 40t Special Purpose Vehicle Network • PBS: - Level 3A, up to 36.5m
Eastern Parade, between PRExy and Ocean Steamers Drive	DIT	Sealed	• GML / HML: - 36.5m Road Train - Road Train Converter Dolly - 23m Vehicle Carrier • OSOM: - 4.6m Wide Load Carrying Vehicle - 25m 59.5t Low Loader - Controlled Access Bus up to 14.5m - 5 Axle Crane Network – Level Two - 6 Axle Crane – Day Travel (not permitted west of Grand Trunkway) - 40t Special Purpose Vehicle Network • PBS: - Level 3A, up to 36.5m
Grand Trunkway	DIT	Sealed	• GML/HML:

Major Road	Road Authority	Surface	Maximum Allowable Vehicle
			- 36.5m Road Train - Road Train Converter Dolly • OSOM: - 4.6m Wide Load Carrying Vehicle - 25m 59.5t Low Loader - Controlled Access Bus up to 14.5m - 5 Axle Crane Network – Level One - 6 Axle Crane – Day Travel - 40t Special Purpose Vehicle Network • PBS: - Level 3A, up to 36.5m

Table 6 PBS Vehicle Route Standards

Road Network	Vehicle Length	Vehicle Description
Level 1A	≤ 20 m	Prime mover and semitrailer, or truck trailer combination
Level 2A	≤ 26 m	B-double
Level 2B	26 m ≤ 30 m	A double
Level 3A	≤ 36.5 m	Double road train (Type I) – eg A-double, B-triple
Level 3B	36.5 ≤ 42 m	Double road train (Type I) – eg AB-triple
Level 4A	≤ 53.5 m	Triple road train (Type II) – eg BAB-quad, ABB-quad

It is noted that there is an active railway line that passes through the Perkins Drive / Eastern Parade / Grand Trunkway intersection, and that the intersection includes typical level crossing controls (i.e. boom gates, flashing lights, signals, pedestrian mazes). Noting that this level crossing and mention of the railway line do not explicitly feature in the NHVR Maps or any of the conditions, it is assumed that:

- It has been considered in the development of the vehicle gazettal routes that pass through the intersection
- There are no restrictions associated with the railway line that impact on these vehicle gazettal routes

It must also be noted that as Grand Trunkway provides the only access to Torrens Island from the mainland, the vehicle sizes that can access the site are restricted by the limitations on this road. Noting the restrictions highlighted in Table 5, PBS Level 3A vehicles are the largest vehicles that can access the site along this gazetted route.

3.4 Vehicle Type and Permits

3.4.1 Over Size and Over Mass Permits (OSOM)

An Oversize Overmass (OSOM) vehicle is a heavy vehicle that is typically carrying a large indivisible item. A heavy vehicle is a Class 1 heavy vehicle if, when combined with its load, it does not comply with either the:

- Prescribed mass and dimension requirements
- Requirements of a heavy vehicle carrying a large indivisible item

Examples of OSOM vehicles include a combination of prime movers, low loaders, low loader dollies, platform trailers and jinkers. The operator of OSOM vehicles must apply to the NHVR to obtain a Mass or Dimension Exemption Permit if a Class 1 OSOM vehicle does not comply with the mass or dimension limits set out in the transition notice presented in Table 7.

Table 7 Maximum limits - OSOM

Criteria	Dimension (m)
Length	30
Width	4.6
Height	5.0
Mass	42.5 tonnes. The maximum allowable mass is 49.5 tonnes

