AIR QUALITY ASSESSMENT

PROPOSED SERVICE STATION

LOGAN RESERVE NEIGHBOURHOOD CENTRE

LOGAN RESERVE

Prepared for:
Logan Reserve Central Pty Ltd

Prepared by:
MWA Environmental

29 April 2022

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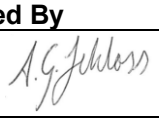
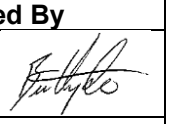
1 Report	29/04/2022	AS		BH	
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1.0 INTRODUCTION

1.1 STUDY BRIEF

MWA Environmental has been engaged to prepare an Air Quality Assessment report for a proposed service station within a Neighbourhood Centre development at Logan Reserve. The assessment has considered the potential impact of air pollutant and odour emissions from the proposed service station at surrounding sensitive uses and the approved childcare centre at the Neighbourhood Centre site.

The assessment of air pollutant concentrations at surrounding and on-site sensitive uses has been made against the air emission standards described in the *Environmental Management Planning Scheme Policy* of the *Logan Planning Scheme 2015*. Reference has also been made to the Air Quality Objectives in the *Environmental Protection (Air) Policy 2019* and Queensland *Ecoaccess Guideline: Odour Impact Assessment from Developments*.

1.2 SITE DESCRIPTION

The site is located at 1-15 Halcyon Way, Logan Reserve. The site has a real property description of Lot 2 on SP292432 and is zoned *Emerging Community* under the Logan City Council Planning Scheme.

The site location is shown on **Figure 1**.

Surrounding land uses are described as follows:

To the North:	Halcyon Way adjoining the subject site with land zoned *Emerging Community* located containing dwellings beyond.
To the East:	Arcare Aged Care facility to the east of the Neighbourhood Centre site.
To the South:	Narrow parcel of land providing access to a heritage cemetery to the southeast, with future residential subdivision development beyond. Land is zoned *Emerging Community*.
To the West:	Logan Reserve Road, with isolated residential dwellings on land zoned *Emerging Community* beyond.

An aerial photograph of the site and surrounding land uses is included as **Figure 2**.

1.3 PROPOSED DEVELOPMENT

The proposed service station is located on the southwestern portion of the Neighbourhood Centre site. The service station will comprise of four double-sided multi-product bowsers located under the refuelling canopy, with the refuelling canopy located to the west of the shop building, fronting Logan Reserve Road.

Proposed development plans are included in **Attachment 1**.

The proposed service station will incorporate a Stage 1 ("VR1") vapour recovery control system to minimise emissions from underground tank vent pipes when bulk refilling is occurring.

Presented on **Figure 3** are the locations of the nominated discrete receptors, representative of the most exposed surrounding and onsite sensitive uses.

Discrete receptors have been nominated on the facades of the nearest surrounding offsite residential dwellings, in addition to several discrete receptors located on the subject site at the boundary of internal and external educational areas of the proposed on-site childcare centre.

The underground storage tank vent pipes are proposed to be located to the north of the fuel dispensing area (refer **Figure 3**). The vent pipes are recommended to be a minimum height of 4 metres above ground level in accordance with AS1940:2017. The minimum setback distance from the vent pipes to a sensitive use is approximately 55 metres from the residential boundary to the west and 87 metres to the proposed on-site childcare centre.

Four double-sided multi-product bowsers are proposed to be located under the refuelling canopy (refer **Figure 3**). The minimum setback distance from a bowser to a sensitive use is approximately 92 metres to the proposed on-site childcare centre. The bowsers are located a minimum of 14 metres from the southern boundary of the subject site.

The fuel sales volume has been estimated based upon economic analysis undertaken by Foresight Partners for the development. Projected fuel sales for the service station are approximately:

Annual Average Fuel Sales:	6 Million litres per annum including diesel
Average Daily Fuel Sales:	16,438 Litres per day including diesel

Conservatively peak day emissions have been based upon a daily fuel sales rate equivalent to 30 percent higher than the average day fuel sales i.e. total fuel sales of 21,370 litres of per peak day.

Diesel sales typically comprise in the order of 25 percent of total fuel sales from service stations. 'Motor spirit' fuels, including unleaded and ethanol blends, have a significantly higher vapour pressure and lower boiling point than diesel, with 'motor spirit' fuels more readily evaporating from a liquid state to gaseous state. Emissions associated with diesel are therefore minor in comparison to motor spirit related emissions and have not been specifically modelled. A conservative 15 percent diesel sales component has been adopted for this assessment.

1.4 LOGAN PLANNING SCHEME PROVISIONS

The principal air quality issue related to the proposed development is the potential impact of volatile organic compounds and odour emissions from the service station on surrounding and on-site sensitive uses.

The assessment of air pollutant concentrations at surrounding sensitive uses has been made against the air emission standards described in the *Environmental Management Planning Scheme Policy* of the *Logan Planning Scheme 2015*. Reference has also been made to the Air Quality Objectives in the *Environmental Protection (Air) Policy 2019* and Queensland *Ecoaccess Guideline: Odour Impact Assessment from Developments*.

Presented below is an extract of the relevant outcomes from the *Logan Planning Scheme*, *Management of emissions and hazardous activities code* with respect to a proposed service station.

Table 9.4.5.3.1–Management of emissions and hazardous activities code: accepted development (subject to requirements) and assessable development

Performance Outcome	***Acceptable Outcome***
PO2 *A Service station is designed and constructed to ensure that on-site operations:* *a. do not cause environmental harm;* *b. do not result in the release of untreated pollutants;* *c. prevent the emission of contaminant to land, surface water or groundwater.*	***AO2*** *A Service station:* *a. is designed and constructed to comply with:* *i. AS1940-2004–The storage and handling of flammable and combustible liquids;* *ii. AS/NZS 1596:2008–The storage and handling of LP Gas;* *iii. Equipment Level 1 of AS4897-2008–The design, installation and operation of underground petroleum storage systems;* *iv. AS4977-2008–Petroleum products – Pipeline, road tanker compartment and underground tank identification;* *b. has installed and maintains and operates Stage 1 and Stage 2 Vapour Recovery Systems in compliance with NSW DECC Standards and Best Practice Guidelines for Vapour Recovery at Petrol Service Stations;* *c. is designed and managed to prevent the discharge of contaminants to the stormwater system by:* *i. discharging contaminants in the fuel dispensing area (under canopy) to a blind sump with a minimum capacity of 10kL;*

	ii. discharging contaminants in the general forecourt (not under canopy) to the stormwater system via a separator with a minimum capacity of 10kL; *iii. discharging contaminants from the underground storage tank remote fill point to an on-site holding tank;* *d. has a spill activated cut-off valve installed.*

With reference to Acceptable Outcome AO2 of the *Logan Planning Scheme*, *Management of emissions and hazardous activities code*:

- The proposed service station will incorporate a Stage 1 ("VR1") vapour recovery control system to minimise emissions from underground tank vent pipes when bulk refilling is occurring.

To address Performance Outcome PO2a of the *Logan Planning Scheme, Management of emissions and hazardous activities code*:

- A detailed air quality assessment has been prepared to address the potential air quality impacts from operation of the service station development at surrounding sensitive uses and the proposed on-site childcare centre.

2.0 AIR QUALITY ASSESSMENT

2.1 DESCRIPTION OF SERVICE STATION EMISSIONS

Air pollutant emissions from a service station are predominantly Volatile Organic Compounds (VOCs) released during the following processes:

- Fuel Delivery **Loading** of Underground Tanks
- Underground Storage Tank **Breathing**
- Fugitive Emissions from **Refuelling** of vehicles
- Fugitive Emissions from **Spillages**

For the purposes of estimating representative air pollutant and odour emission rates reference has been made to:

(a) **Published emission factors** in the NPI Manual[1]**,** for the estimation of Total VOC and speciated individual contaminant emissions, and

(b) **Mass balance analysis**, for the estimation of odour emissions based upon NPI Manual Total VOC emission factors with reference to the unleaded fuel odour detection threshold[2]

Air pollutant emission rates of individual contaminants have been determined from the NPI Manual Total VOC emission factors (Table 2) with speciation based upon typical unleaded composition (Table 3).

'Whoosh' emissions released by vehicles prior to refuelling, have been estimated based upon California Air Pollution Control Officers Association (CAPCOA) – Air Toxics "Hot Spots" Program - Gasoline Service Station Industrywide Risk Assessment Guidelines.

Calculated odour emissions are based upon predicted Total VOC concentrations and an odour detection threshold of 1,888 µg Total VOC/m^3 as determined from an investigation commissioned by MWA Environmental in April 2015.

MWA commissioned Air Noise Environment to take duplicate samples of fugitive emissions from an unleaded petrol can in April 2015. The samples were analysed for Total VOC concentration and for odour (by olfactometry) by The Odour Unit. The results of the analysis allow for calculation of the odour detection threshold and thus correlation between predicted Total VOC concentrations and Odour Units. As a conservative assumption, the lower measured odour detection threshold of 1,888 µg/m^3 Total VOC has been applied for the purposes of assessing odour concentrations from Total VOC modelling results.

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1 *Emissions Estimation Techniques Manual for Aggregated Emissions from Service Stations* (Environment Australia, 1999)

2 Based upon Air Noise Environment and The Odour Unit testing commissioned by MWA Environmental in April 2015

The results of the analyses and calculation of the odour detection threshold for representative fuel based upon Total VOC concentration are provided in **Attachment 2**.

The following assumptions have been made for the purpose of estimating air pollutant emissions from the proposed service station.

- 24-hour operation of the service station
- Delivery of fuel to underground storage tanks conservatively undertaken by 54,500 litre tankers.
- Several bulk tanker fuel deliveries per week[3] as required which may occur at any time of day as triggered by automated tank level monitors but more typically during the daytime and evening periods;
- Bulk refuelling conservatively represented as occurring for 1 hour of every day of the year with delivery hour delayed by one hour each day (i.e. 1 January bulk refuelling from Midnight to 1am, 2 January bulk refuelling from 1am to 2am, 3 January bulk refuelling from 2am to 3am, etc.). This methodology provides a representation of bulk refuelling events and also considers the different periods of the day when these events may occur.
- Conservative estimate of annual fuel sales of 6 million litres per annum
- Estimated peak daily fuel sales of 21,370 litres which relates to 30 percent higher than the average fuel sales.
- Hourly emissions distributed based upon a daily sales profile as distributed per Brisbane City Council guidance[4] for the assessment of service station developments.
- Stage 1 ("VR1") vapour recovery system
- 'Whoosh' emissions based upon the 'upper limit' emission factor specified by CAPCOA.

The emission rate calculations have considered the maximum 1% volume national Benzene regulation that came into effect on 1 January 2006. The previous Queensland regulation was for a maximum of 3.5% Benzene in petrol. Thus, the current national regulation has resulted in a significant reduction in Benzene emissions from service stations in Queensland.

Detailed emission estimation calculations are included as **Attachment 3**.

[3] Fewer than one per day based upon tanker capacity and estimated annual fuel sales
[4] Applied in lieu of specific guidance from Logan City Council

2.2 AMBIENT AIR QUALITY

The Queensland Government operates a network of ambient air quality monitoring stations across the state.

Key air pollutant emissions associated with service stations are Volatile Organic Compounds (VOCs) including Toluene, Xylene and Benzene.

Ambient air quality data for these three pollutants is routinely monitored at Springwood. An assessment of ambient concentrations of Toluene, Xylene and Benzene has been performed for five recent years of hourly-averaged air quality monitoring data from the Springwood monitoring site.

A summary of the annual average and 70th percentile ambient air pollutant measurements from the Springwood monitoring site over years 2015 to 2019, for inclusion in the dispersion modelling predictions as background concentrations is presented in **Table 1**.

Table 1: Ambient Air Pollutant Concentrations – Queensland Government Data - Springwood

Pollutant	Averaging Period	Concentration[1] (µg/m^3)	Statistical Reference
Benzene	1-hour average	5.9	1-hour average 90th percentile over 5 years from 2016 to 2020 at Springwood
	Annual Average	3.6	Average over 5 years from 2016 to 2020 at Springwood
Toluene	1-hour average	21.8	1-hour average 90th percentile over 5 years from 2016 to 2020 at Springwood
	24-hour average	10.5	24-hour average 70th percentile over 5 years from 2016 to 2020 at Springwood
	Annual Average	10.0	Average over 5 years from 2016 to 2020 at Springwood
Xylenes	1-hour average	59.2	1-hour average 90th percentile over 5 years from 2016 to 2020 at Springwood
	24-hour average	42.2	24-hour average 70th percentile over 5 years from 2016 to 2020 at Springwood
	Annual Average	37.3	Average over 5 years from 2016 to 2020 at Springwood

2.3 RELEVANT AIR QUALITY PLANNING CRITERIA

The assessment of air pollutant concentrations at surrounding sensitive uses and the proposed onsite childcare centre has been made against the air emission standards described in the *Environmental Management Planning Scheme Policy* of the *Logan Planning Scheme 2015*. Reference has also been made to the Air Quality Objectives in the *Environmental Protection (Air) Policy 2019* and Queensland *Ecoaccess Guideline: Odour Impact Assessment from Developments*.

Presented in **Table 2** are the adopted air quality planning criteria relevant to the assessment of air pollutant impacts from the proposed service station.

For averaging periods, less than or equal to 1 hour, 99.9th percentile concentrations are assessed. For longer averaging times, assessment is based upon the maximum predicted concentrations.

Table 2: Air Quality Planning Criteria

Pollutant	Averaging Period	Adopted Air Quality Planning Criteria (µg/m^3)	Health Outcome Protected	Source
Benzene	3-minute	53	Design ground level concentrations	Logan
	Annual	5.4	Health and wellbeing	EPP (Air)
Ethyl-benzene	3-minute	14,500	Design ground level concentrations	Logan
Styrene	3-minute	210	Design ground level concentrations	Logan
	30-minute	75	Protecting aesthetic environment	EPP (Air)
	7 days	280	Health and wellbeing	EPP (Air)
Toluene	3-minute	650	Design ground level concentrations	Logan
	30-minute	1,100	Protecting aesthetic environment	EPP (Air)
	24 hours	4,100	Health and wellbeing	EPP (Air)
	Annual	410	Health and wellbeing	EPP (Air)
Xylenes	3-minute	350	Design ground level concentrations	Logan
	24 hours	1,200	Health and wellbeing	EPP (Air)
	Annual	950	Health and wellbeing	EPP (Air)
Odour	1-hour 99.5th percentile	2.5 Odour Units	Odour	QLD Odour Guideline

2.4 METEOROLOGICAL MODELLING

To enable assessment of air pollutant concentrations at surrounding sensitive uses as a result of emissions from the proposed service station, detailed dispersion modelling has been conducted using the TAPM / CALMET / CALPUFF modelling suite.

Following accepted methodology for detailed assessment, the TAPM software was utilised to develop a prognostic meteorological model which generated a year of representative hourly meteorological data for the region.

TAPM has been used to predict meteorological parameters specific to the region including temperature, wind speed, wind direction and stability classification. The model accesses databases of surface characteristics (terrain height, soil and vegetation) and synoptic weather analyses provided by CSIRO to carry out these analyses. TAPM is able to process the output data to produce input meteorological data files suitable for input to the CALMET / CALPUFF modelling system i.e. hourly predictions of meteorological parameters over a full year and generation of surface, upper air and geophysical data files.

Technical discussion of the model algorithms, inputs and model validation studies are provided in the *Part 1: Technical Paper* (Hurley, 2002) and *Part 2: Summary of Verification Studies* (Hurley *et al*, 2002)[5,6].

The centre coordinates for the model grid were Latitude -27°42'30" and Longitude 153°7'. The following nested model grids were applied to the TAPM modelling:

35 x 30 km grid (total area 1050 km x 1050 km)
35 x 10 km grid (total area 350 km x 350 km)
35 x 3 km grid (total area 105 km x 105 km)
35 x 1 km grid (total area 35 km x 35 km)

Twenty-five vertical grid levels were modelled.

