



Main Street Cap Pty Ltd

**Lithgow Service Station -
Odour and Smoke Impact
Assessment Report**

**353 Main St
Lithgow, NSW**

**Final Report
Version 1.2**

December 2024

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LIST OF ABBREVIATIONS & DEFINITIONS

Council	Lithgow City Council
DA	Development Application
DLCS	Delfs Lascelles Consulting Surveyors
ECS	emissions control system
GGP	Go Go Petroleum
MSC	Main Street Cap Pty Ltd
NATA	National Association of Testing Authorities
NSW EPA	New South Wales environmental protection authority
OOSA	Operational odour and smoke analysis
OSIA	Odour and Smoke Impact Assessment
Proposed Development	Lithgow Service Station – Lots 113 – 115, DP 9370, 353 Main Street, Lithgow NSW
TOU	The Odour Unit
VR1	Vapour recovery system stage 1 - transfer to tanks
VR2	Vapour recovery system stage 2 – transfer to vehicles
VRR	NSW EPA Standards and Best Practice Guide for Vapour Recovery at Service Stations, 2012

1 INTRODUCTION

In July 2024, Main Street Cap Pty Ltd (**MSC**) engaged The Odour Unit (**TOU**) to undertake an odour and smoke impact assessment (**OSIA**) of the proposed service station, located at Lots 113 – 115 DP9370, 353 Main Street, Lithgow, New South Wales (the **Proposed Development**). The following report summarises the findings and recommendations of the OSIA for the Proposed Development.

1.1 RELEVANT BACKGROUND & CONTEXT

TOU understands that the Proposed Development requires an OSIA report as part of a development application (**DA**) pre-lodgement, which is lodged by MSC with Lithgow City Council (**Council**). A pre-lodgement meeting was undertaken on Monday, 4 December 2023, with the minutes of the pre-lodgement meeting being issued to MSC on Monday, 11 December 2023. Section 6 of the minutes outlined *Further Matters for Consideration*. The relevant items to this OSIA, as outlined in Section 6 of the pre-lodgement minutes are as follows:

Item *Mechanical Exhaust Ventilation System*

35. Where cooking or extensive heating processes or such other processes as may be specified area carried out in the kitchen or in food preparation area(s), an approved mechanical exhaust ventilation system shall be installed and operated in accordance with AS/NZS 1668.1-1998 and AS 1668.2-2012. A mechanical exhaust system shall be provided in the food preparation area(s) to remove the steam from the dishwasher or other washing and sanitizing equipment. Details of mechanical exhaust ventilation shall be provided on the submitted Architectural Plans.

Item *Waste Management*

40. The Waste Management Plan shall adequately address the following requirements:
a) Waste and recyclable material generated from the operations of the business shall be managed in a satisfactory manner that does not give rise to offensive odour or encourage pest activity. Food residues, food scraps, and waste material shall be regularly removed from the premises. Waste shall not be permitted to accumulate near the allocated waste storage bins.

Item *Grease Arrestor*

42. A grease arrestor shall be indicated on the submitted Architectural Plans. The grease arrestor shall not be located in areas where food, equipment or packaging are handled or stored. Access to the grease arrestor for emptying shall not be through areas where open food is handled or stored or where food contact equipment and packaging materials are handled or stored.

Item *Odour*

44. A smoke and odour impact assessment report shall be submitted to Council in relation to the emissions generated from the service station and food and drink premises. The report must be prepared by a suitably qualified environmental consultant and including modelling of the odour impacts on the nearest sensitive receptor (e.g. residents/property occupants. Any recommendations resulting from the report are to be in accordance with AS/NZS 1668.1-1998 and AS 1668.2-2012, as well as the Office of Environment and Heritage technical Framework – Assessments and Management of Odour from Stationary Sources in NSW (November 2006)

1.2 THE OSIA OBJECTIVE

The objective of the OSIA is to identify all potentially significant odour and smoke emission sources from the Proposed Development via an expert review of the activities that will be undertaken at the Proposed Development. Based on the outcomes of the review process, the OSIA evaluates whether engineered and other management-based controls are adequate to reduce odour and smoke impact risk from all significant activities at Proposed Development.

This detailed review analysis is intended to assist the Council in conducting an odour impact risk assessment for applications and is referred to as an Operational Odour and Smoke Analysis (**OOSA**).

1.3 THE OSIA APPROACH

The OSIA undertaken for the Proposed Development follows a similar odour and smoke assessment approach used for other similar (and now existing) developments across several Council jurisdictions. Specifically, the OSIA approach is framed around the New South Wales Environment Protection Authority (**NSW EPA**) documentation, including:

- The *Local Government Air Quality Kit*, which consists of three key modules:
 1. *The science and management of air quality module;*
 2. *Legislative and policy framework for air quality management; and*
 3. *Guidelines for managing air pollution.*

With the above in mind, the OSIA approach for the Proposed Development entailed the following:

1. A review of the key activities that will be undertaken by the Proposed Development;
2. Identification of all key odour and smoke emission sources and their associated level of risk; and
3. Where an odour or smoke emission source is evaluated to pose an unacceptable level of risk, a review into whether the necessary controls or management practices have been implemented to reduce this risk.