3.4.2 Equipment Deliveries

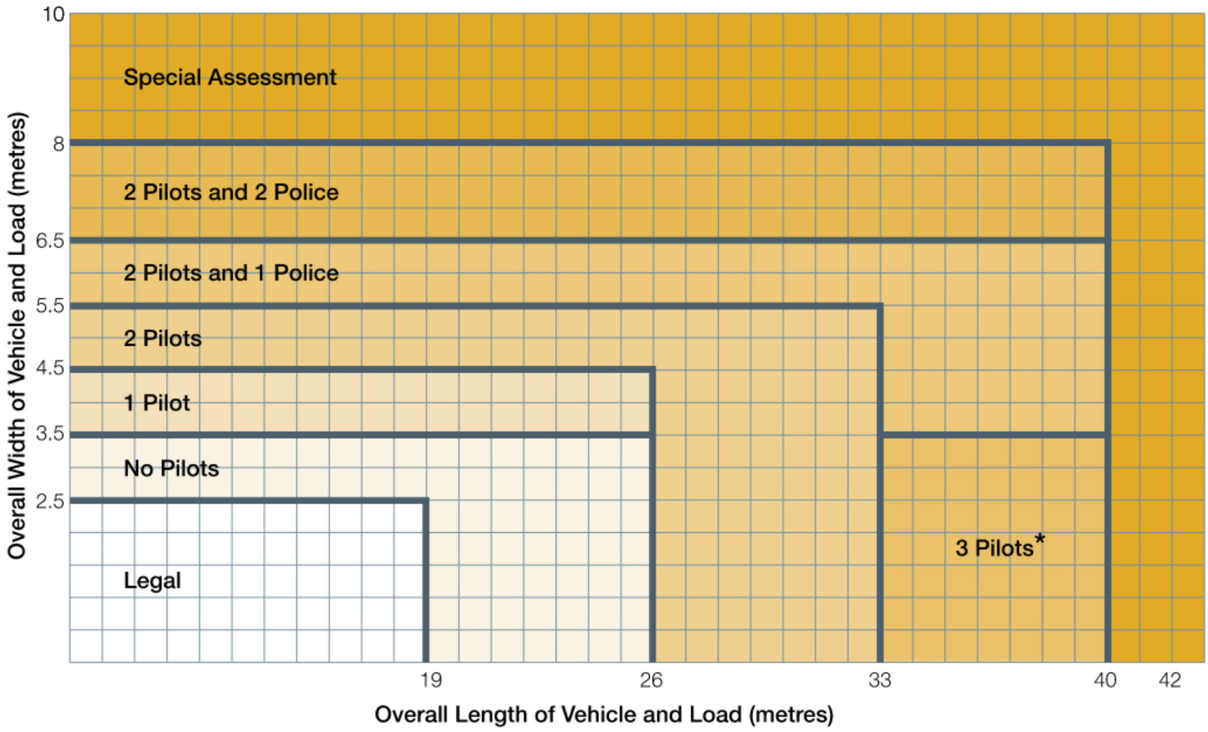
The deliveries of the various equipment and components may impact on the existing road network, depending on their size and mass.

Depending on the specific dimensions, the OSOM permits will need to be obtained through the NHVR and DIT. Depending on the precise size of the respective loads, conditions for transporting such OSOM vehicles could involve:

- Pilot and escort requirements – to provide advanced warning to approaching traffic through appropriate signage;
- Police escort requirements – required for safe movement of other traffic;
- Night travel restrictions.

The Minimum Daytime Pilot and Escort Requirements for Oversize Vehicles are shown in Figure 7.

Figure 7: Adelaide Metropolitan Area - Minimum Pilot and Escort Requirements



Source: Escorting Guidelines for Oversize and Overmass vehicles and loads in South Australia, DIT (2020)

Equipment deliveries will comprise most of the heavy vehicle movements during the 18-month construction period, while other deliveries to the site which could be locally sourced may include concrete and other smaller related construction items. All the transportation vehicles bringing the project components to site, as well as the significant construction vehicles, will be required to traverse the designated routes listed above in Section 3.1.

The construction-related material deliveries that are likely to be transported to site include:

- Reinforced steel for foundations, including concrete slabs and piling works
- Quarry materials
- Frames and cladding for site structures and buildings
- Transportable buildings if required during the construction phase
- Security fencing
- Switchyard components

Additionally, the site will require the delivery of large, indivisible items that may require OSOM permits, including:

- Gas turbine generator units
- Engines, Step Up Transformers
- Heat recovery steam generators
- Power connection equipment and cables, and large water and storage tanks
- Civil components including steel structures, wall panels, roofs and stack structures
- Radiators, CAFs (Compressed Air Foam system), Silencer, Auxiliary Transformer, Cranes, BSU (Battery Supply Unit)
- Other construction equipment and materials

It is expected that the periods which will generate the highest vehicle volumes will be during the:

- Concrete deliveries
- Components of the gas generators

3.5 Constraint Points

This section details the constraints along the identified routes to the site from both Berth 19 and the Outer Harbor Container Terminal, as well as the route approaching the site along the Port River Expressway from the east. It highlights the constraints that may be encountered during either of the construction, operational or decommissioning phases of the project.

Noting the route assessments completed in Section 3.1 and Section 3.3, this preliminary desktop assessment highlights the locations where large vehicles could be constrained in their manoeuvrability. Coordination of these over-sized vehicle movements to occur outside the periods of high traffic volumes could allow for a more flexible utilisation of the road corridor and facilitate movements that may otherwise have been constrained. Such instances would require temporary traffic management, and it must be noted that detailed turning path checks should be undertaken to confirm the suitability of such manoeuvres during the preparation of an Operational Management Plan.