The TAPM model was set up to generate a site-specific meteorological data file for the locality, based upon synoptic analysis data for the representative Year 2020, as provided by CSIRO.

Observed wind speeds and wind directions for the Bureau of Meteorology (BoM) station at Greenbank was incorporated into the TAPM model as assimilation data.

[5] Hurley, P.J. (2002) The Air Pollution Model (TAPM) Version 2: User Manual. Aspendale: CSIRO Atmospheric Research Internal Paper.

[6] Hurley, P.J. (2002) The Air Pollution Model (TAPM) Version 2: Part 1: Technical Description. Aspendale: CSIRO Atmospheric Research Technical Paper.

The TAPM output was processed using the CALTAPM software to produce a 3-dimensional data file suitable for input to the diagnostic CALMET model as an 'initial guess field'. The CALMET model further resolved the prognostic meteorology to a finer terrain, land use and soil type resolution of 100 metres over a 6 x 6 km area covering the subject site and surrounding region for the purpose of dispersion modelling.

Analysis of the CALMET derived meteorology for the site including a wind rose, wind frequency graph, monthly average temperatures graph and stability class analysis is contained in **Attachment 4**.

2.5 MODELLING METHODOLOGY

The CALPUFF model has been used for this assessment to predict the resultant concentrations of Total VOC, individual contaminants and odour emissions from the proposed service station at surrounding sensitive receptors and the proposed on-site childcare centre.

The dispersion modelling has predicted the resultant cumulative exposure of air pollutants at surrounding sensitive receptors from the service station and the proposed on-site childcare centre and ambient background concentrations.

The CALPUFF model was set up to model dispersion within a 300m x 300m area covering the service stations and surrounding sensitive uses. A gridded receptor mesh with 5 metre spacing over the modelling domain was used for the CALPUFF model given the proximity of the proposed service station to the surrounding sensitive uses.

Presented in **Figure 3** are locations of the nominated discrete receptors representative of the most exposed surrounding and onsite sensitive uses.

Discrete receptors have been represented at heights of 0 m above ground level (AGL), 1.5 mAGL, 3.0 mAGL and 4.5 mAGL, to enable assessment of predicted air pollutant concentrations up to two stories in height.

For the assessment of air pollutant concentrations with sub-1-hour average criteria, the *CSIRO Peak to Mean Calculator* has been adopted for scaling output by the CALPUFF model. For 3-minute averaging periods, a peak to mean ratio of 1.88 has been applied to the CALPUFF model output. For 30-minute averaging periods, a peak to mean ratio of 1.16 has been applied to the CALPUFF model output.

2.6 EMISSION SOURCE REPRESENTATION

The underground storage tank vent pipe emissions were represented as being released from a stack to the north of the refuelling canopy with the following properties:

Height:	4 metres above ground
Diameter:	0.075 metres
Exit velocity:	0.01 metres per second
Release temperature:	18 degrees Celsius

Emissions from vehicle refuelling including 'whoosh' emissions were modelled as being released from four (4) volume sources under the canopy area with the following properties:

Height:	1 metre above ground
Initial Vertical Spread:	1.16 metres
Initial Horizontal Spread:	1.16 metres

Emissions from fuel spillage under the canopy area have been modelled as being released from four (4) area sources with the following properties:

Height:	0 metres above ground
Length:	3 metres
Width:	3 metres

2.7 RESULTS OF DISPERSION MODELLING

The results of the air pollutant dispersion modelling of the service station are provided in **Table 3** for the discrete receptors representing surrounding and on-site sensitive uses.

The highest predicted concentrations over the modelled heights of 0, 1.5, 3.0 and 4.5mAGL have been assessed, representing the highest predicted exposure over two stories. The highest predicted concentrations are at ground level.

Table 3: Predicted Air Pollutant Concentrations (µg/m³) from Proposed Service Station including Ambient

Pollutant	Averaging Period	Highest Predicted Concentration Including Ambient at Surrounding Sensitive Uses and the Proposed onsite Childcare Centre (µg/m³)					Air Quality Planning Criteria (µg/m³)	Comply ?
		North	East	South	West	Future Childcare Centre		
Benzene	3-minute	32.8	17.2	41.4	26.2	21.3	53	Yes
	Annual	4.04	3.81	4.29	3.97	3.92	5.4	Yes
Ethyl-benzene	3-minute	6.5	2.7	8.6	4.9	3.7	14,500	Yes
Styrene	3-minute	0.23	0.10	0.31	0.17	0.13	210	Yes
	30-minute	0.14	0.06	0.19	0.11	0.08	75	Yes
	7 days	9E-03	5E-03	2E-02	8E-03	8E-03	280	Yes
Toluene	3-minute	110.4	59.2	138.7	88.7	72.6	650	Yes
	30-minute	76.4	44.8	93.9	63.0	53.1	1,100	Yes
	24 hours	17.0	14.3	27.4	18.5	15.8	4,100	Yes
	Annual	11.5	10.7	12.3	11.2	11.1	410	Yes
Xylenes	3-minute	94.7	74.2	106.1	86.0	79.5	350	Yes
	24 hours	44.8	43.7	49.0	45.4	44.3	1,200	Yes
	Annual	37.9	37.6	38.2	37.8	37.7	950	Yes
Odour	1-hour 99.5th percentile	1.14	0.60	2.11	1.20	0.84	2.5 Odour Units	Yes

The results demonstrate air pollutant emissions from the proposed service station will satisfy the relevant 'air quality planning criteria' and 'odour criteria' at surrounding sensitive uses and the proposed future onsite childcare centre.

Contour plots are presented in **Attachment 5** for concentrations of Odour and Benzene which have the highest predicted concentrations with respect to the relevant 'air quality planning criteria' and 'odour criteria' at surrounding sensitive uses and the proposed onsite childcare centre.

The predicted concentrations of other pollutants are a small fraction of the relevant 'air quality planning criteria', therefore gridded contour plots were not considered necessary for development assessment purposes.

The results of the air quality assessment demonstrate that, with the proposed Stage 1 ("VR1") vapour recovery system, the relevant air quality planning criteria and odour criteria will be satisfied at surrounding sensitive uses and the proposed onsite childcare centre.

3.0 CONCLUSION

MWA Environmental has been engaged to prepare an Air Quality Assessment report for a proposed service station within a Neighbourhood Centre development at Logan Reserve. The assessment has considered the potential impact of air pollutant and odour emissions from the proposed service station at surrounding sensitive uses and the approved childcare centre at the Neighbourhood Centre site.

With reference to Acceptable Outcome AO2 of the *Logan Planning Scheme, Management of emissions and hazardous activities code*:

- The proposed service station will incorporate a Stage 1 ("VR1") vapour recovery control system to minimise emissions from underground tank vent pipes when bulk refilling is occurring.

To address Performance Outcome PO2a of the *Logan Planning Scheme, Management of emissions and hazardous activities code*:

- A detailed air quality assessment has been prepared to address the potential air quality impacts from operation of the service station development at surrounding sensitive uses.

The assessment of air pollutant concentrations at surrounding sensitive uses has been made against the air emission standards described in the *Environmental Management Planning Scheme Policy* of the *Logan Planning Scheme 2015*. Reference has also been made to the Air Quality Objectives in the *Environmental Protection (Air) Policy 2019* and Queensland *Ecoaccess Guideline: Odour Impact Assessment from Developments*.

Detailed emission estimations and dispersion modelling have been undertaken in accordance with accepted methodologies to assess the potential impacts of the service station on surrounding sensitive uses and the proposed on-site childcare centre.

The results of the air quality assessment demonstrate that, with the proposed Stage 1 ("VR1") vapour recovery system, the relevant air quality planning criteria and odour criteria will be satisfied at surrounding sensitive uses and the proposed onsite childcare centre.

MWA Environmental
29 April 2022

FIGURES

LEGEND

PROPERTY BOUNDARY

SUBJECT SITE BOUNDARY

DRAWING REFERENCE

CLIENT

LOGAN RESERVE CENTRAL PTY LTD

PROJECT

AIR QUALITY ASSESSMENT

NEIGHBOURHOOD CENTRE INDOOR SPORTS AND RECREATION AND SERVICE STATION
1-15 HALCYON WAY
LOGAN RESERVE QLD

TITLE

SITE LOCATION AND SURROUNDING LAND USES

JOB	LOGAN RESERVE	**FIGURE 1**
JOB NO.	17-166	
DATE	29/04/22	DWG NUMBER
SCALE	1:18000 (A4)	**17-166-DA2-1**
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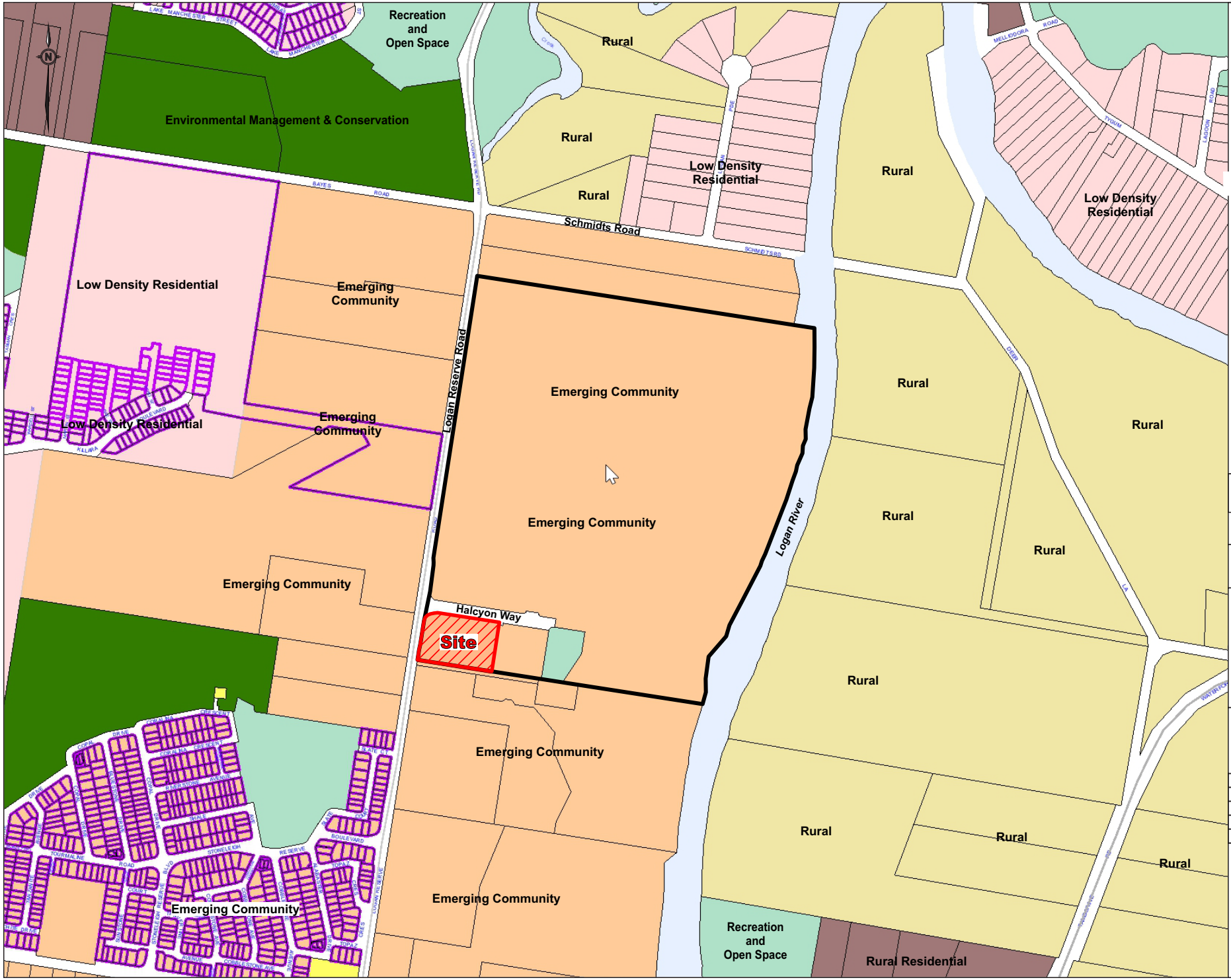

LEGEND

PROPERTY BOUNDARY
SUBJECT SITE BOUNDARY

Logan Planning Scheme 2015 Zones

- Centre
- Community facilities
- Emerging community
- Environmental management and conservation
- Low density residential
- Low impact industry
- Low-medium density residential
- Low density residential
- Medium impact industry
- Mixed use
- Priority development area
- Recreation and open space
- Rural
- Rural residential
- Special purpose
- Specialised centre

DRAWING REFERENCE
LOGAN CITY COUNCIL PLANNING SCHEME 2015, INTERACTIVE MAPPING, ZONING MAP.

0 100 200 300m

CLIENT
LOGAN RESERVE CENTRAL PTY LTD

PROJECT
AIR QUALITY ASSESSMENT
NEIGHBOURHOOD CENTRE INDOOR SPORTS AND RECREATION AND SERVICE STATION
1-15 HALCYON WAY
LOGAN RESERVE QLD

TITLE
LOGAN PLANNING SCHEME 2015 ZONING MAP

JOB	LOGAN RESERVE	**FIGURE 2**
JOB NO.	17-166	
DATE	29/04/22	DWG NUMBER
SCALE	1:10000 (A4)	**17-166-DA2-2**
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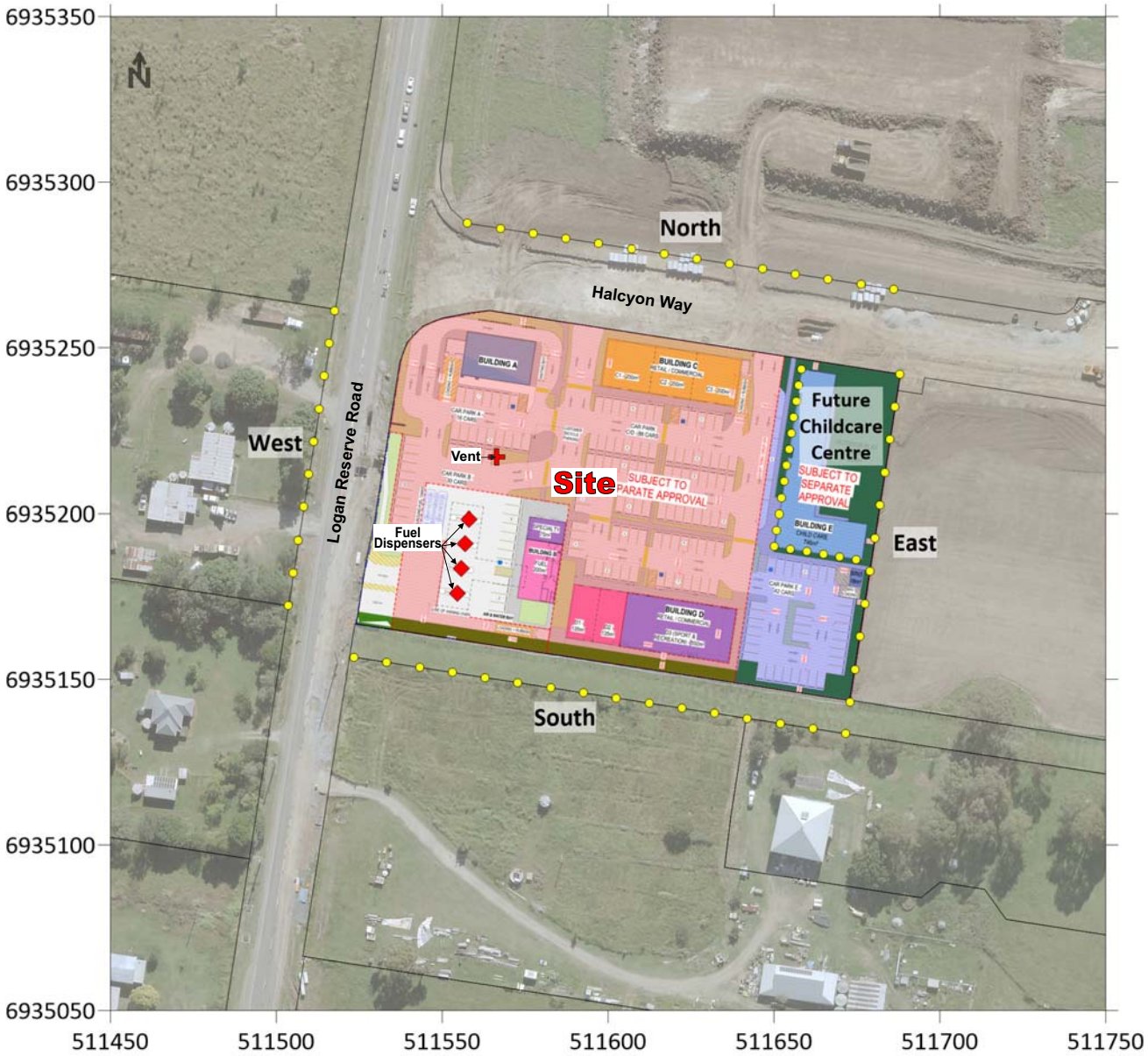