In TOU's experience, the activities associated with the Proposed Development do not require the level of investigation or assessment that is provided by air dispersion modelling, as specified in Section 6 - Item 44 of the pre-lodgement meeting minutes, given the expected low level of odour emission potential from the activities that will be conducted at the Proposed Development.

The approach adopted for the OSIA is suitable for the planned activities at the Proposed Development.

1.4 SUPPLIED INFORMATION

The OSIA is based on the following information relating to the Proposed Development:

- Architectural design drawings for the Proposed Development, as completed by Go Go Petroleum (**GGP**) and part of the Lithgow DA set 24062024_03;
- Detailed survey of Lots 113 – 115 DP9370, as completed by Delfs Lascelles Consulting Surveyors (**DLCS**);
- Waste Management Plan as provided by AusWide Consulting;
- Verbal and email correspondence with MSC;
- Technical data specified in the design drawings;
- Technical data on potential odour treatment equipment as sourced by TOU; and
- TOU's experience in odour science and engineering.

In undertaking the OSIA, TOU has reviewed the supplied information in the context of its extensive knowledge in odour science and engineering and past project experience.

2 LOCATION AND ELEVATIONS

An aerial map highlighting the Proposed Development in relation to its site location and general surroundings is shown in **Figure 2.1**, with the Proposed Development identified by a yellow rectangle.

The detailed survey of the proposed Development site is illustrated in **Figure 2.3**.

The general surrounding of the Proposed Development can be described as a mixed-used environment with existing residential dwellings from the northwest to the southeast, the Tony Luchetti sports ground to the northeast, Ferrero Australia immediately north, and the Lithgow wastewater treatment plant further to the north. Directly opposite the proposed development site are the main train tracks to and from Lithgow. The Tony Luchetti sports ground, Ferrero Australia and Lithgow wastewater treatment plant are shown in red rectangles.

The Proposed Development site plan, Drawing DA 001, is illustrated in **Figure 2.4**.

The Proposed Development elevations, Drawing DA 005 (north and east), Drawing DA 006 (south and west), Drawing DA 007 (light vehicle fuel canopy), Drawing DA 008 (heavy vehicle diesel canopy) and Drawing DA 009 (drive thru awning) are illustrated in **Figure 2.5**, **Figure 2.6**, **Figure 2.7**, and **Figure 2.8**, respectively.