3.5.1 Pinch Point 1 – Intersection of Port River Expressway and Perkins Drive

The routes detailed in Section 3.1 can generally facilitate the movement of Heavy Vehicles, including over-sized vehicles. However, as detailed in Table 5 above, various vehicles cannot use Perkins Drive to access Grand Trunkway and must instead use Eastern Parade. Relative to the left-turn slip lane between the Port River Expressway and Perkins Drive, the intersection with Eastern Parade allows for wider left-turn movements that can be traversed by larger vehicles (that is, by 4.6m Wide Load Carrying Vehicles and 5 Axle – Level Two Cranes instead of 4.0m Wide Load Carrying Vehicles and 5 Axle – Level One Cranes, respectively).

Figure 8 Intersections of Port River Expressway with Perkins Drive (Left) and Eastern Parade (Right) with left-turn movements shown by green arrows

Source: NearMap, 2024

Figure 9 Westbound view of Left-Turn lane at Port River Expressway intersection with Perkins Drive

Source: Google Street View, 2024

Figure 10 Westbound view of Left-Turn lane at Port River Expressway Eastbound Off-Ramp intersection with Eastern Parade

Source: Google Street View, 2022

3.5.2 Pinch Point 2 – Torrens Island Entrance

Located on the southern end of Torrens Island is the checkpoint that controls access from the Grand Trunkway causeway onto Torrens Island. This location is constrained by the width of the lane between the fence and existing poles in the centre of the road that limit the capability of oversized vehicles exceeding the width of a single lane to enter Torrens Island.

While the total road width is 7.2m, these obstructions shown in the middle of the road in Figure 11 should be temporarily removed to facilitate the movement of larger vehicles that exceed the width of a single lane.

Figure 11 Torrens Island Access Road Checkpoint from Google Street View (Left) and central dividing poles highlighted by Red Circles on NearMap Aerial Imagery (Right)

Source: Google Street View, 2021 (Left) and NearMap, 2024 (Right)

However, it must be acknowledged that Grand Trunkway providing the only access to Torrens Island from the mainland limits the largest vehicles that can access the site to those classed as PBS Level 3A.

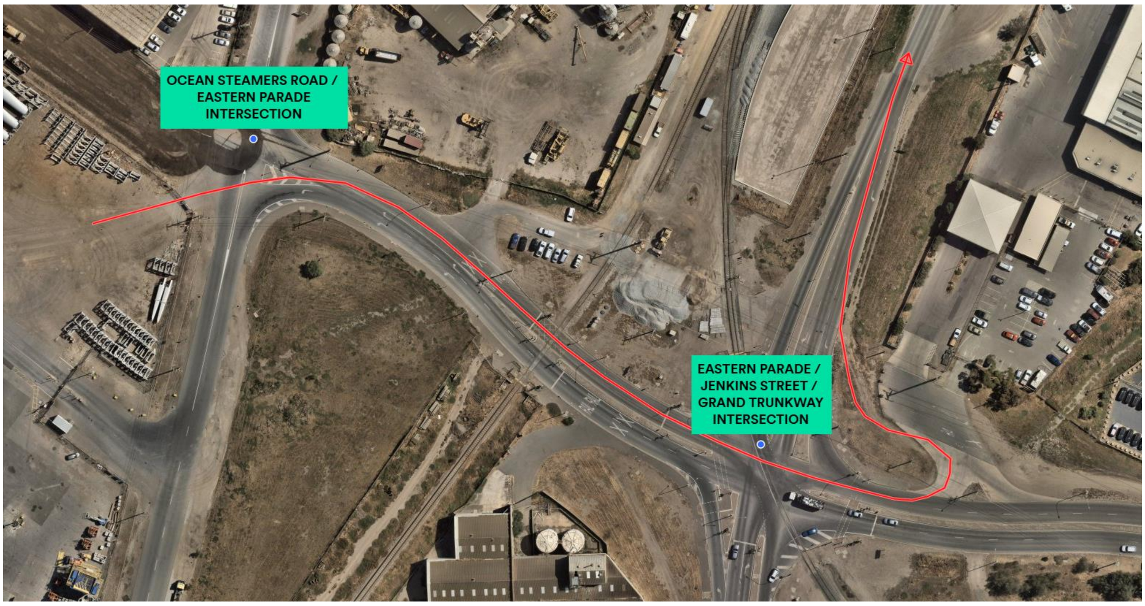
3.5.3 Additional Pinch Points – 2018 Traffic Management Plan