LEGEND

SENSITIVE RECEPTORS

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AIR QUALITY ASSESSMENT
NEIGHBOURHOOD CENTRE INDOOR SPORTS AND RECREATION AND SERVICE STATION
1-15 HALCYON WAY
LOGAN RESERVE QLD

TITLE
SENSITIVE RECEPTOR LOCATIONS

JOB	LOGAN RESERVE	**FIGURE 3**
JOB NO.	17-166	
DATE	29/04/22	DWG NUMBER
SCALE	1:2000 (A4)	**17-166-DA2-3**
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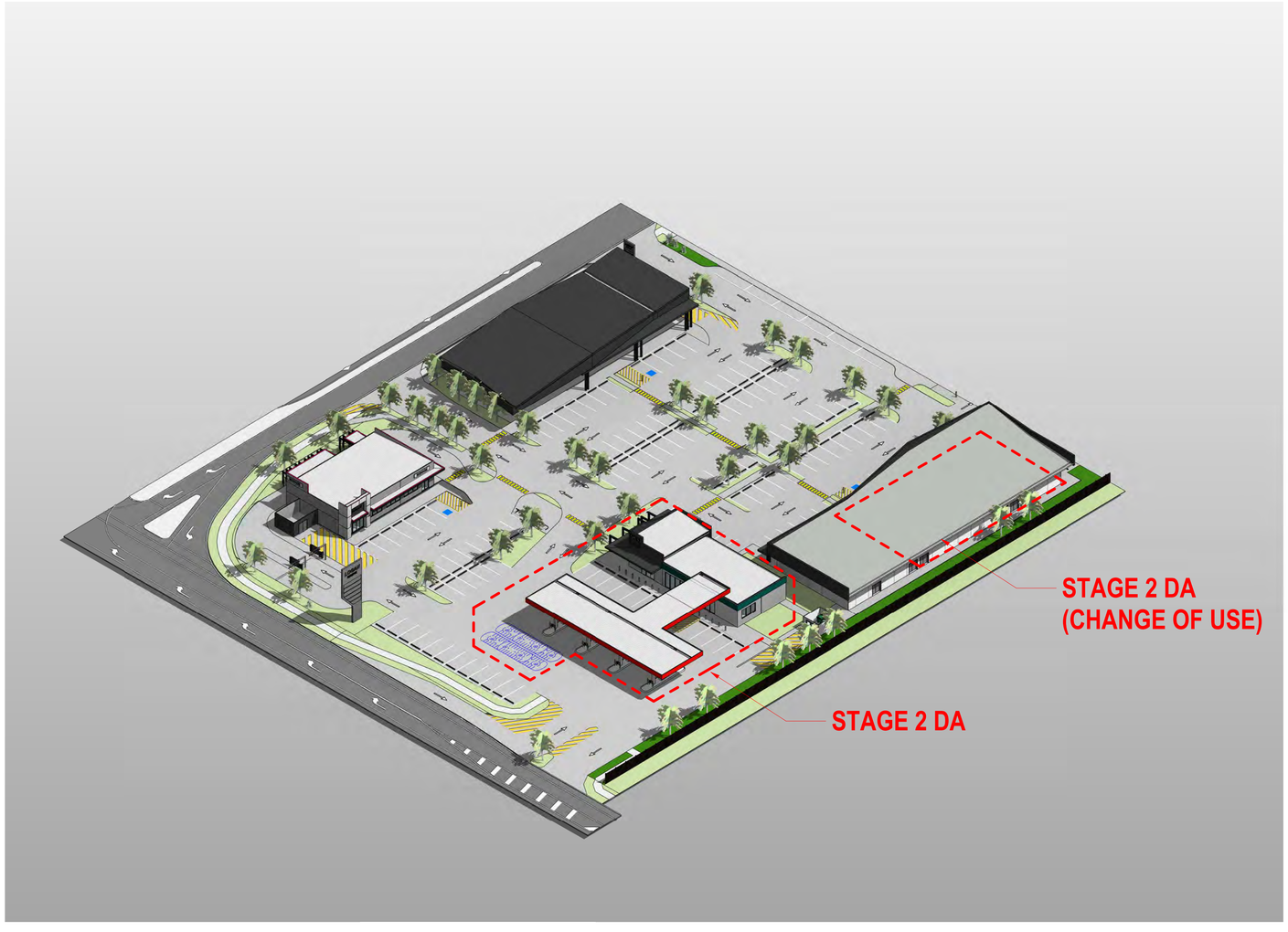
ATTACHMENT 1

Proposed Development Plans

LOGAN RESERVE NEIGHBOURHOOD SHOPPING CENTRE

200 LOGAN RESERVE ROAD, LOGAN RESERVE



PROPOSED DEVELOPMENT - AERIAL VIEW

SITE CONTEXT PLAN

DRAWING LIST - STAGE 02	
NUMBER	NAME
A- DA-2.01	STAGE 02 - COVER SHEET
A- DA-2.11	STAGE 02 - SITE PLAN
A- DA-2.31	BUILDING B - FLOOR PLAN
A- DA-2.33	BUILDING B - ELEVATIONS
A- DA-2.34	BUILDING B - ELEVATIONS / SECTION
A- DA-2.38	BUILDING B - PERSPECTIVE VIEW
A- DA-2.39	BUILDING B - PERSPECTIVE VIEW
A- DA-2.51	BUILDING D - FLOOR PLAN

rev	date	details	init.
2	2022-03-30	REVISED DA ISSUE	YH
1	2022-03-22	DRAFT DA SET FOR REVIEW	YH

LOGAN RESERVE NEIGHBOURHOOD SHOPPING CENTRE

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DEVELOPMENT APPLICATION

STAGE 02 - COVER SHEET

1 : 1500 @ A1

2022-03-30

A-DA-2.01

rev. 2

DEVELOPMENT SCHEDULE, STAGE 02
(PARKING SPACE NUMBERS)

USE:	GFA:	CARS RATIO:	CARS REQUIRED:
FAST FOOD	280m²	1/17m²	17
SHOPS (C1-3, D1-2)	870m²	1/17m²	52
SPECIALTY	75m²	1/17m²	5
SERVICE STATION	200m²	*SEE CLAUSE*	11
SPORT & RECREATION	550m²	1/15m²	37
TOTAL	**1975m²**		**122**

CARS PROVIDED: 134

***SERVICE STATION PARKING RATE** - 2 spaces; plus 1 space per 25m² of GFA for a Shop of less than 150m²; plus 1 spaces per 20m² of GFA of Shop area exceeding 150m².

LANDSCAPED AREA - STAGE 02

NAME	AREA	PERCENTAGE
HARD SURFACE - STAGE 02	9842 m²	87%
LANDSCAPED AREA	1435 m²	13%
SITE AREA	11277 m²	

SITE COVER - STAGE 02

NAME	AREA	PERCENTAGE
SITE COVER - STAGE 02	2379 m²	21%
NOT COVERED	8898 m²	79%
SITE AREA	11277 m²	

0 2 4 6 10 20 m

rev	date	details	init.
3	2022-03-30	REVISED DA ISSUE	YH
2	2022-03-28	REVISED SITE PLAN FOR REVIEW	YH
1	2022-03-22	DRAFT DA SET FOR REVIEW	YH

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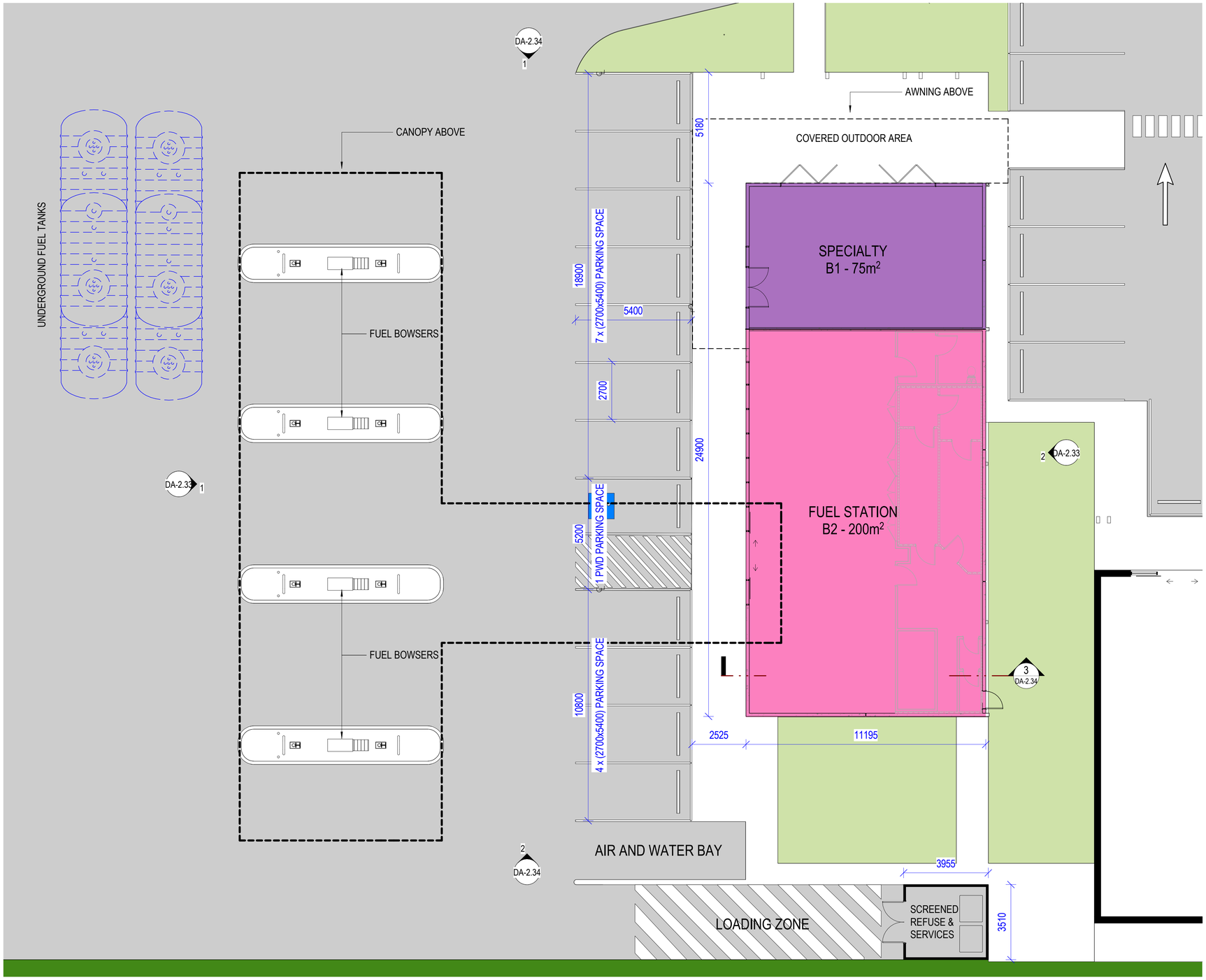
DEVELOPMENT APPLICATION

STAGE 02 - SITE PLAN

As indicated @ A1 | 2022-03-30

A-DA-2.11 | **rev. 3**



0 1 2 3 5 10m

rev	date	details	init.
2	2022-03-30	REVISED DA ISSUE	YH
1	2022-03-22	DRAFT DA SET FOR REVIEW	YH

LOGAN RESERVE NEIGHBOURHOOD SHOPPING CENTRE

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DEVELOPMENT APPLICATION

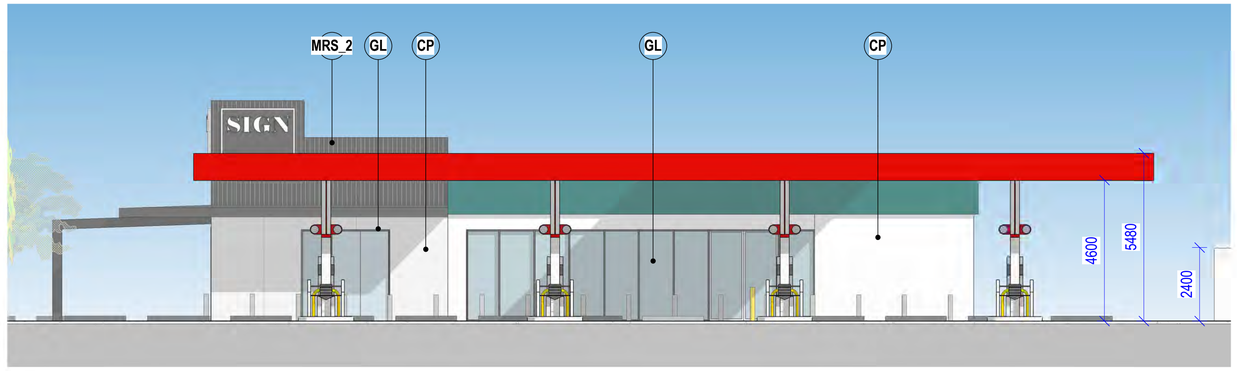
BUILDING B - FLOOR PLAN

1 : 100 @ A1

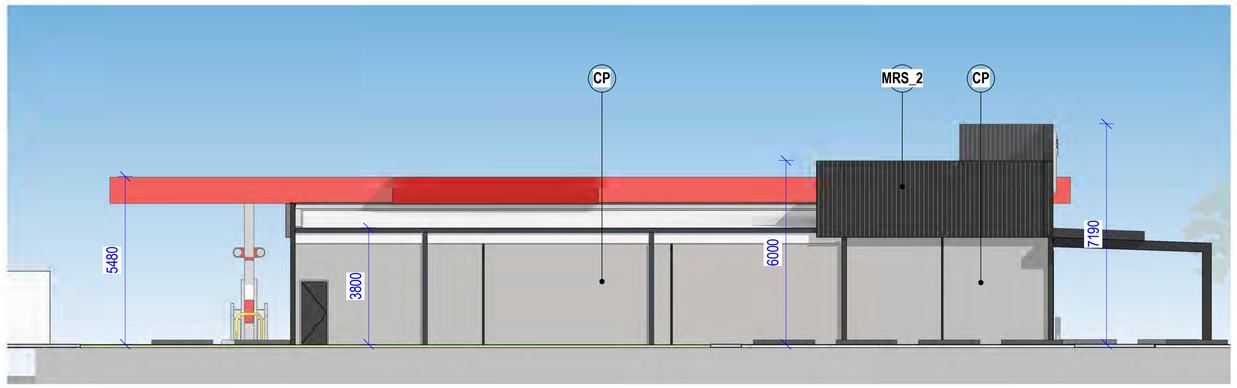
2022-03-30

A-DA-2.31

rev. 2



1 BUILDING B - WEST ELEVATION
1 : 100



2 BUILDING B - EAST ELEVATION
1 : 100

MATERIAL PALETTE

SHOPFRONT & CLEAR GLAZING

LAMINATED SAFETY GLASS. ALUMINUM FRAME WITH POWDERCOAT FINISH. COLORBOND MONUMENT

CORRUGATED METAL ROOF SHEETING

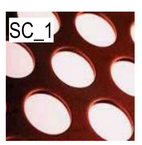
LYSAGHT KLIP-LOK. COLORBOND SURFMIST

METAL ROOF SHEETING

LYSAGHT LONGLINE. COLORBOND BASALT

TILT-UP CONCRETE PANEL

EXTERIOR PAINT. WHITE



PERFORATED METAL SCREEN

LOCKER GROUP. POWDERCOAT FINISH. BRAND COLOUR

STAINLESS STEEL

BOLLARS, BIKE RACKS, TRELLIS WIRE

CFC CLADDING EXPRESS JOINTS

JAMES HARDIE EXOTEC OR SIMILAR. WHITE FINISH

CFC CLADDING EXPRESS JOINTS

JAMES HARDIE EXOTEC OR SIMILAR. BRAND COLOUR FINISH

TIMBER-LOOK CLADDING

CEMINTEL WOODLANDS TEAK OR SIMILAR.