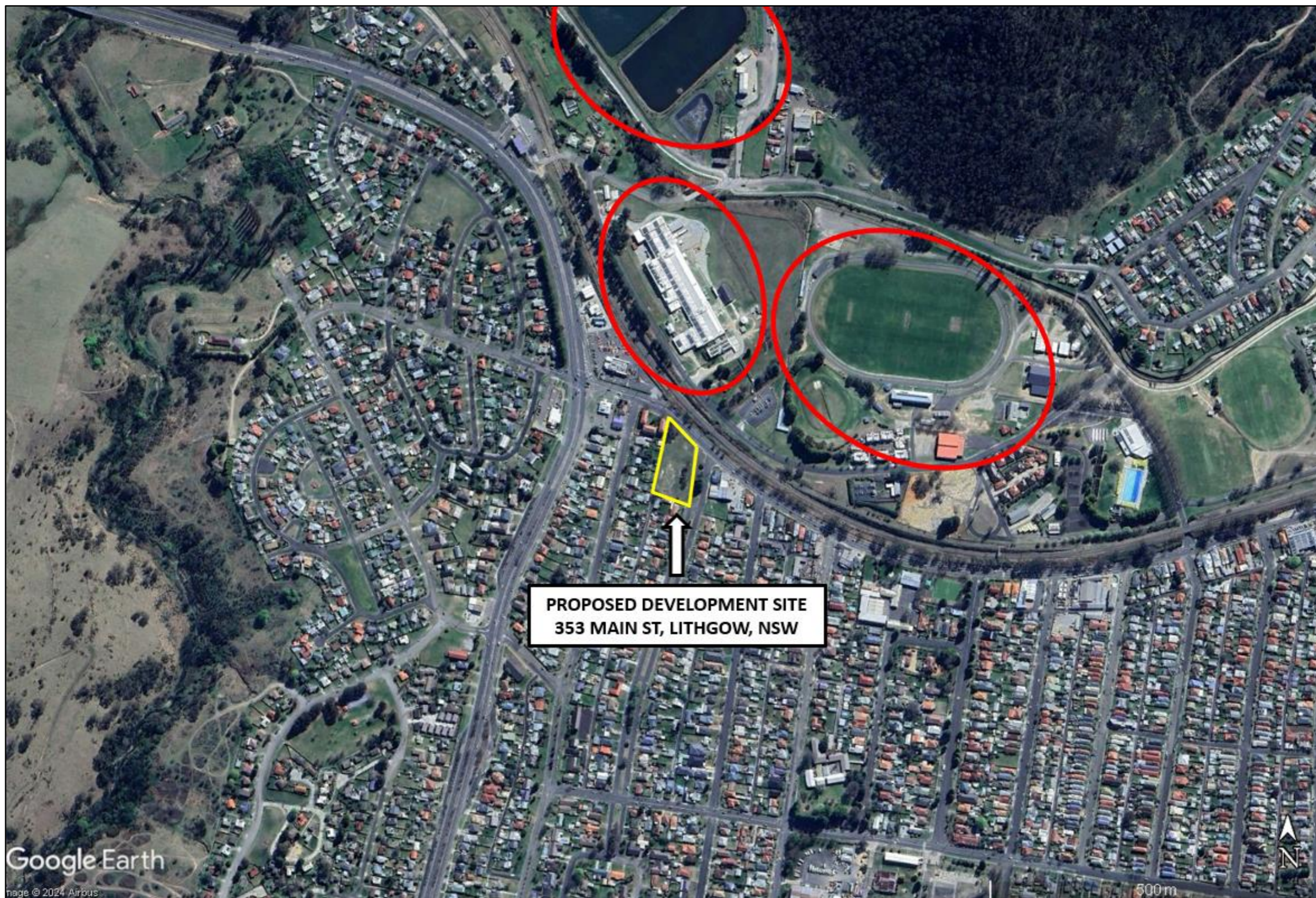


Figure 2.1: Aerial view of the Proposed Development (Source: Google Earth 12/07/2024)