During the preparation of a previous Traffic Management Plan during 2018 to facilitate the original BIPS deliveries from Berth 19, there were numerous pinch points identified along Route A. These pinch points concerned the transportation of a Wartsilla Engine (14.7m Length, 3.86m Width, 6.05m Height) with an over-dimensional vehicle. The route assessment identified the following pinch points along the route highlighted below in Figure 12:

- Ocean Steamers Road / Eastern Parade Intersection
  - Signs within the intersection were flagged for temporary removal during transportation
- Eastern Parade / Jenkins Street / Grand Trunkway Intersection
  - Signage and Flashing Lights associated with the railway crossing through this intersection were positioned 7m apart and impeded northbound left-turn movements from Eastern Parade onto Grand Trunkway
  - The alternative means of accessing Grand Trunkway required the establishment of a temporary access road on the north-eastern verge (as seen in Figure 12)
  - A Low-hanging Power Line (~6m above the road surface) was identified and flagged to be temporarily raised to facilitate the transportation movement
- Grand Trunkway
  - Low-hanging Power Lines (~7m above the road surface) identified immediately south of the Grand Trunkway bridge onto Garden Island were identified for further detailed assessment to confirm any possible impediment of the transportation route

As some of the infrastructure along this route has been modified since 2018, it is crucial that the route is subject to another detailed assessment during the development of new TMPs for BIPS 2. This will confirm the continued presence of these pinch points that require localised management as in 2018, as well as any new pinch points that may now be encountered along Route A.

Figure 12 Route identified in 2018 TMP from Berth 19 to Grand Trunkway



Source: NearMap, 2024

3.6 Site Access

Access to the BIPS 2 site is along the Grand Trunkway from either Jenkins Street or Eastern Parade, all of which are State roads maintained by DIT, followed by a traversal of the existing causeway that extends from the western tip of Garden Island to Torrens Island (as shown in Figure 13 below).

The internal road network within Torrens Island beyond the checkpoint requires a further detailed site investigation and assessment during the development of a future TMP to determine the roads' suitability to accommodate vehicles that will carry large components and materials.

Figure 13 Grand Trunkway access to Garden Island and Torrens Island (shown in blue)

Source: NearMap, 2024

4.0 Transportation Requirements

4.1 Development Lifespan Phases

While the precise details of the BIPS 2 project are subject to further refinement, it will incorporate the following key changes to the Approved Project:

- Enabling the use of either Reciprocating engines or Gas Turbines for BIPS 2 and increasing the output to 280MW
- Connections to the adjacent ElectraNet switchyard and the laying of underground connection cables
- Revisions to the locations of the laydown areas, site access, internal roads and carparking
- Additional diesel storage capacity
- Associated civil works, including a stormwater pond
- Gas blending station and associated connections

As detailed in Section 1.3, the two phases of the BIPS 2 project that are covered by this TIA are the Construction Phase and the Operational Phase, with the Decommissioning Phase to be detailed in a future TIA. It is expected that significant additional traffic volumes will be generated during the Construction Phase relative to the Operational Phase.

4.1.1 Construction Phase

The anticipated 18-month construction phase will have a relatively significant impact on the daily traffic volumes in the immediate vicinity of the project, while the impacts on the busier roads of the national highway network will be less apparent due to the comparatively higher daily traffic volumes. The construction vehicles traversing the roads identified in Section 3.3 will be required to facilitate the:

- Delivery of gas turbines or reciprocating engines (depending on the determined strategy)
- Delivery of electrical transformers
- Delivery of power connection cables and equipment
- Delivery of diesel storage facility components
- Delivery of equipment and materials to facilitate the construction of the stormwater pond, new laydown areas, internal roads and carparking facilities
- Delivery of gas blending station infrastructure and piping
- Daily transportation of the anticipated 200 construction workers

4.1.2 Operational Phase

It is expected that approximately ten (10) additional jobs will be created for the duration of the anticipated 25-year design life of the BIPS project. The traffic movements associated with the ongoing operations and maintenance activities at the site are expected to travel along the designated routes identified in Section 3.1, and incorporate:

- Daily commuting of BIPS staff
- Staff accessing the site for routine servicing and maintenance activities
- Delivery of replacement parts
- Delivery of workers and materials to facilitate maintenance or repair works to the site access roads and carparking facilities