METAL WALL SHEETING

POWDERCOAT FINISH. COLORBOND MONUMENT

0 1 2 3 5 10m

rev	date	details	init.
2	2022-03-30	REVISED DA ISSUE	YH
1	2022-03-22	DRAFT DA SET FOR REVIEW	YH

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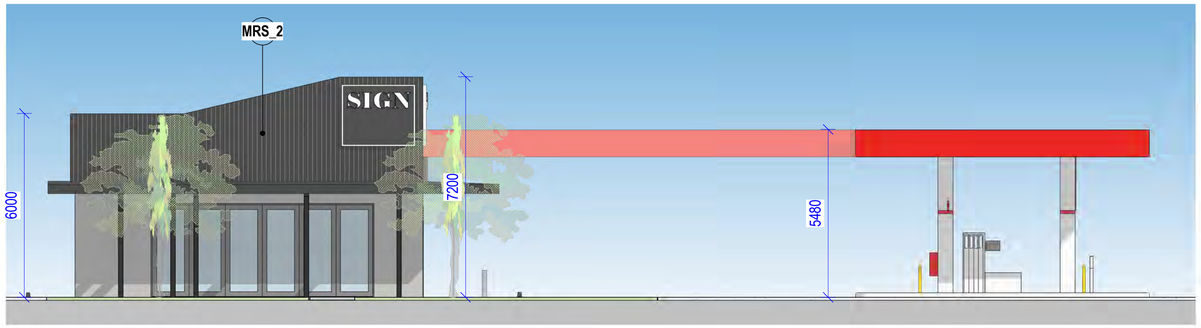
DEVELOPMENT APPLICATION

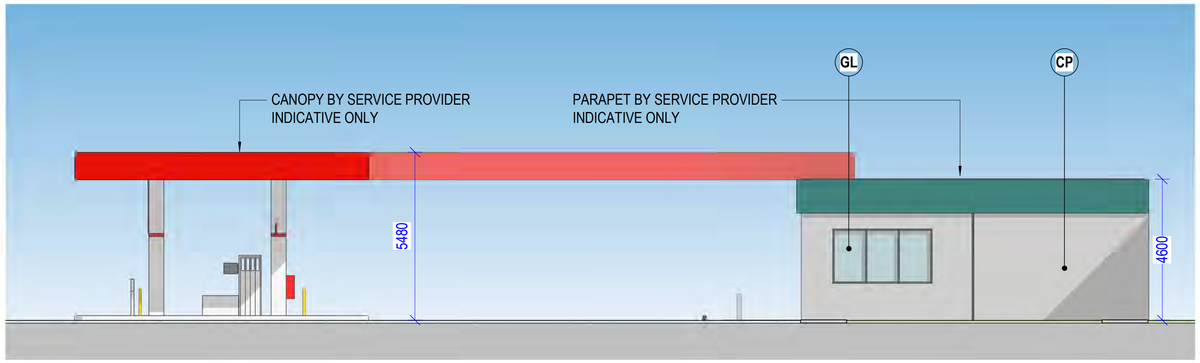
BUILDING B - ELEVATIONS

1 : 100 @ A1 | 2022-03-30

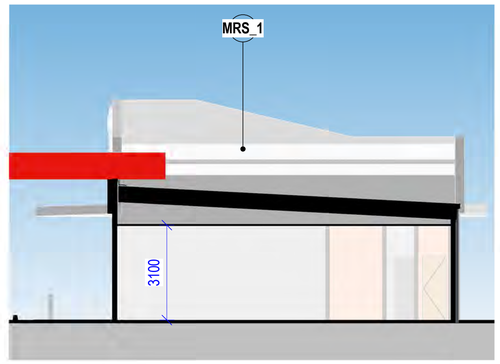
A-DA-2.33 | **rev. 2**



1 BUILDING B - NORTH ELEVATION
1 : 100



2 BUILDING B - SOUTH ELEVATION
1 : 100



3 BUILDING B - SECTION
1 : 100

MATERIAL PALETTE

SHOPFRONT & CLEAR GLAZING

LAMINATED SAFETY GLASS. ALUMINUM FRAME WITH POWDERCOAT FINISH. COLORBOND MONUMENT

CORRUGATED METAL ROOF SHEETING

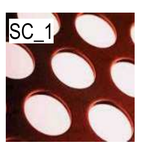
LYSAGHT KLIP-LOK. COLORBOND SURFMIST

METAL ROOF SHEETING

LYSAGHT LONGLINE. COLORBOND BASALT

TILT-UP CONCRETE PANEL

EXTERIOR PAINT. WHITE



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STAINLESS STEEL

BOLLARS, BIKE RACKS, TRELLIS WIRE

CFC CLADDING EXPRESS JOINTS

JAMES HARDIE EXOTEC OR SIMILAR. WHITE FINISH

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TIMBER-LOOK CLADDING

CEMINTEL WOODLANDS TEAK OR SIMILAR.

METAL WALL SHEETING

POWDERCOAT FINISH. COLORBOND MONUMENT

0 1 2 3 5 10m

rev	date	details	init.
2	2022-03-30	REVISED DA ISSUE	YH
1	2022-03-22	DRAFT DA SET FOR REVIEW	YH

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DEVELOPMENT APPLICATION

BUILDING B - ELEVATIONS / SECTION

1 : 100 @ A1 | 2022-03-30

A-DA-2.34 | **rev. 2**

BUILDING B - VIEW LOOKING AT NORTHWEST CORNER

rev	date	details	init.
1	2022-03-30	REVISED DA ISSUE	YH

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DEVELOPMENT APPLICATION

BUILDING B - PERSPECTIVE VIEW

@ A1 2022-03-30

A-DA-2.38 **rev. 1**

BUILDING B - VIEW LOOKING AT NORTHEAST CORNER

rev	date	details	init.
1	2022-03-30	REVISED DA ISSUE	YH

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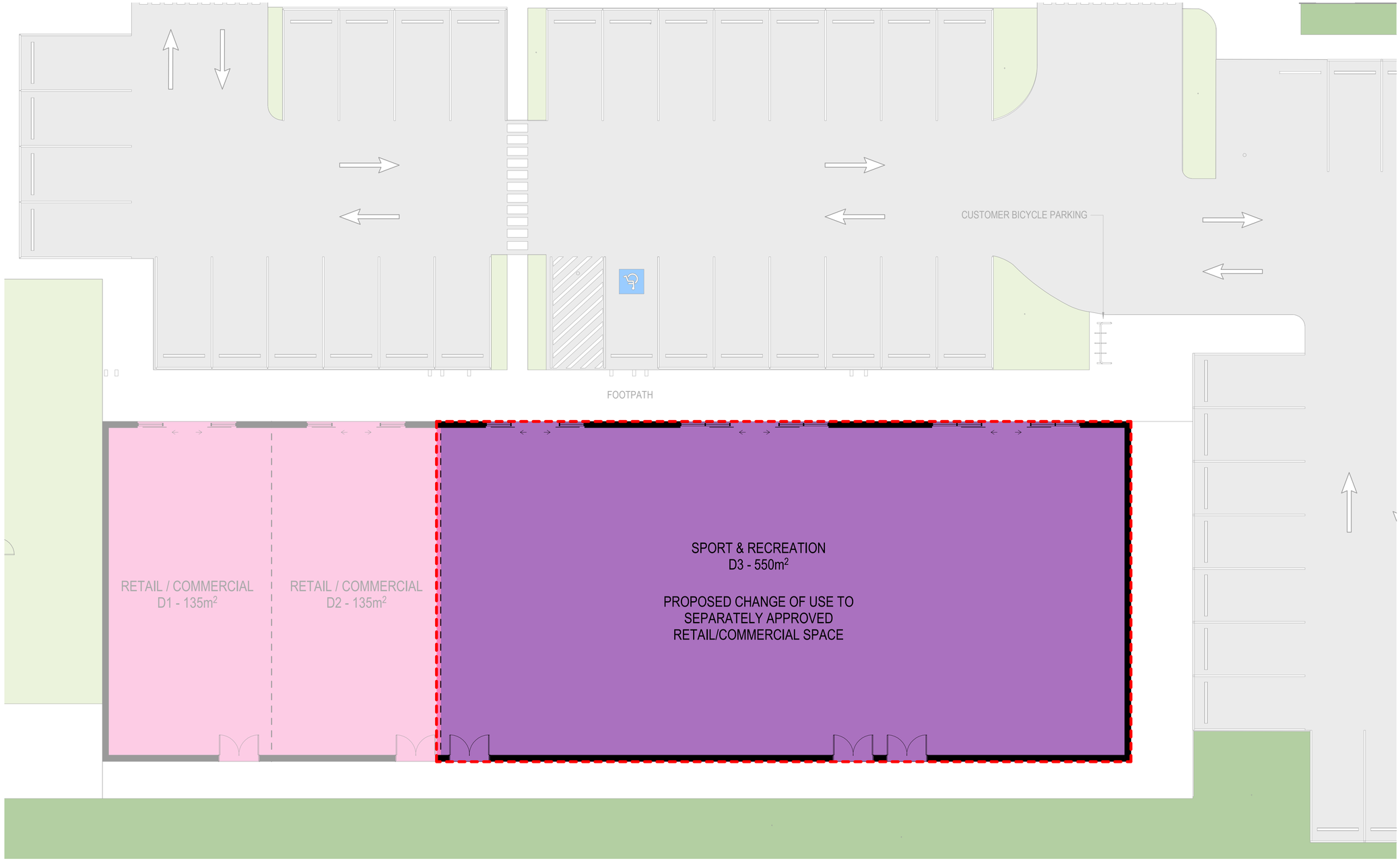
DEVELOPMENT APPLICATION

BUILDING B - PERSPECTIVE VIEW

@ A1	2022-03-30
A-DA-2.39	**rev. 1**



1 BUILDING D - FLOOR PLAN
1 : 100

0 1 2 3 5 10m

rev	date	details	init.
2	2022-03-30	REVISED DA ISSUE	YH
1	2022-03-22	DRAFT DA SET FOR REVIEW	YH

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DEVELOPMENT APPLICATION

BUILDING D - FLOOR PLAN

1 : 100 @ A1 2022-03-30

A-DA-2.51 **rev. 2**

ATTACHMENT 2

Odour Detection Threshold of Unleaded Fuel

Based upon
Air Noise Environment and The Odour Unit testing
commissioned by MWA Environmental

APRIL 2015 UNLEADED FUEL SAMPLE ODOUR DETECTION THRESHOLD CALCULATION

Air Noise Environment Total VOC analysis
The Odour Unit olfactometry analysis

SAMPLE	Total VOC (mg/m3)	Total VOC (ug/m3)	Odour Units	Calculated Odour Threshold (ug/m3)
1	57772	57771777	30600	1888
2	61043	61043200	21600	2826
Average				2357

Calculated odour detection threshold is comparable to Neumann Fuels Unleaded Petrol MSDS NC317ECP of 0.25ppm (2150 ug/m3)

ATTACHMENT 3

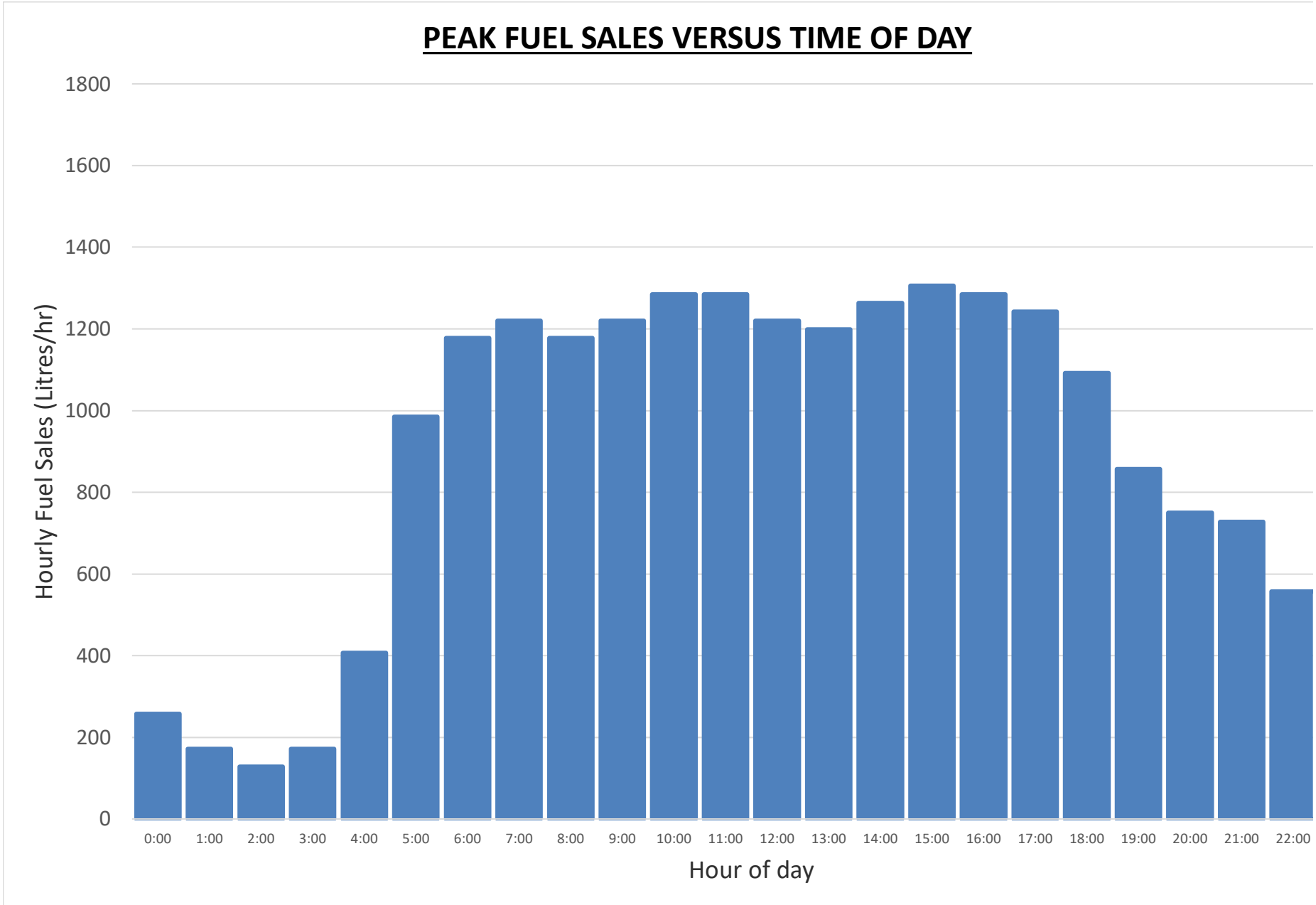
Service Station Emission Estimations

Service Station Hourly Fuel Sales Estimate

Annual Fuel Sales:	***6,000,000***	**L/annum**
Average Daily Fuel Sales:	***16,438***	**L/day**
Peak Daily Fuel Sales (+30%):	***21,370***	**L/day**