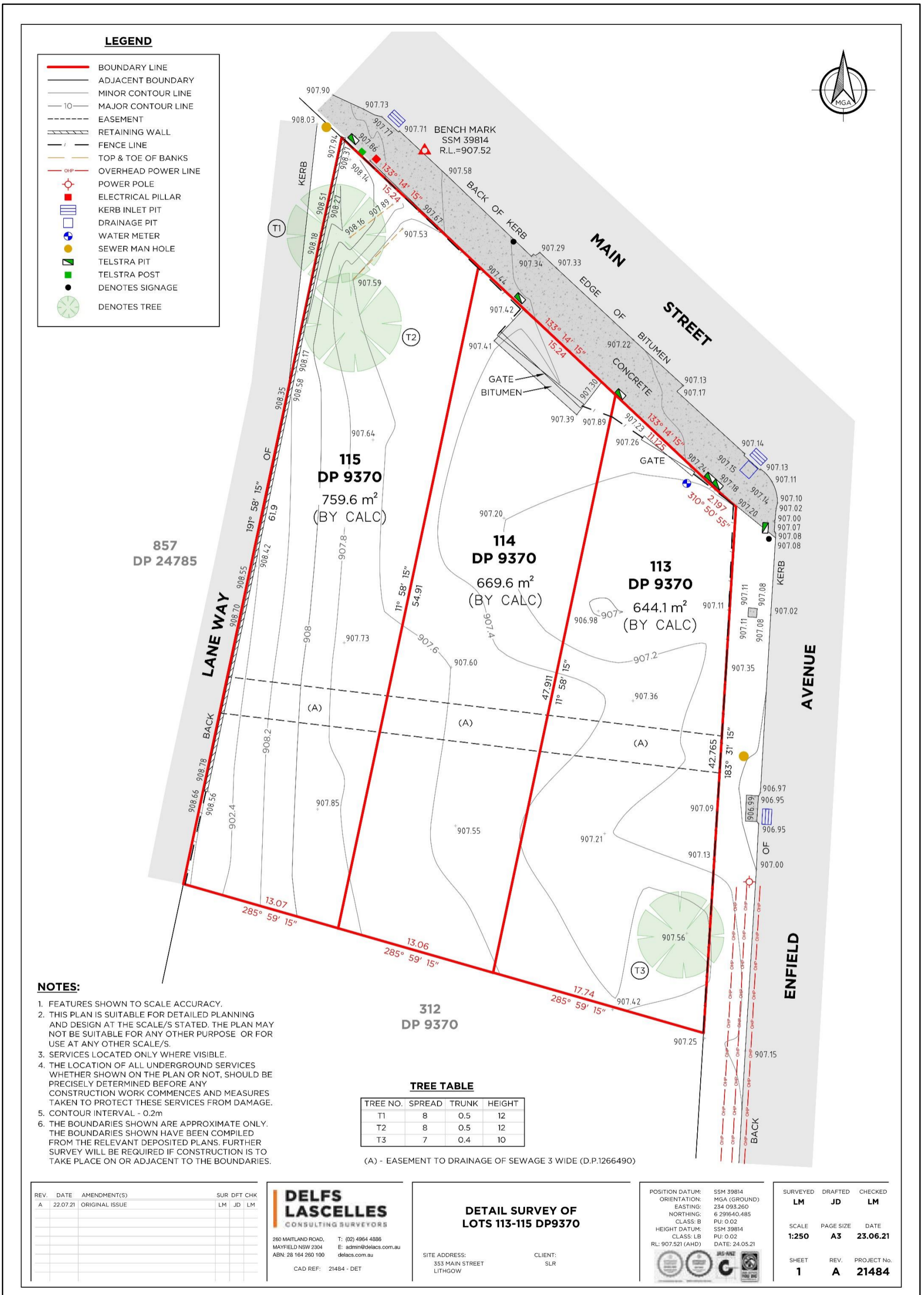


Figure 2.2: Proposed Development: Detailed Survey Plan

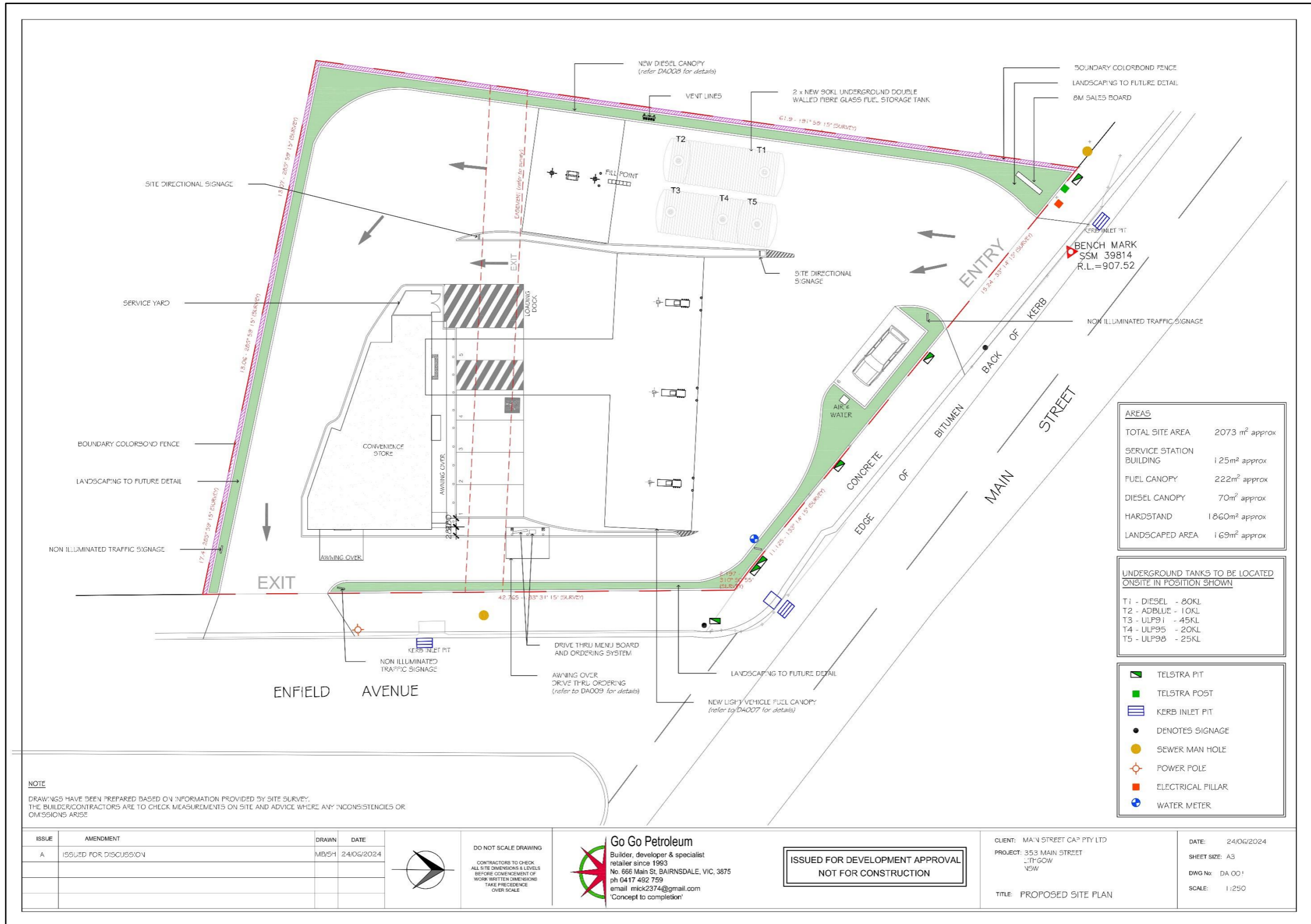


Figure 2.3: Proposed Development – Site Layout Plan

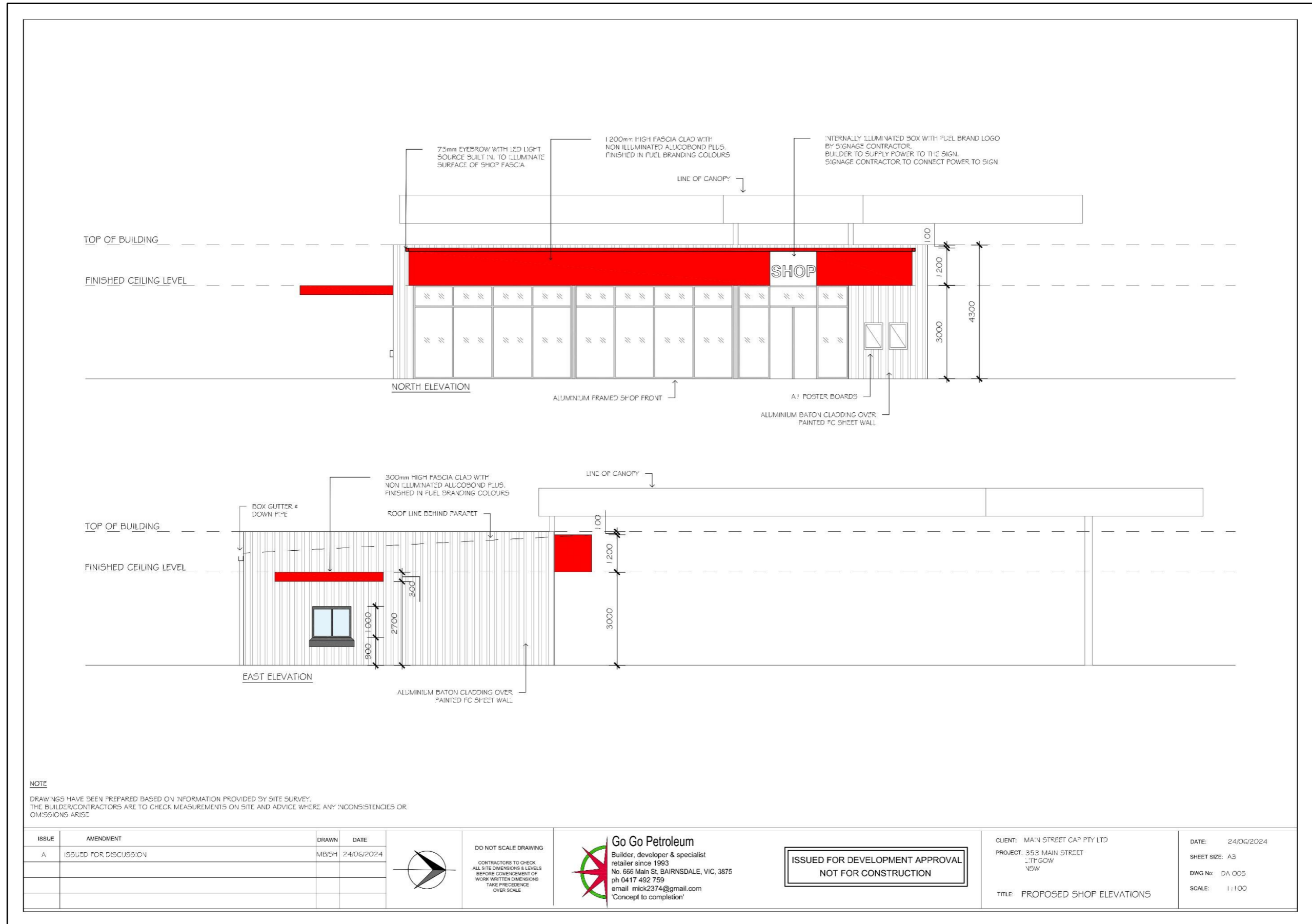


Figure 2.4: Proposed Development: Elevation Plan 1 of 2

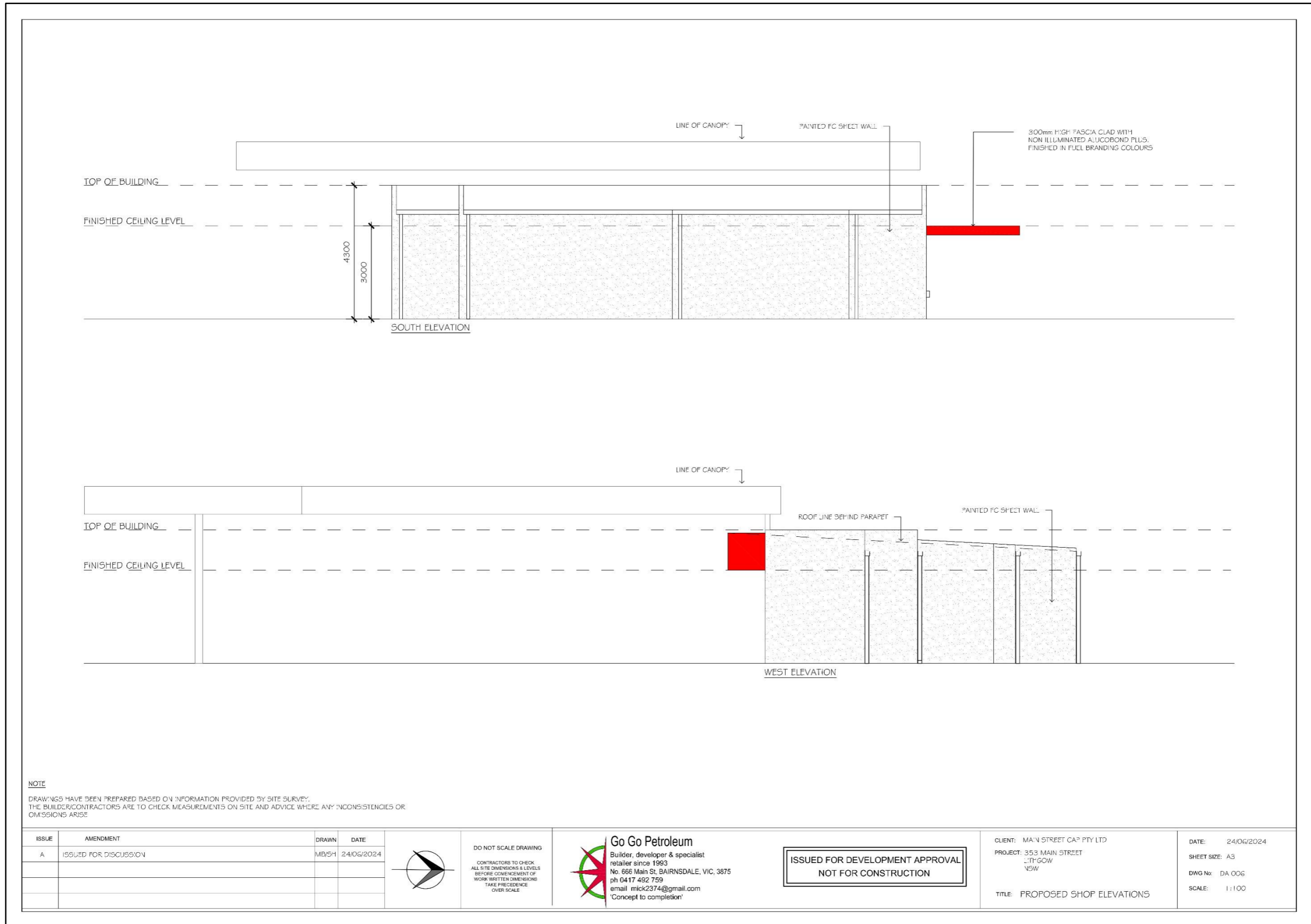


Figure 2.5: Proposed Development: Elevation Plan 2 of 2