4.2 Equipment Specifications

While precise equipment specifications are subject to the final decision on whether to proceed with Gas Turbines or Reciprocating Engines, it can be assumed that the items specified in the 2018 TMP for BIPS 1 will closely resemble the specifications of BIPS 2. The Break Bulk Cargo specified in the 2018 TMP for transportation from Berth 19 comprised:

- Power Plant components including Steel Structure, Wall Panels, Roof, Stack structure, Process Ventilation, and Mechanical Equipment
- Break Bulk Cargo including Radiators, CAFs (Compressed Air Foam system), Silencer, Auxiliary Transformer, Cranes, BSU (Battery Supply Unit)
- Major Mechanical and Electrical Equipment including Piping, Cabling, Platforms, SCR (Silicon Controlled Rectifier)
- Generators
- Engines

5.0 Projected Traffic Generation and Impacts

5.1 Construction Phase

Estimated construction vehicle traffic volumes, in accordance with the respective assumptions upon which they are based, are summarised in the tables below with a conservative 10% increase applied to accommodate any unanticipated changes to the nature of these movements. It should be noted that:

- The values have been estimated with an assumption of 6-day working weeks
- Due to the fixed nature of various project components (that is, the quantities of generators, reciprocating engines, diesel storage components and underground connection cables are all fixed), the 10% contingency has not been applied across every element of the project.
- The quantities in Table 8 to Table 12 replicate the estimates from the previous 2018 TMP developed for the delivery of the BIPS 1 project components which is of similar scope to BIPS 2.
  - This includes the both the Forecasted Construction Traffic Demand as well as the Break Bulk Cargo delivered in containers.
  - While BIPS 1 involved the mobilisation of reciprocating engines, and BIPS 2 conversely allows for the mobilisation of either reciprocating engines or gas turbines, it has been assumed that the traffic requirements to mobilise gas turbines would be similar in terms of:
    - Vehicle types required
    - Travel along the respective gazetted routes
  - The respective assumptions of what was estimated for the BIPS 1 project are outlined in brackets

Table 8 Estimated total construction traffic for 3-week site mobilisation (in accordance with 2018 TMP for BIPS 1)

Components	Estimated Total Trips (One-Way)	Total Trips with 10% Contingency (One-Way)	Vehicle Type
Daily Workforce	54 (3x LVs per day)	70	Light Vehicles
Site Mobilisation – Buildings	30 (30x OSOM trailers)	35	Heavy duty semi-trailer (Over size / Over mass)
Site Establishment – Franna	3 (staggered weekly delivery assumed)	3	Franna (Assume 40t Crane)
Site Establishment – Elevated Work Platform Delivery	1 (single delivery assumed)	1	Semi-trailer / B-double
Total Light Vehicle Movements (one way)	**54**	**60**	**Car / Light Vehicles**
Total Heavy Commercial Vehicle (HCV) Movements (one way)	**1**	**1**	**HCVs**
Total OSOM Vehicle Movements (one way)	**33**	**38**	**OSOM**

Table 9 Estimated total construction traffic for 12-week piling works (in accordance with 2018 TMP for BIPS 1)

Components	Estimated Total Trips (One-Way)	Total Trips with 10% Contingency (One-Way)	Vehicle Type
Equipment mobilisation	1 (single mobilisation)	1	Semi-trailer
Large equipment mobilisation	7 (single mobilisation of 7x low-loader trailers)	7	Low Loader
Workforce (LVs)	288 (4x per day)	320	Light vehicles
Workforce (Bus)	155 (2x per day)	160	Controlled Access Bus
Delivery of Cages	3 (3x truckloads)	3	Semi-trailer
Cement Delivery	24 (24x Ag-trucks)	24	Cement Agitator Truck
Fuel Deliveries	72 (1x per day)	80	Mini Fuel Tanker
Total Light Vehicle Movements (one way)	**288**	**320**	**Car / Light Vehicles**
Total Heavy Commercial Vehicle (HCV) Movements (one way)	**244**	**268**	**HCVs**
Total OSOM Vehicle Movements (one way)	**7**	**7**	**OSOM**

Table 10 Estimated total construction traffic for 20-week Foundation works (in accordance with 2018 TMP for BIPS 1)