HOURLY FUEL SALES BREAKUP

HOUR BEGINNING	% WEEK DAY SALES	PEAK HOURLY FUEL SALES (l/hr)
12MN	1.2	257
1am	0.8	171
2am	0.6	128
3am	0.8	171
4am	1.9	407
5am	4.6	985
6am	5.5	1178
7am	5.7	1221
8am	5.5	1178
9am	5.7	1221
10am	6.0	1285
11am	6.0	1285
12pm	5.7	1221
1pm	5.6	1199
2pm	5.9	1263
3pm	6.1	1306
4pm	6.0	1285
5pm	5.8	1242
6pm	5.1	1092
7pm	4.0	857
8pm	3.5	749
9pm	3.4	728
10pm	2.6	557
11pm	1.8	385


PEAK FUEL SALES VERSUS TIME OF DAY
Hourly Fuel Sales (Litres/hr)
1800
1600
1400
1200
1000
800
600
400
200
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
Hour of day

VOC Emission Factors

Source	Value	Units
Underground Tank Breathing	120	mg / l
Refuelling Vehicles	1320	mg / l
Spillage at Vehicles	80	mg / l
Whoosh Emissions at Vehicles	79	mg / l
Bulk Tanker Refuelling with Stage 1 Vapour Recovery	40	mg / l

Bulk Tanker Refuelling

Parameter	Value	Units
Volume of Refuelling Tanker	54500	Litres
Total VOC emissions per fill	2180	grams
Total VOC emission rate	0.61	g/s

VOC Emission Rates from Various Sources by Hour of Day

Hour Beginning	Peak Hourly Fuel Throughput (Litres)	VOC Emission Rates					Units
		Underground Tank Breathing	Refuelling Vehicles	Spillage at Vehicles	Whoosh at Vehicles	Bulk Tanker Refuelling	
12MN	257	0.0086	0.0942	0.0057	0.0056	0.61 [1]	g/s
1am	171	0.0057	0.0628	0.0038	0.0038	-	g/s
2am	128	0.0043	0.0471	0.0029	0.0028	-	g/s
3am	171	0.0057	0.0628	0.0038	0.0038	-	g/s
4am	407	0.0136	0.1492	0.0090	0.0089	-	g/s
5am	985	0.0328	0.3612	0.0219	0.0216	-	g/s
6am	1178	0.0393	0.4318	0.0262	0.0258	-	g/s
7am	1221	0.0407	0.4475	0.0271	0.0267	-	g/s
8am	1178	0.0393	0.4318	0.0262	0.0258	-	g/s
9am	1221	0.0407	0.4475	0.0271	0.0267	-	g/s
10am	1285	0.0428	0.4711	0.0286	0.0281	-	g/s
11am	1285	0.0428	0.4711	0.0286	0.0281	-	g/s
12pm	1221	0.0407	0.4475	0.0271	0.0267	-	g/s
1pm	1199	0.0400	0.4397	0.0266	0.0263	-	g/s
2pm	1263	0.0421	0.4632	0.0281	0.0277	-	g/s
3pm	1306	0.0435	0.4789	0.0290	0.0286	-	g/s
4pm	1285	0.0428	0.4711	0.0286	0.0281	-	g/s
5pm	1242	0.0414	0.4554	0.0276	0.0272	-	g/s
6pm	1092	0.0364	0.4004	0.0243	0.0239	-	g/s
7pm	857	0.0286	0.3141	0.0190	0.0188	-	g/s
8pm	749	0.0250	0.2748	0.0167	0.0164	-	g/s
9pm	728	0.0243	0.2669	0.0162	0.0159	-	g/s
10pm	557	0.0186	0.2041	0.0124	0.0122	-	g/s
11pm	385	0.0128	0.1413	0.0086	0.0084	-	g/s

[1] Conservatively assume that a full tanker is unloaded at the service station once per day, progressively rolling for each day of the year

ATTACHMENT 4

CALMET Meteorology for Logan Reserve

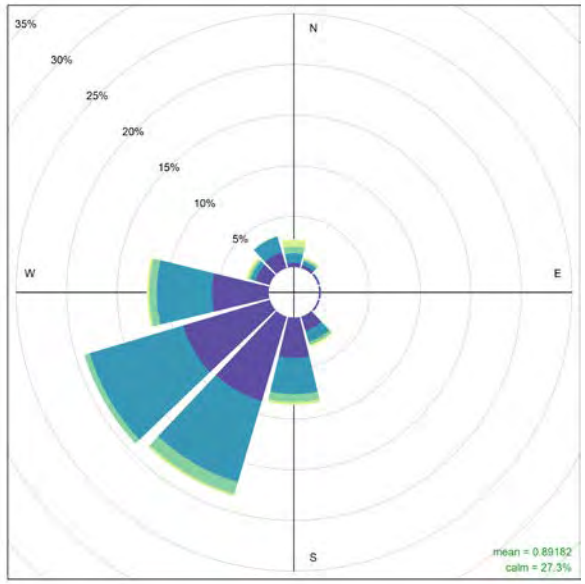
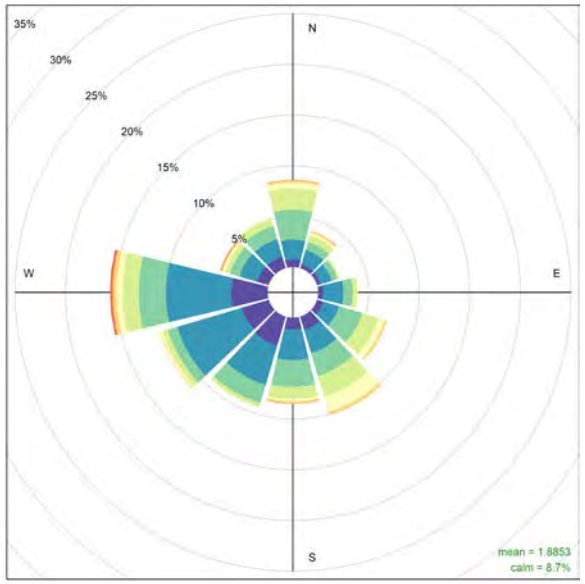
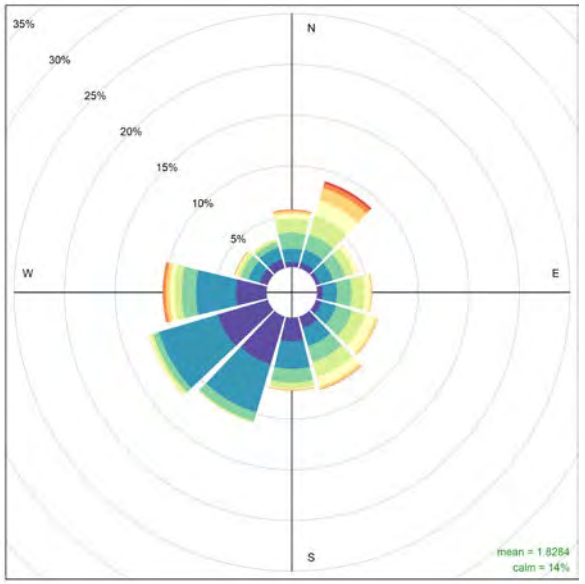
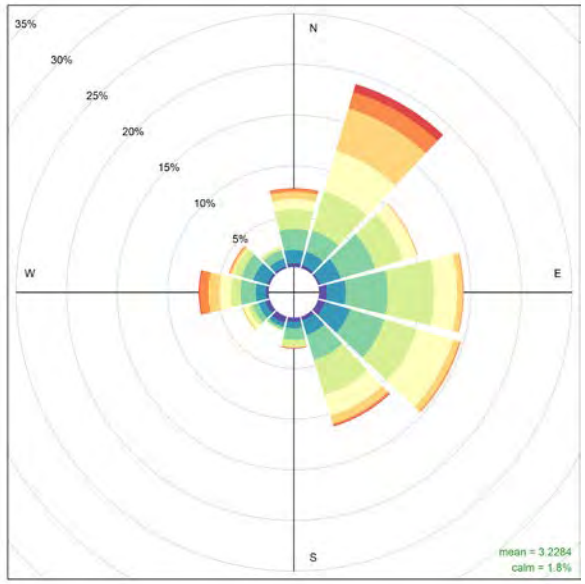
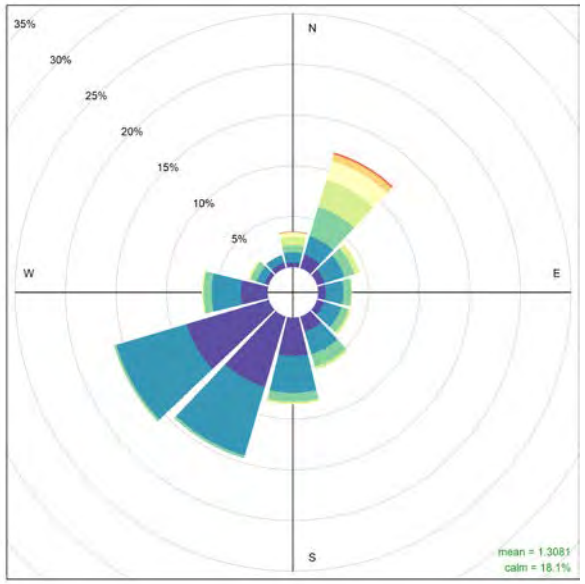
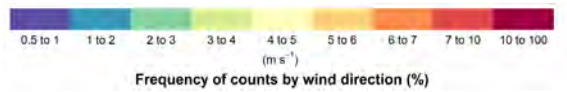
Midnight to 6am	6am to Midday	Annual
		
Midday to 6pm	**6pm to Midnight**	**Key**
		

Figure A4.1 Diurnal wind roses for Site as generated by CALMET

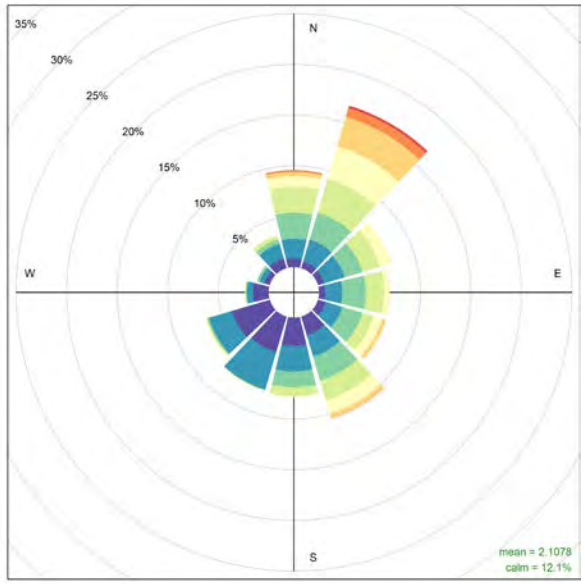
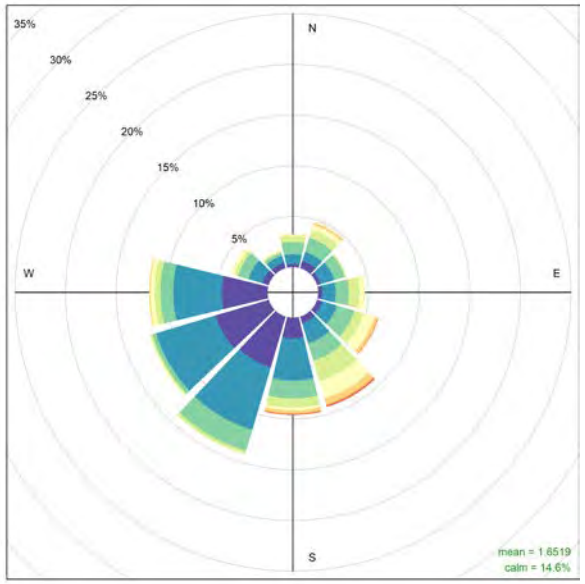
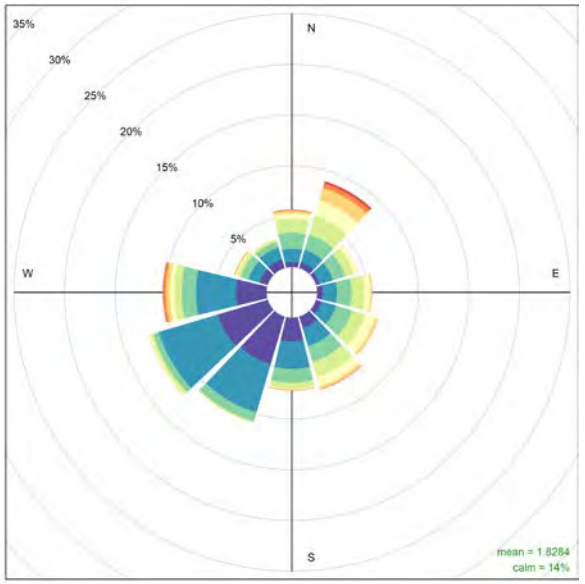
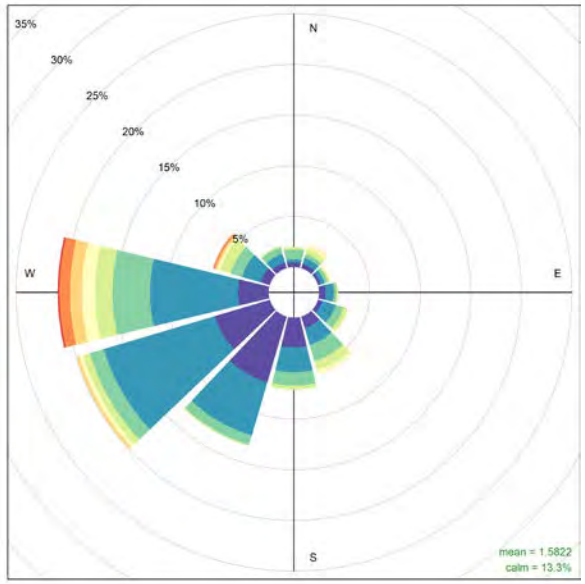
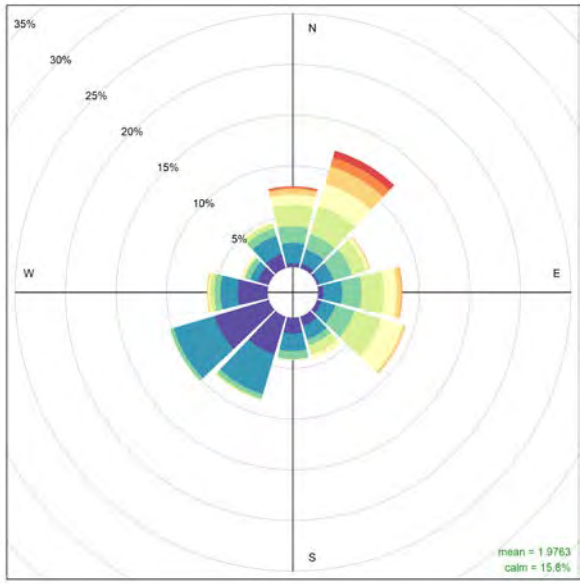
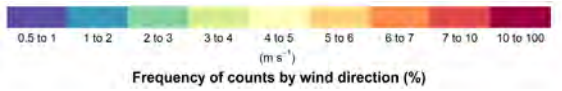
Summer	Autumn	Annual
		