Components	Estimated Total Trips (One-Way)	Total Trips with 10% Contingency (One-Way)	Vehicle Type
Deliveries – Semi Trailer	3 (single mobilisation)	3	Semi-trailer
Deliveries – Drop Deck Trailer	7 (single mobilisation of 7x break bulk cargo shipments)	7	Low Loader
Workforce (LVs)	600 (5x per day)	660	Light vehicles
Workforce (Bus)	360 (3x per day)	400	Controlled Access Bus
Concrete Works	120 (Daily)	135	Concrete Pump Truck
Fuel Delivery	120 (Daily)	135	Mini Fuel Tanker
Additional Deliveries – Semi-trailer	120 (Daily)	135	Semi-trailer
Total Light Vehicle Movements (one way)	**600**	**660**	**Car / Light Vehicles**
Total Heavy Commercial Vehicle (HCV) Movements (one way)	**723**	**808**	**HCVs**
Total OSOM Vehicle Movements (one way)	**7**	**7**	**OSOM**

Table 11 Estimated total construction traffic for 28-week SMPE (Structural, Mechanical, Piping, Electrical) works (in accordance with TMP for BIPS 1)

Components	Estimated Total Trips (One-Way)	Total Trips with 10% Contingency (One-Way)	Vehicle Type
Deliveries – Semi Trailer	10 (single mobilisation of 10x semi-trailers)	10	Semi-trailer
Deliveries – Drop Deck Trailer	10 (single mobilisation of 10x low-loaders)	10	Low Loader
Workforce (LVs)	1,680 (10x per day)	1,850	Light vehicles
Workforce (Bus)	672 (4x per day)	740	Controlled Access Bus
Fuel Delivery	168 (Daily)	185	Mini Fuel Tanker
Ongoing Equipment Deliveries	840 (5x per day)	925	Rigid truck and trailer
Total Light Vehicle Movements (one way)	**1,680**	**1,850**	**Car / Light Vehicles**
Total Heavy Commercial Vehicle (HCV) Movements (one way)	**1,690**	**1,860**	**HCVs**
Total OSOM Vehicle Movements (one way)	**10**	**10**	**OSOM**

Table 12 Estimated total construction traffic for general requirements over the approximately 72-week construction period

Components	Estimated Total Trips (One-Way)	Total Trips with 10% Contingency (One-Way)	Vehicle Type
Waste Disposal	144 (2x per week)	160	Waste disposal truck
Septic removal	216 (3x per week)	240	Septic truck
Site visitors	216 (3x per week)	240	Light vehicles
Total Light Vehicle Movements (one way)	**216**	**240**	**Car / Light Vehicles**
Total Heavy Commercial Vehicle (HCV) Movements (one way)	**360**	**400**	**HCVs**
Total OSOM Vehicle Movements (one way)	**0**	**0**	**OSOM**

5.2 Operation Phase

It is anticipated that the traffic volumes associated with the Operational phase will closely resemble the volumes generated by the current operations due to only ten (10) additional jobs due to be created at BIPS 2.

While the testing and commissioning phase will require a temporary increase in the daily workforce due to the attendance of technical and maintenance specialists on-site, it is expected that this will only be for the first six (6) months and will typically involve commercial vehicles such as light vehicles and four-wheel drives instead of OSOM vehicles.

The traffic generated during this period can be categorised into the following components:

- Permanent workforce undertaking a daily commute to site from their homes in light vehicles and four-wheel drives (as are typically used by blue collar workers)
- Routine inspection and maintenance by operational personnel from their homes in light vehicles and four-wheel drives
- Heavy maintenance and repair deliveries accessing the site on an as-needed basis in heavy vehicles, with specific deliveries on over-sized vehicles requiring temporary traffic management if the routes highlighted in Section 3.1 and Section 3.3 are insufficient for the required vehicle type
- Similar such increases in vehicular traffic may also occur throughout the lifecycle of BIPS 2 during major maintenance periods.

5.3 Decommissioning Phase

As detailed in Section 1.3, a new TIA will be developed upon decommissioning of the site. As the volumes on the surrounding road network will have likely changed by this point in time, the traffic volumes should be re-assessed in the context of this change to gauge an understanding of the anticipated impacts.

5.4 Traffic Impacts

For the purposes of this assessment, the traffic generated by the construction phase of the project is divided into the following three categories:

1. Light vehicles (e.g. Cars, Utes, Four-wheel drives) typically used by the daily workforce
2. Heavy Commercial Vehicles (e.g. >2-tonne Trucks, Semi-Trailers, Tipper Trucks, Concrete Ag-Trucks, Buses, Waste and Septic disposal trucks, etc) typically used for most material deliveries along the surrounding State-maintained road network
3. Over Size / Over Mass Vehicles exceeding the general access dimensions, limited to travel along the Restricted Access routes identified in Section 3.3 under NHVR and DIT permits

To properly evaluate the expected impacts of these movements on the surrounding network, the trip generations estimated in Section 3.1 and 5.1 have been converted to Annual Average Daily Traffic (AADT) volumes in the tables below.

Table 13 One-way Traffic generated during Construction Phase

Vehicle Type	Total Generated Traffic (As per Section 5.1)	Traffic during peak construction period (assumed 80% of Total Generated Traffic)	Peak daily traffic (assumed 6x working days over 72 weeks)
Light Vehicles	3,130	2,504	6
Heavy Commercial Vehicles	3,337	2,670	7
OSOM	62	50	1
Total	6,529	5,224	14

By doubling these determined traffic movements (to reflect the two-way movements of each vehicle then returning from site), these AADT volumes can be compared to the volumes on the surrounding State roads.

Table 14 Traffic Impact Assessment on State Roads

State Road	Existing Traffic Volumes (As per Section 3.1)	Total Traffic Volumes (Existing + Estimated Increase)	Traffic Increase (%)
Victoria Road	32,100	32,128	0.1%
Port River Expressway	46,000	46,028	0.1%
Perkins Drive	4,000	4,028	0.7%
Ocean Steamers Drive	850	878	3.3%
Eastern Parade	3,600	3,628	0.8%
Grand Trunkway	3,300	3,328	0.8%
Causeway Entrance	315	343	8.9%

From the perspective of the capacity and volumes of the existing road network, it is not anticipated that the added construction traffic will have a significant impact on the overall functionality. While there may be a slightly noticeable increase in the daily traffic volumes on Ocean Steamers Drive and the Torrens Island Causeway (that are not expected to exceed those experienced during BIPS 1), it must be noted that these roads have the capacity to accommodate these increases and ensure that there is not a significant effect on their functionality.

Additionally, it must also be noted that the OSOM vehicles requiring pilot vehicles as noted in Section 3.4 will be appropriately managed to minimise the delays and general impacts to the roads which they traverse.

6.0 Recommendations

6.1 Site Accessibility

There are three primary routes detailed in Section 3.1 that could be used by vehicles to make deliveries to the site depending on the origin of the respective components being delivered. These routes from the Inner Harbour Berth 19, the Outer Harbor Container Terminal, or from Domestic locations, are summarised as follows:

- Route A = Ocean Steamers Road – Eastern Parade – Grand Trunkway
- Route B1 = Victoria Road – Port River Expressway – Jenkins Street – Grand Trunkway
- Route B2 = Victoria Road – Port River Expressway – Eastern Parade – Grand Trunkway
- Route C1 = Port River Expressway – Jenkins Street – Grand Trunkway
- Route C2 = Port River Expressway – Eastern Parade – Grand Trunkway

In addition to Route A deliveries from Berth 19, it is recommended that Routes B2 and C2 are prioritised for deliveries from Outer Harbor and Domestic locations, respectively. These two routes facilitate a greater variety of vehicle types than can be accommodated on the respective Routes B1 and C1, and although the quantity of such over-sized deliveries could be relatively minor, explicitly advising operators to use Routes B2 and C2 could help minimise confusion. Due to the limited available information, the BIPS 1 Traffic Management Plan is referenced to determine the heaviest potential load, which consists of twelve (12) reciprocating engines, each weighing 24 tonnes, with a total weight of 288 tonnes. Both the Port River Expressway and Torrens Island Bridge are capable of handling these loads (subject to the proposed transport trailer axle configuration and subsequent confirmation from DIT's structural unit for bridge capacity assessment).

6.2 Traffic Impacts

Consistent with BIPS 1, the frequent OSOM and construction vehicle movements expected during the construction phase will be evident on the surrounding road network, while the operational and decommissioning phases will be comparatively unaffected.

It is advised that a detailed TMP be developed in conjunction with DIT, the Port Adelaide Enfield Council and Flinders Ports to ensure minimal impacts to residents, businesses and other stakeholders in the vicinity of the project. Such TMPs should include:

- Specifically defined delivery periods during which the various controls can be implemented to facilitate OSOM vehicle movements
- Precise access routes to clearly identify the affected parts of the road network to stakeholders
- Appropriate signage, traffic controls, and details of pilot vehicles and operational procedures that will address traffic-related impacts and ensure the proper use of the designated routes

6.3 Improvements

Noting that the identified Routes A2 and B2 can accommodate most of the vehicles expected during the construction phase, further improvements to these roads to accommodate even larger vehicles are not expected but are subject to confirmation through further detailed turning path assessments. This includes confirming whether the 2018 BIPS 1 TMP modifications to the following assets will need to be repeated:

- Temporary removal of signs within the Ocean Steamers Road / Eastern Parade Intersection
- Temporary removal of signs and flashing lights in the Eastern Parade / Jenkins Street / Grand Trunkway Intersection, combined with the establishment of a temporary access road
- Temporary raising of Low-hanging Power Lines to facilitate adequate clearances
- Temporary removal of posts delineating the central line of the Torrens Island causeway

7.0 Conclusions

Noting the need to utilise oversize and over-mass (OSOM) vehicles to facilitate the transportation of large power station components and construction equipment, it is expected that many potential issues associated with these vehicles can be managed by ensuring that these vehicles remain on the gazetted routes (specifically the three key routes flagged herein). However, it must be ensured that the adoption of these routes and the interface with site access be confirmed during the development of the necessary TMP at a later stage.

It is ultimately expected that the associated traffic impact will be similar to BIPS 1 and that traffic management issues can be managed by adopting the following measures:

- Implementation of temporary traffic management control (including pilot vehicles and localised road closures if necessary) during the transportation of some OSOM vehicles
- Encouraging the timing of OSOM vehicle movements to off-peak during the day or low-volume periods during the night, thereby reducing the interactions with other vehicles
- Encouraging car-pooling by construction workers to reduce the light vehicle volumes
- Possible establishment of an off-site carpark and associated shuttle bus service to transfer workers to site in concentrated vehicle movements
- Thorough collaboration with Flinders Ports, the local council (Port Adelaide Enfield) and DIT in the development of the TMPs required for operations. Bridge capacity assessment is required by DIT to confirm the bridge loadings
- Collaboration with Flinders Ports to understand any specific requirements surrounding the mobilisation of OSOM vehicles to transport cargo from their sites at Berth 19 and at Outer Harbor
- Conducting a detailed geometric and turn path assessment of the routes as part of the development of a detailed TMP to determine the need to modify specific intersections along the routes, modify the access gate on the Torrens Island causeway, or raise individual power lines to facilitate adequate clearances to the road surface

While there is anticipated to be an increase in the traffic volumes on the road network surrounding BIPS and Torrens Island during the construction period, it is not expected that it will involve a disproportionately large increase that compromises the broader operational integrity of these roads. While the presence of OSOM vehicles travelling at lower speeds than other vehicles could be a distraction or a hindrance to other motorists, it is expected that the risks associated with these movements will be captured in the development of the appropriate TMP and the obtaining of relevant permits from NHVR and DIT.

APPENDIX I OTR CERTIFICATE

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Ref: 2024D127908

Energy and Technical Regulation

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13 September 2024

Kevin Andersen
AGL Energy Ltd
Level 24, 200 George St
Sydney NSW 2000
kandersen@agl.com.au

Dear Kevin,

RE: Barker Inlet Power Station Stage 2 Project

The development of the Barker Inlet Power Station (BIPS) Stage 2 Project has been assessed by the Office of the Technical Regulator (OTR) under section 122 of the *Planning, Development and Infrastructure Act 2016.*

The *Planning, Development and Infrastructure (General) Regulations 2017* prescribe if the proposed development is for the purposes of the provision of electricity generating plant with a generating capacity of more than 5 MW that is to be connected to the State's power system – a certificate from the Technical Regulator is required, certifying that the proposed development complies with the requirements of the Technical Regulator in relation to the security and stability of the State's power system.

In deciding on your application, I have taken the following information into account:

- 20240905 BIPS 2 OTR Application Final.pdf

After assessing the information provided, I advise that approval is granted for the proposed generator on the following conditions:

- The requirements of the South Australian Generator Development Approval Procedure (GDAP) shall be met in full, via a mix of real inertia provided by the BIPS stage 2 synchronous machines, and fast frequency response (FFR) provided via the Torrens Island 250MW BESS.
- As the BIPS stage 2 project progresses, if issues are identified relating to the requirements of the GDAP, these shall be resolved to the satisfaction of the Technical Regulator.

Please note that the Torrens Island 250MW BESS is currently providing 6.14MW of FFR for the Barker Inlet Power Station and 170MW of FFR for AGL's proposed Barn Hill Wind Farm project. This results in a surplus of 74MW of FFR being available for the BIPS stage 2 project.

Should you have any questions regarding this matter, please do not hesitate to call Mark Burns on (08) 8429 2707.

Yours sincerely

Rob Faunt
TECHNICAL REGULATOR

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