Winter	**Spring**	**Key**
		

Figure A4.2 Seasonal wind roses for Site as generated by CALMET

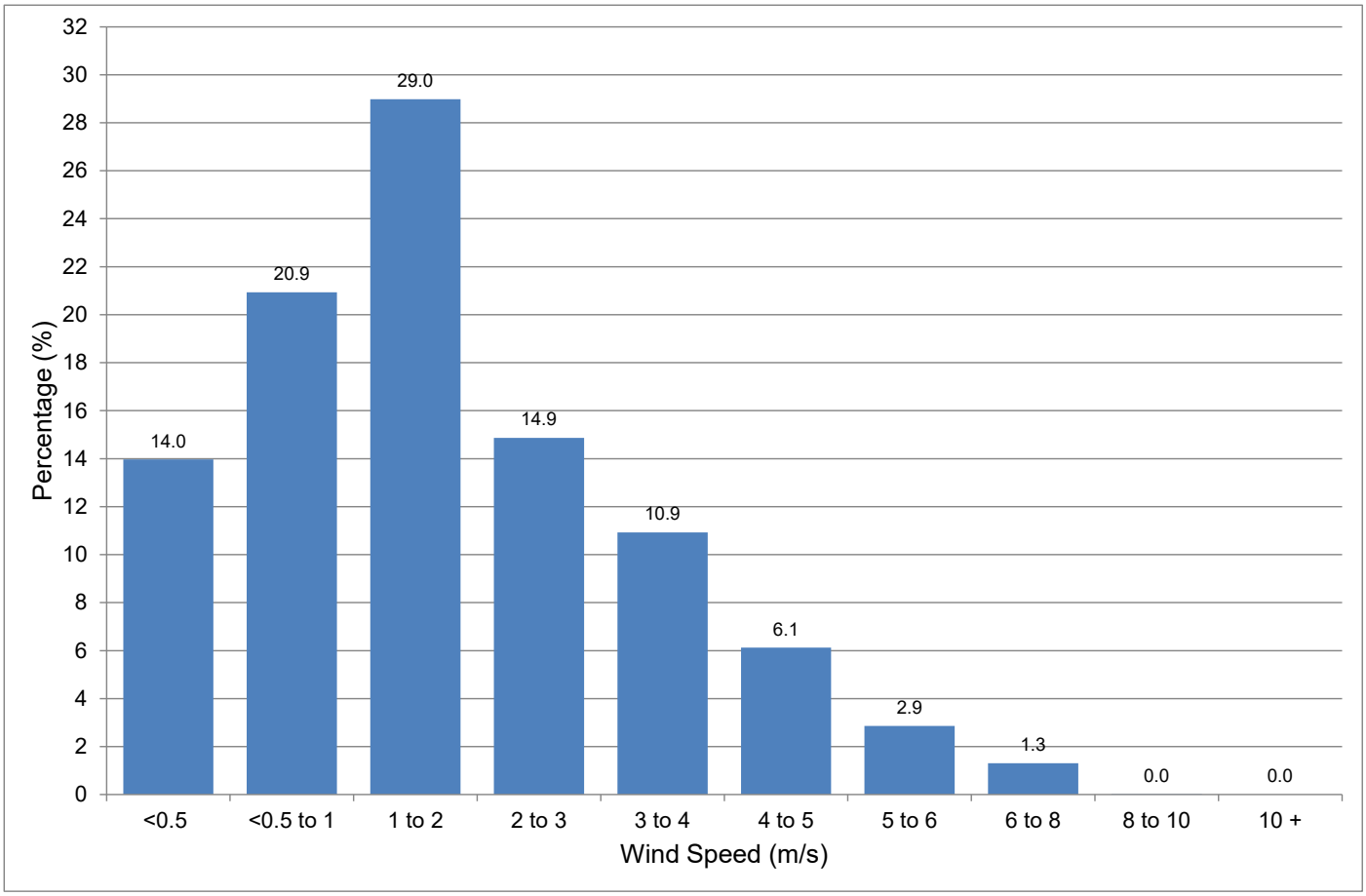


Figure A4.3 Wind frequency graph for Site as generated by CALMET

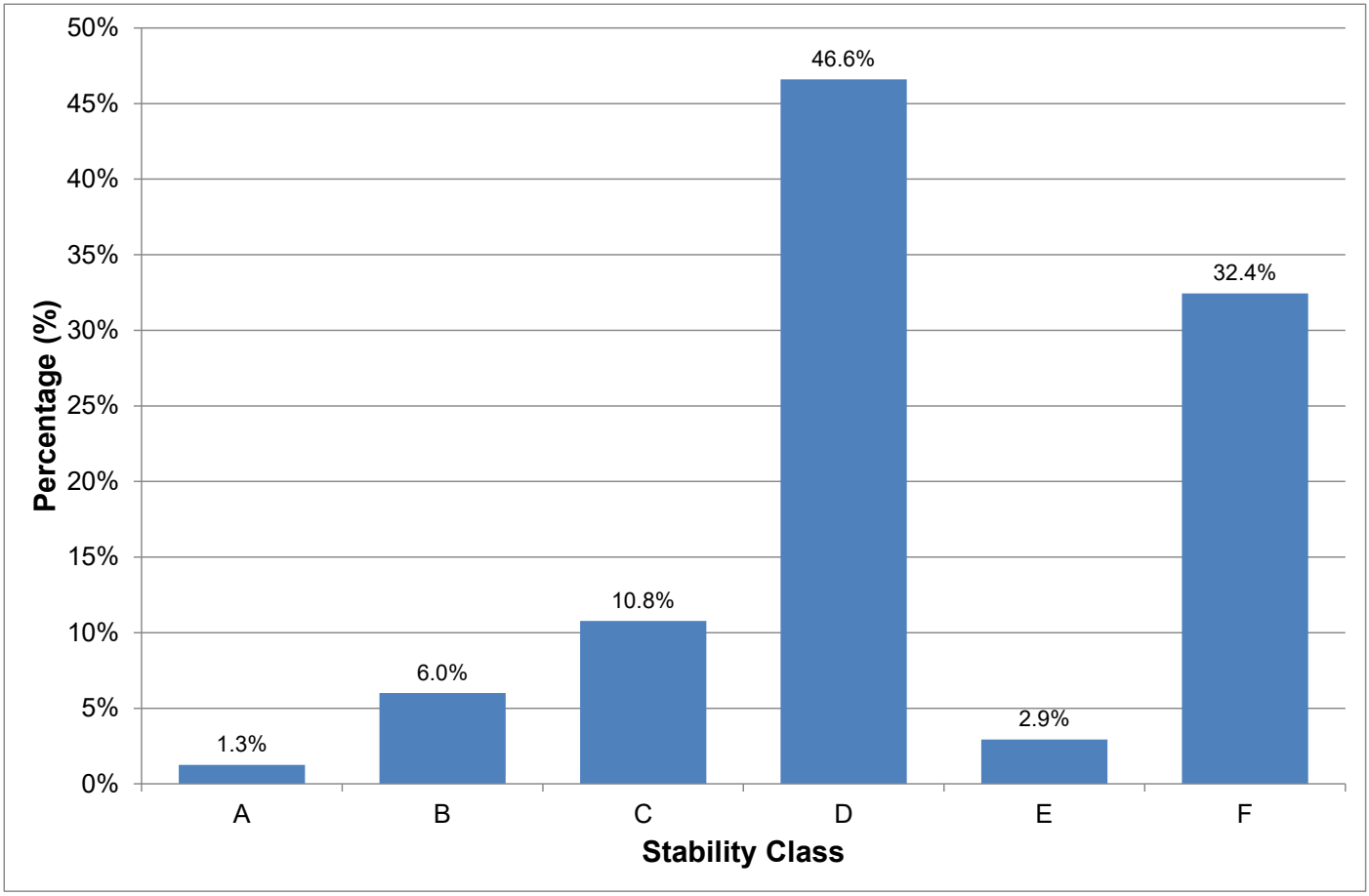


Figure A4.4 Stability Class distribution for Site as generated by CALMET

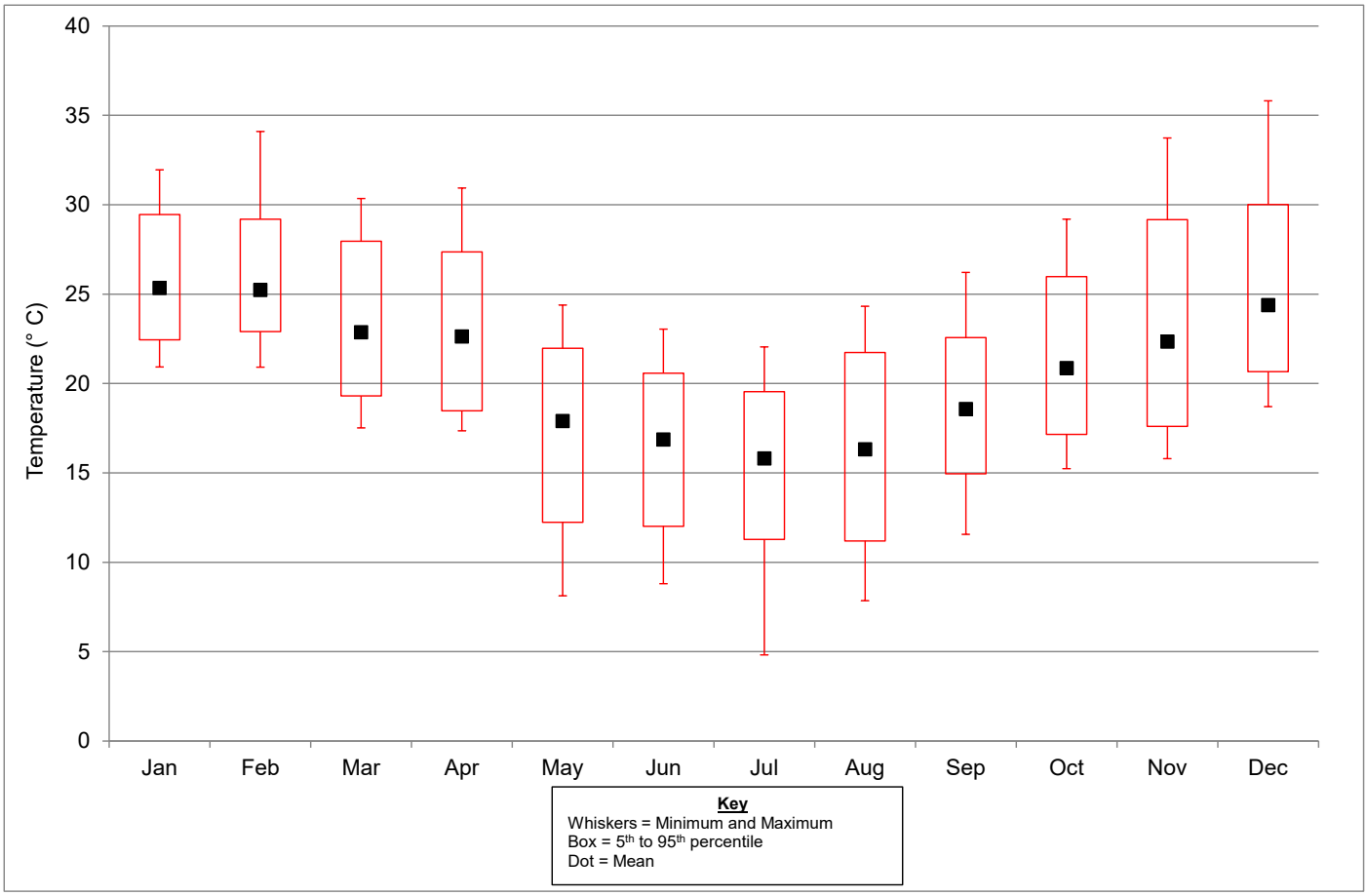


Figure A4.5 Box and Whisker plot of monthly temperature for Site as generated by CALMET

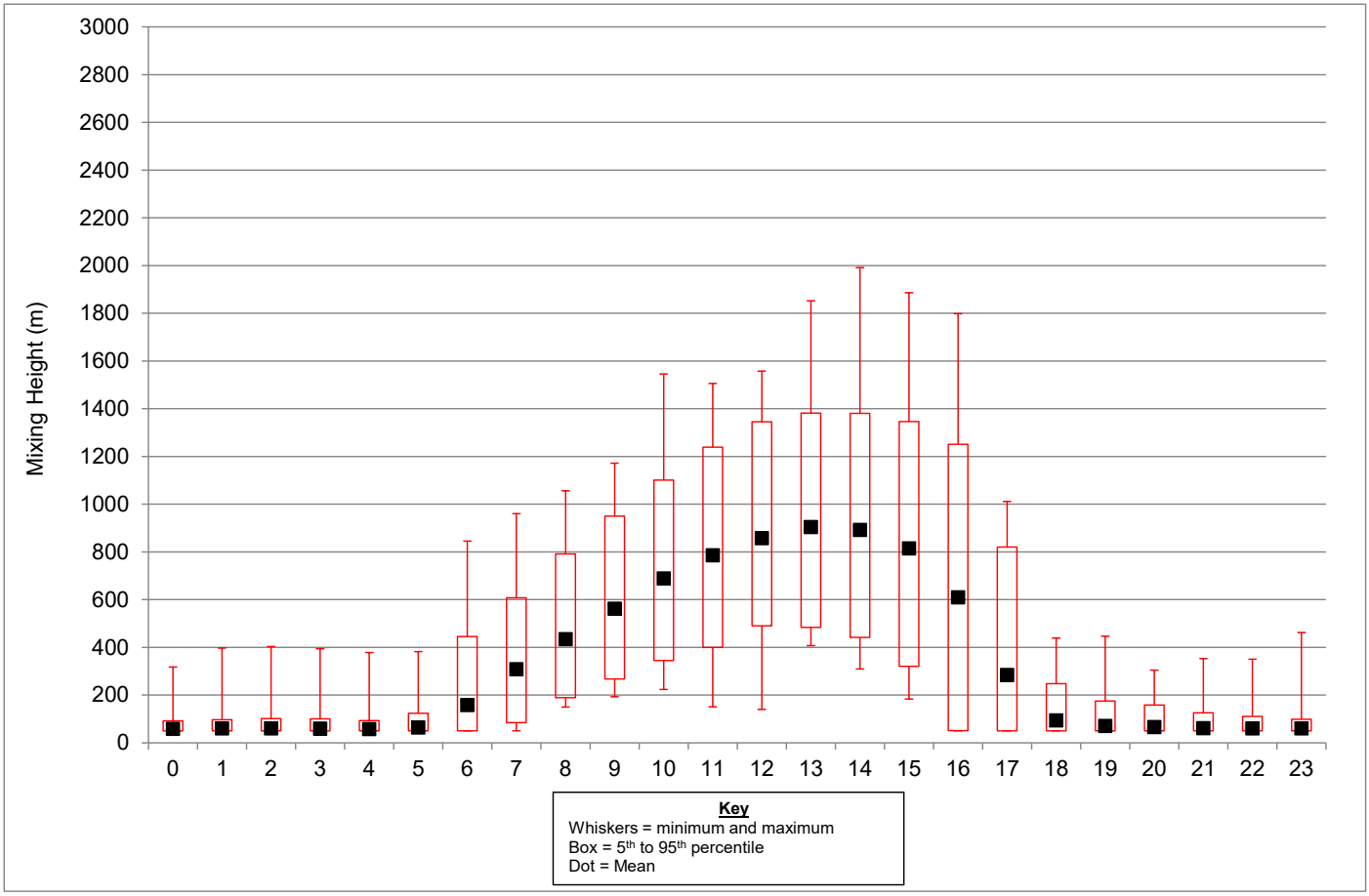
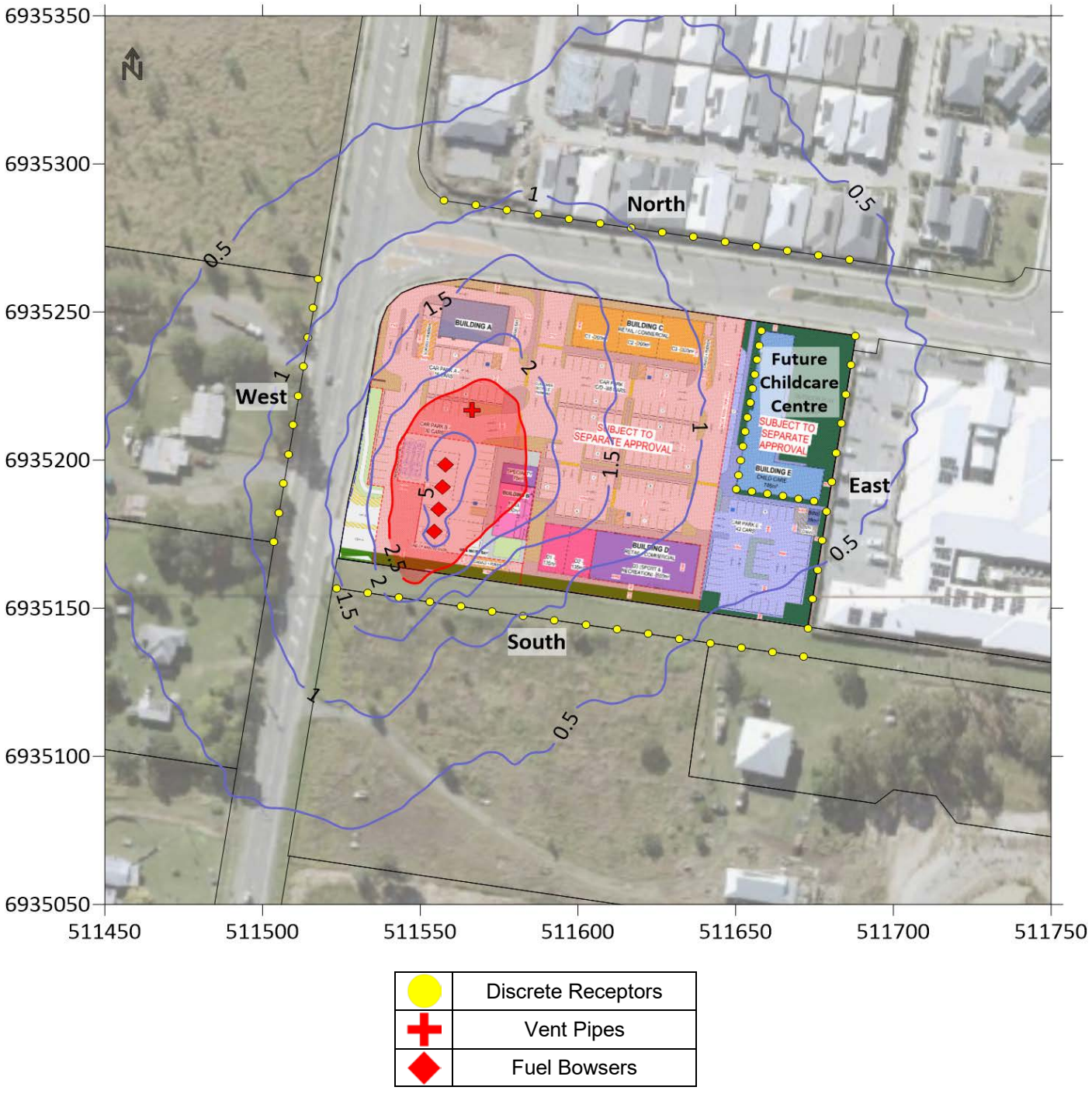


Figure A4.6 Box and Whisker plot of diurnal mixing height for Site as generated by CALMET

ATTACHMENT 5

Contour Plots

Odour and Benzene Concentrations for Proposed Service Station



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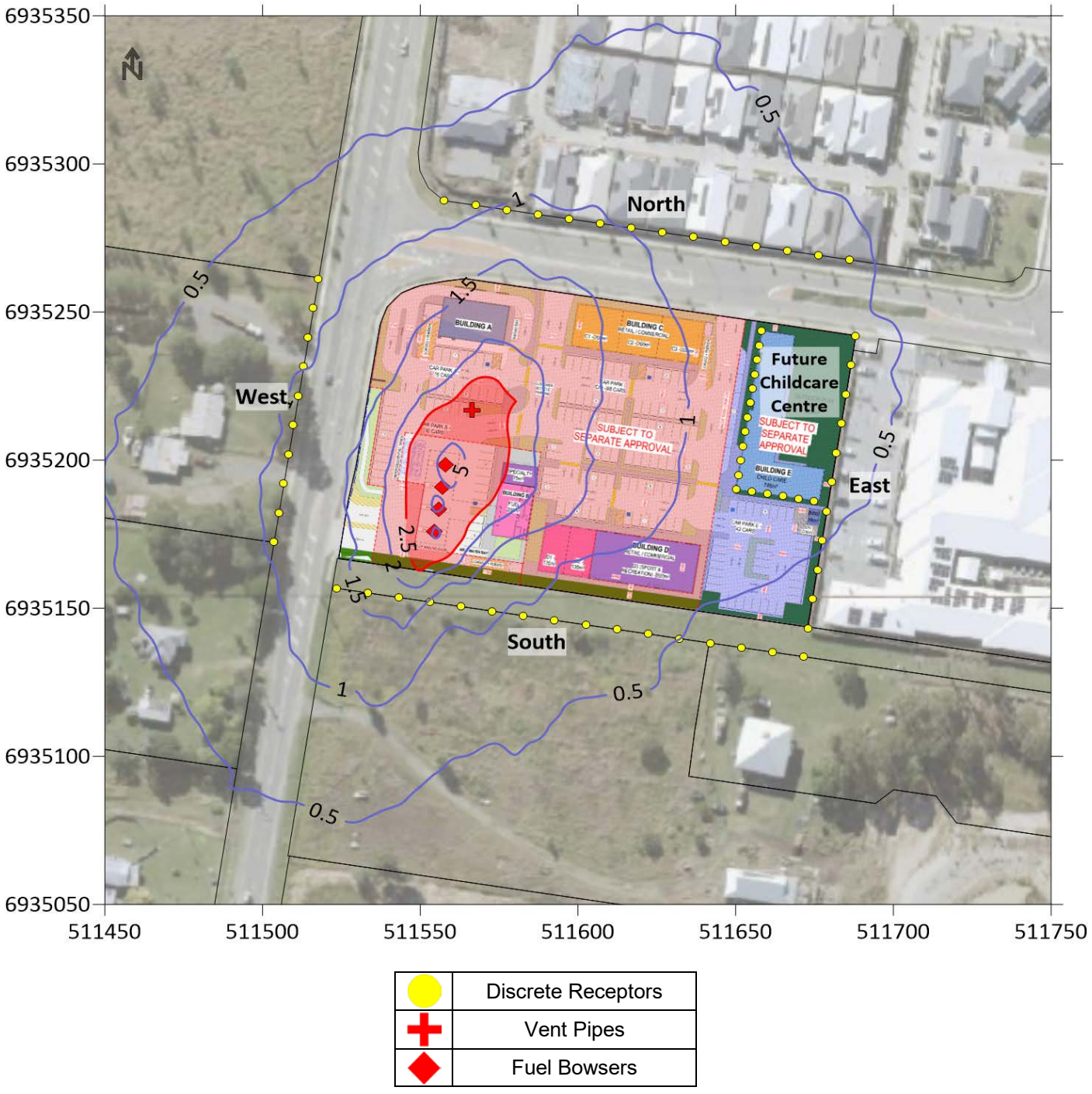
1-hour average 99.5th concentrations of Odour from Proposed Service Station at ground level

Figure A5.1	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Odour	1-hour average 99.5th	2.5	Odour Units	29-Apr-22



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1-hour average 99.5th concentrations of Odour from Proposed Service Station at 1.5 metres above ground level

Figure A5.2	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Odour	1-hour average 99.5th	2.5	Odour Units	29-Apr-22

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1-hour average 99.5th concentrations of Odour from Proposed Service Station at 3 metres above ground level

Figure A5.3	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Odour	1-hour average 99.5th	2.5	Odour Units	29-Apr-22

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1-hour average 99.5th concentrations of Odour from Proposed Service Station at 4.5 metres above ground level

Figure A5.4	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Odour	1-hour average 99.5th	2.5	Odour Units	29-Apr-22

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3-minute average concentrations of Benzene from Proposed Service Station including ambient concentrations of 5.9 µg/m³ at ground level

Figure A5.5	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Benzene	3-minute	53	µg/m³	29-Apr-22

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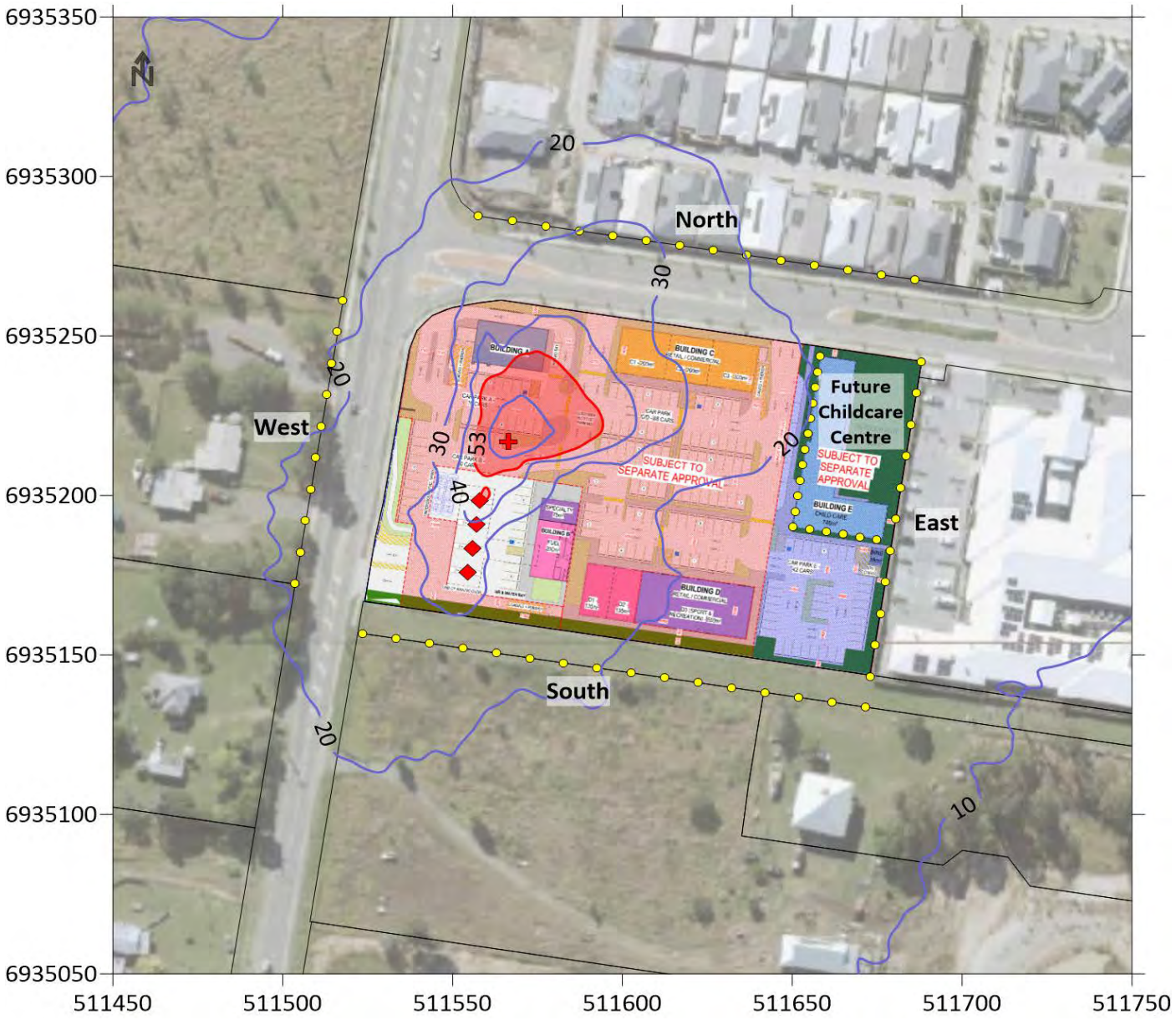
3-minute average concentrations of Benzene from Proposed Service Station including ambient concentrations of 5.9 µg/m³ at 1.5 metres above ground level

Figure A5.6	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Benzene	3-minute	53	µg/m³	29-Apr-22



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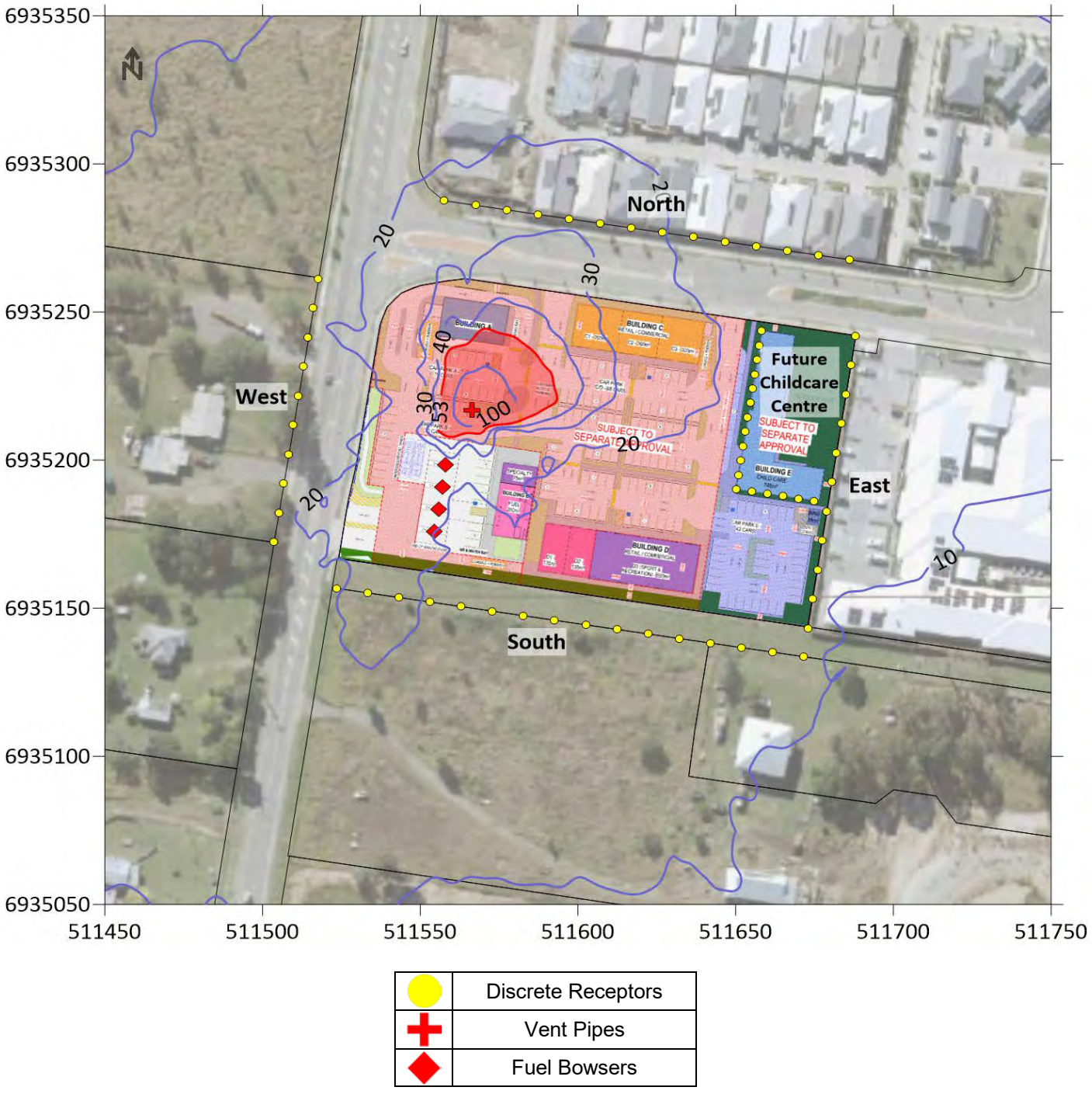
3-minute average concentrations of Benzene from Proposed Service Station including ambient concentrations of 5.9 µg/m³ at 3 metres above ground level

Figure A5.7	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Benzene	3-minute	53	µg/m³	29-Apr-22



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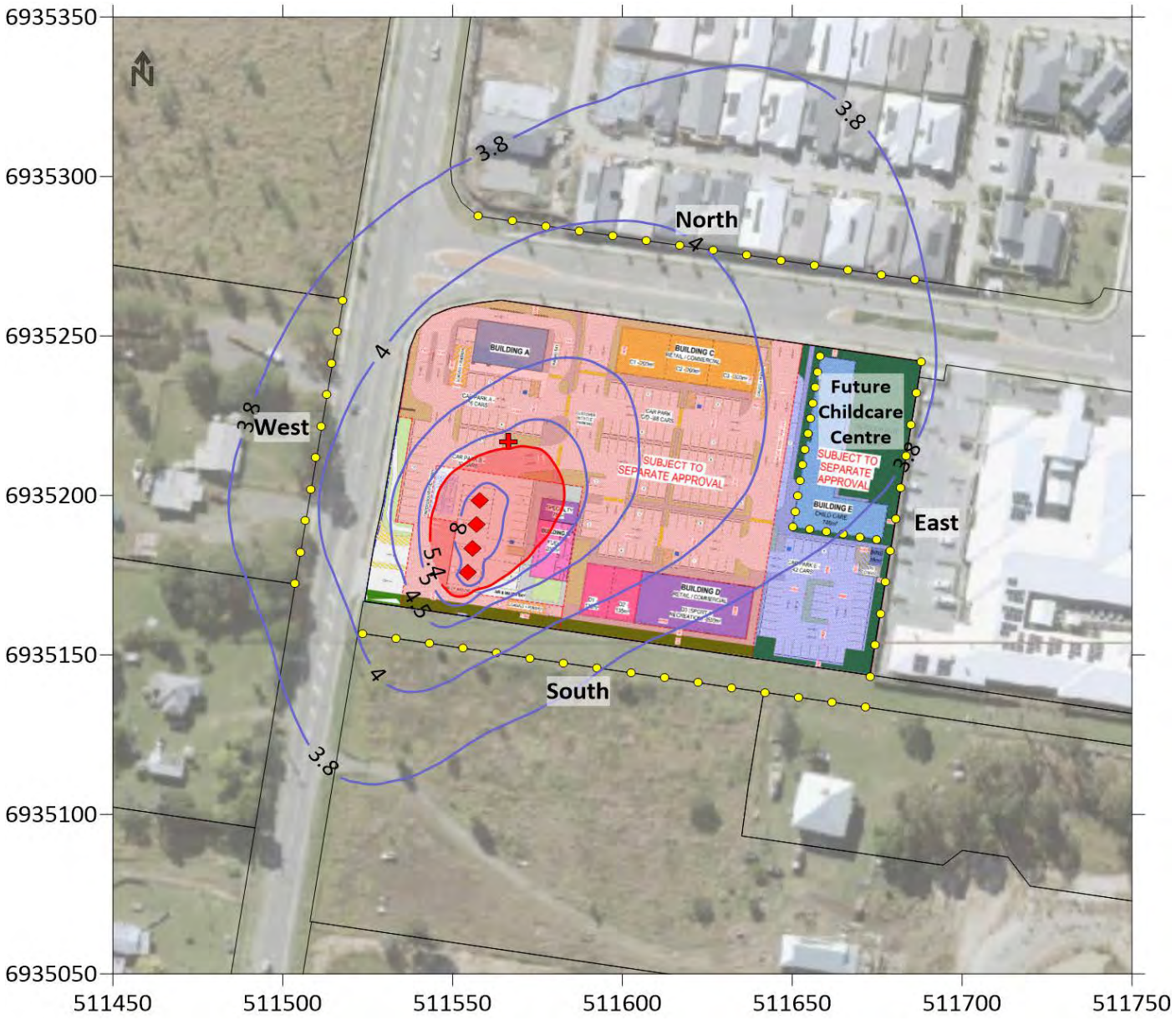
3-minute average concentrations of Benzene from Proposed Service Station including ambient concentrations of 5.9 µg/m³ at 4.5 metres above ground level

Figure A5.8	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Benzene	3-minute	53	µg/m³	29-Apr-22



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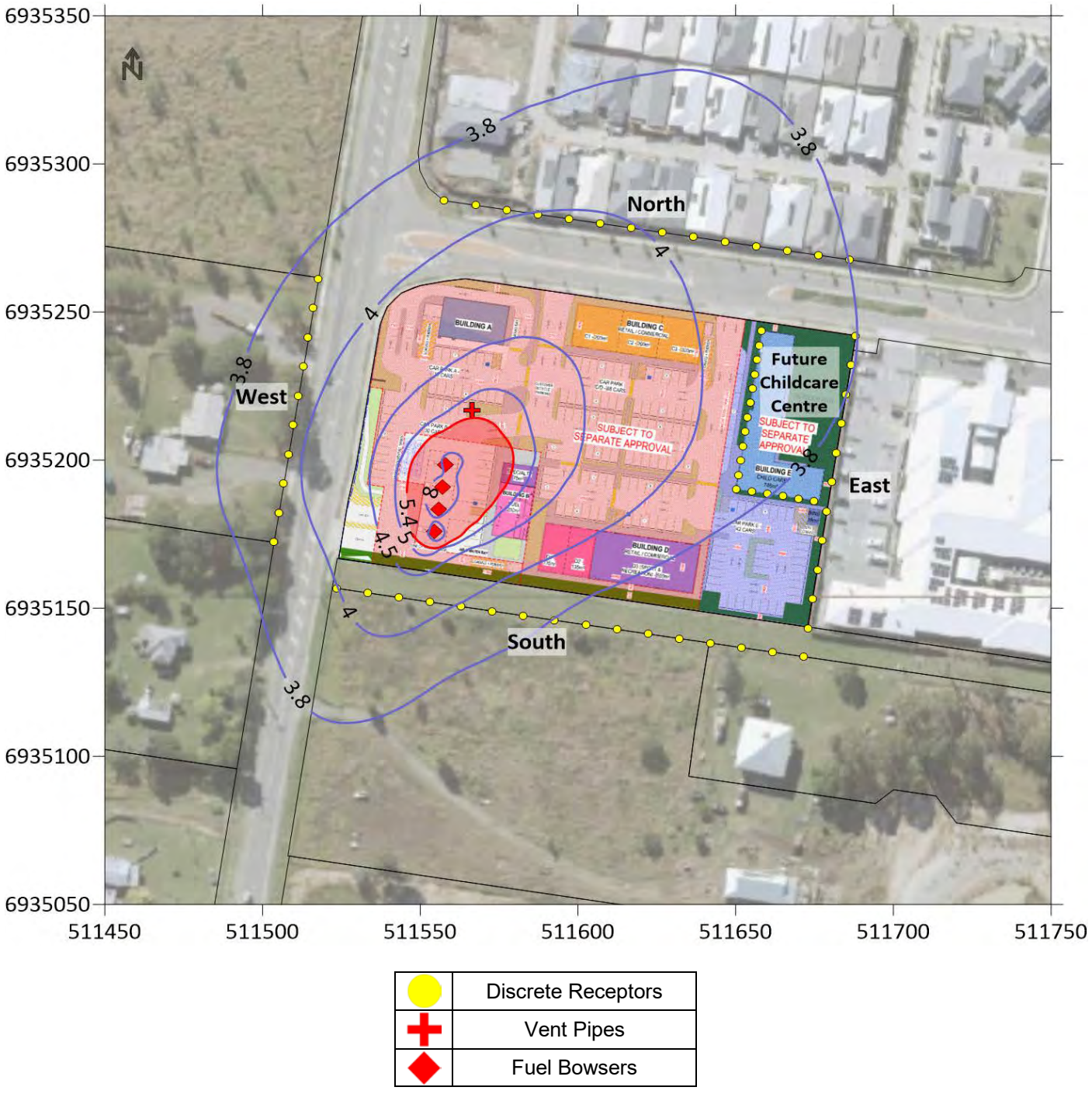
Annual average concentrations of Benzene from Proposed Service Station including ambient concentrations of 3.6 µg/m³ at ground level

Figure A5.9	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Benzene	Annual	5.4	µg/m³	29-Apr-22



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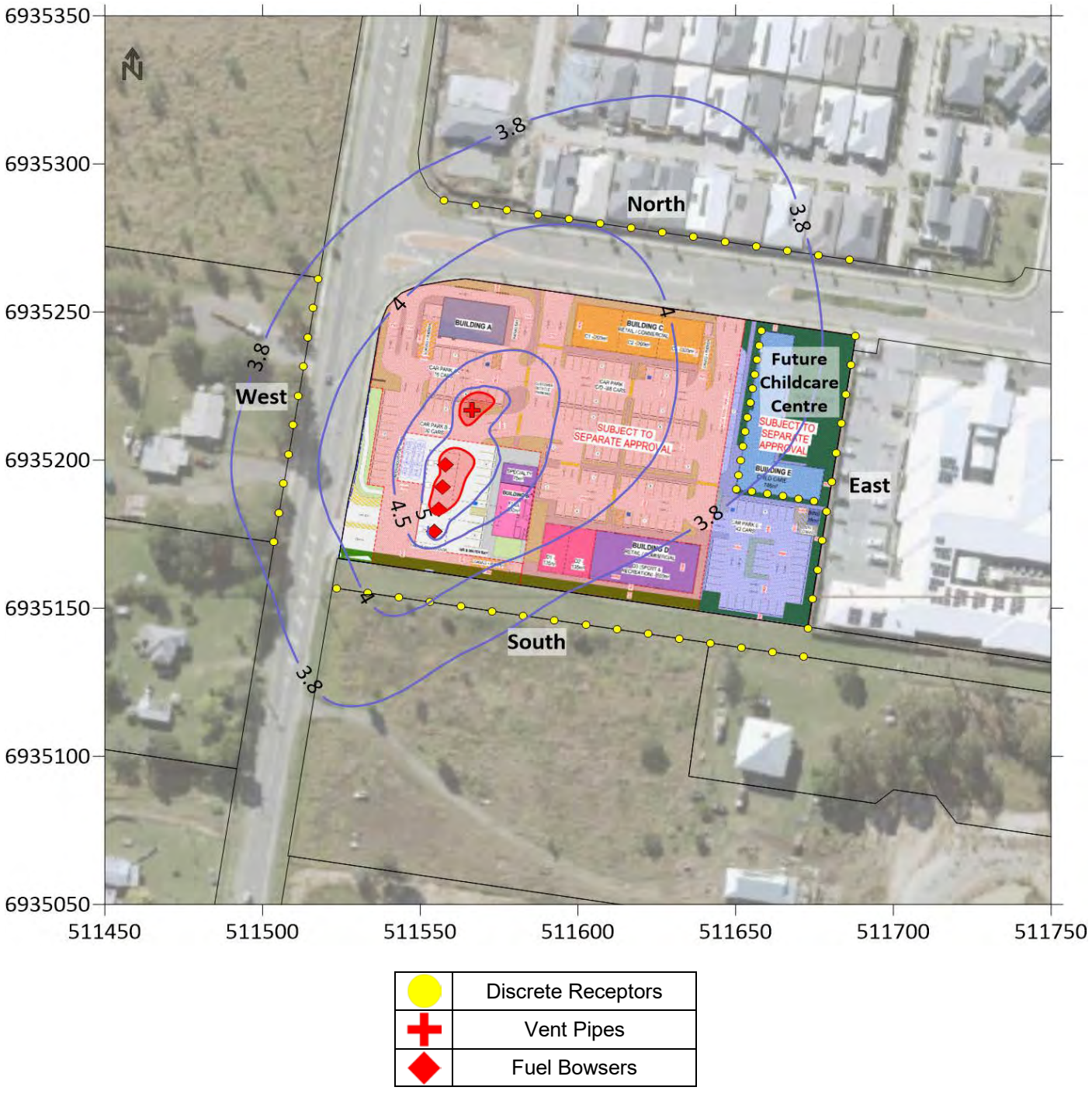
Annual average concentrations of Benzene from Proposed Service Station including ambient concentrations of 3.6 µg/m³ at 1.5 metres above ground level

Figure A5.10	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Benzene	Annual	5.4	µg/m³	29-Apr-22



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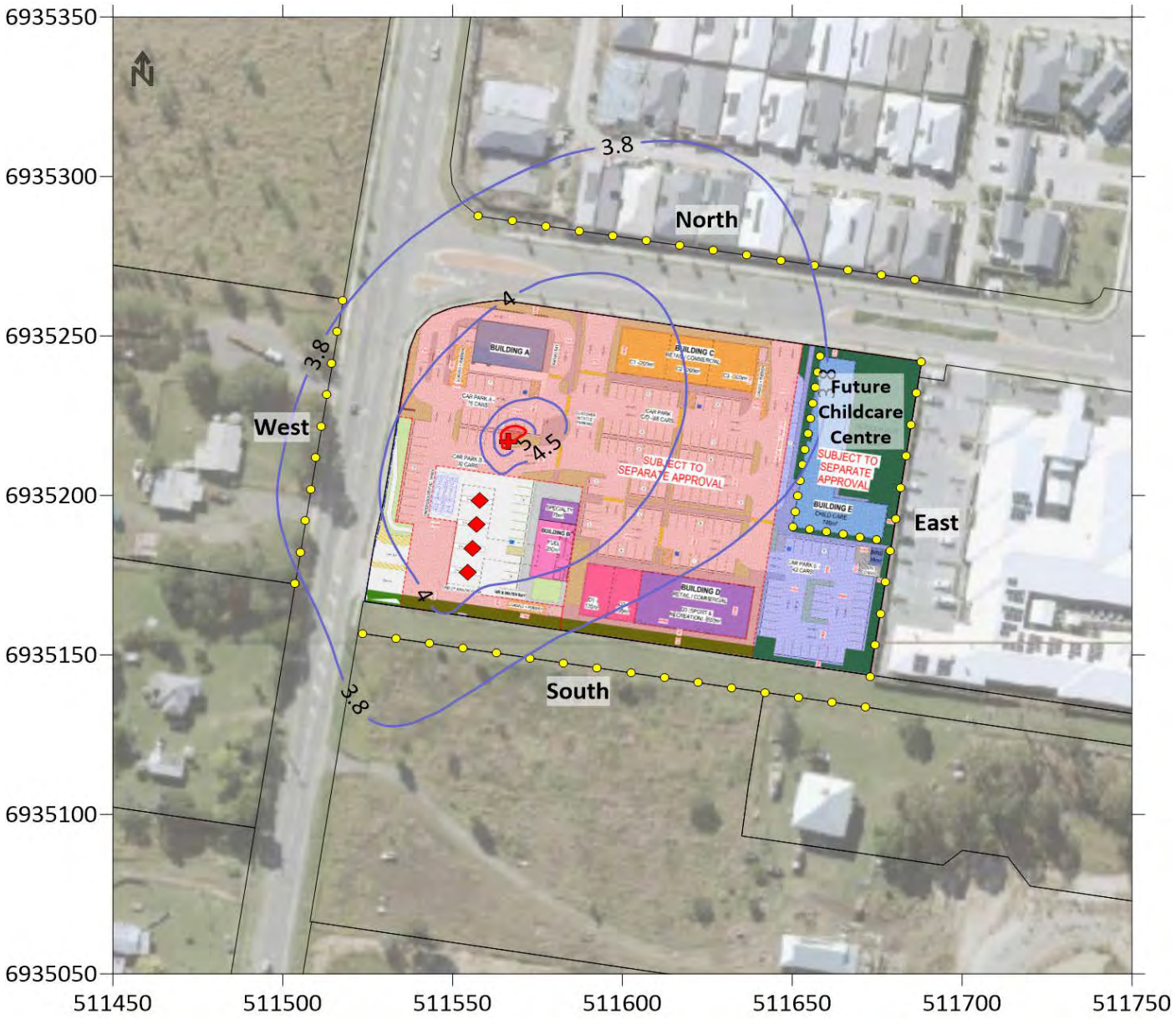
Annual average concentrations of Benzene from Proposed Service Station including ambient concentrations of 3.6 µg/m³ at 3 metres above ground level

Figure A5.11	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Benzene	Annual	5.4	µg/m³	29-Apr-22



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Annual average concentrations of Benzene from Proposed Service Station including ambient concentrations of 3.6 µg/m³ at 4.5 metres above ground level

Figure A5.12	Source	Pollutant	Averaging Period	Guideline	Units	Date
mwa ENVIRONMENTAL	Proposed Service Station	Benzene	Annual	5.4	µg/m³	29-Apr-22