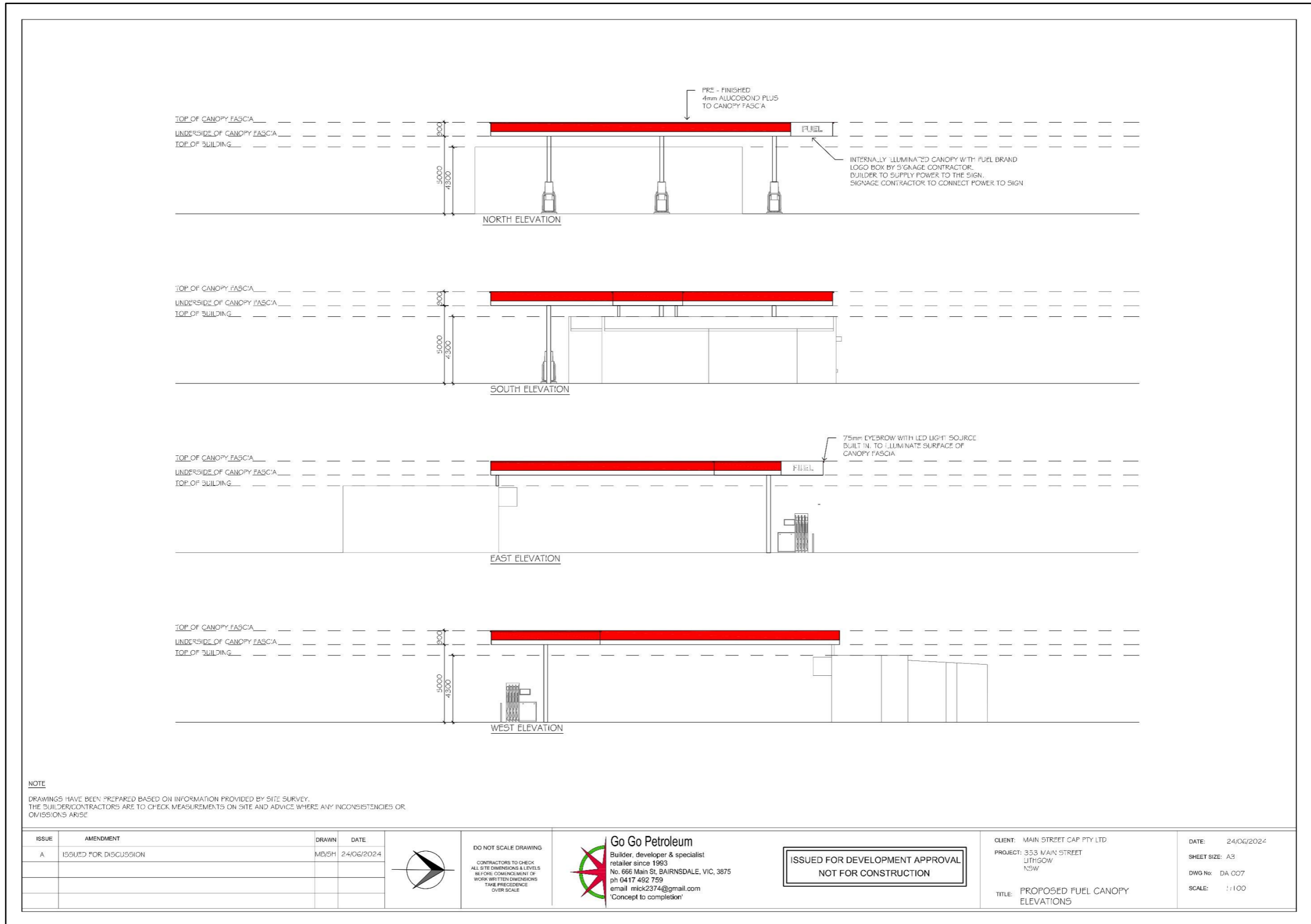


Figure 2.6: Proposed Development: Light Vehicle Fuel Canopy Elevation Plan

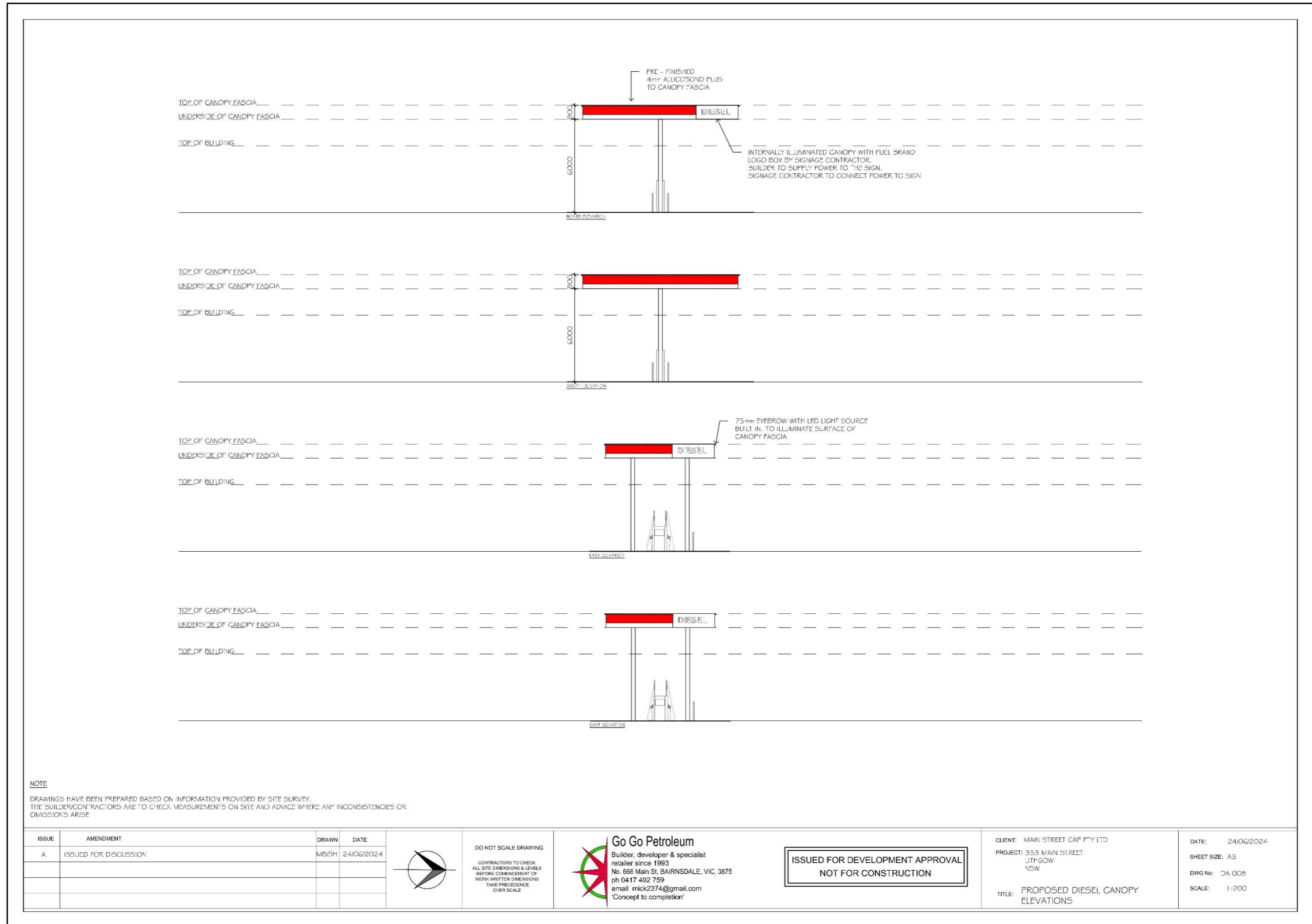


Figure 2.7: Proposed Development: Heavy Vehicle Diesel Canopy Elevation Plan

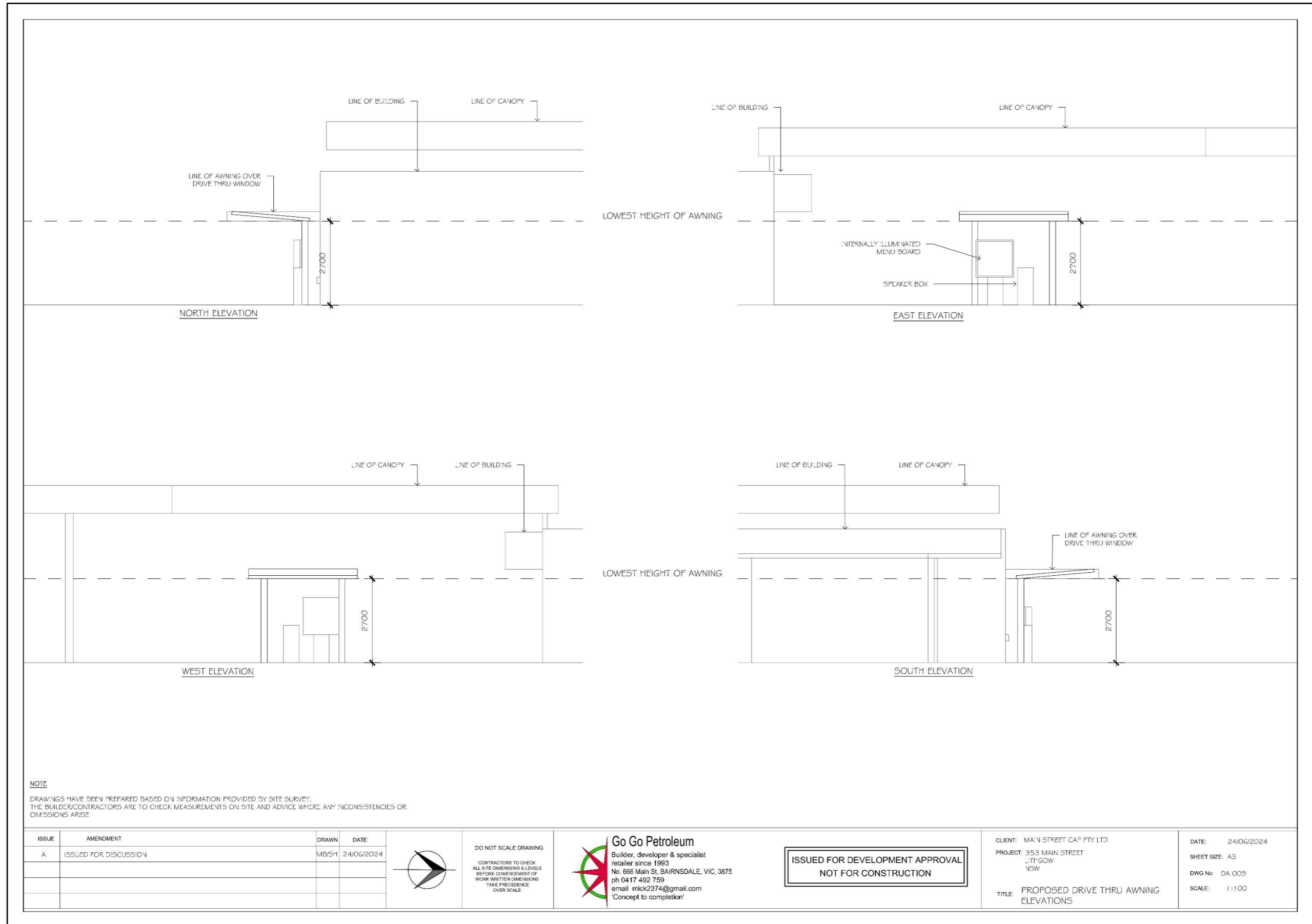


Figure 2.8: Proposed Development: Drive-thru Awning Elevation Plan

3 SITE CONTEXT

3.1 SITE CONTEXT AND IDENTIFICATION OF SENSITIVE RECEPTORS

A sensitive receptor, as defined in the NSW EPA document titled *Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW* and dated November 2006, is a location where people are likely to work or reside; this may include a residential dwelling, school, hospital, office, or public recreational area. Given this definition, the Proposed Development is regarded to be in a locality that is within proximity to sensitive receptors (refer to **Section 2**). On this basis, potential odour emissions from the Proposed Development will be required to be emitted or released at a rate and quality that will not adversely affect the general amenity of the surrounding area. This circumstance is addressed as part of the review analysis conducted in the OSIA.

3.2 THE PROPOSED DEVELOPMENT ACTIVITIES

The operating hours for the proposed Development are as follows:

- Seven days per week, 24 hours per day.

The Proposed Development activities will be the receipt and sales of motor spirits, kitchen cooking activities and retail sales within the retail convenience store.

The kitchen activities will consist of a deep fryer and hot plate, refer to **Figure 3.1** for a detailed floor plan of the kitchen area and the convenience store area.

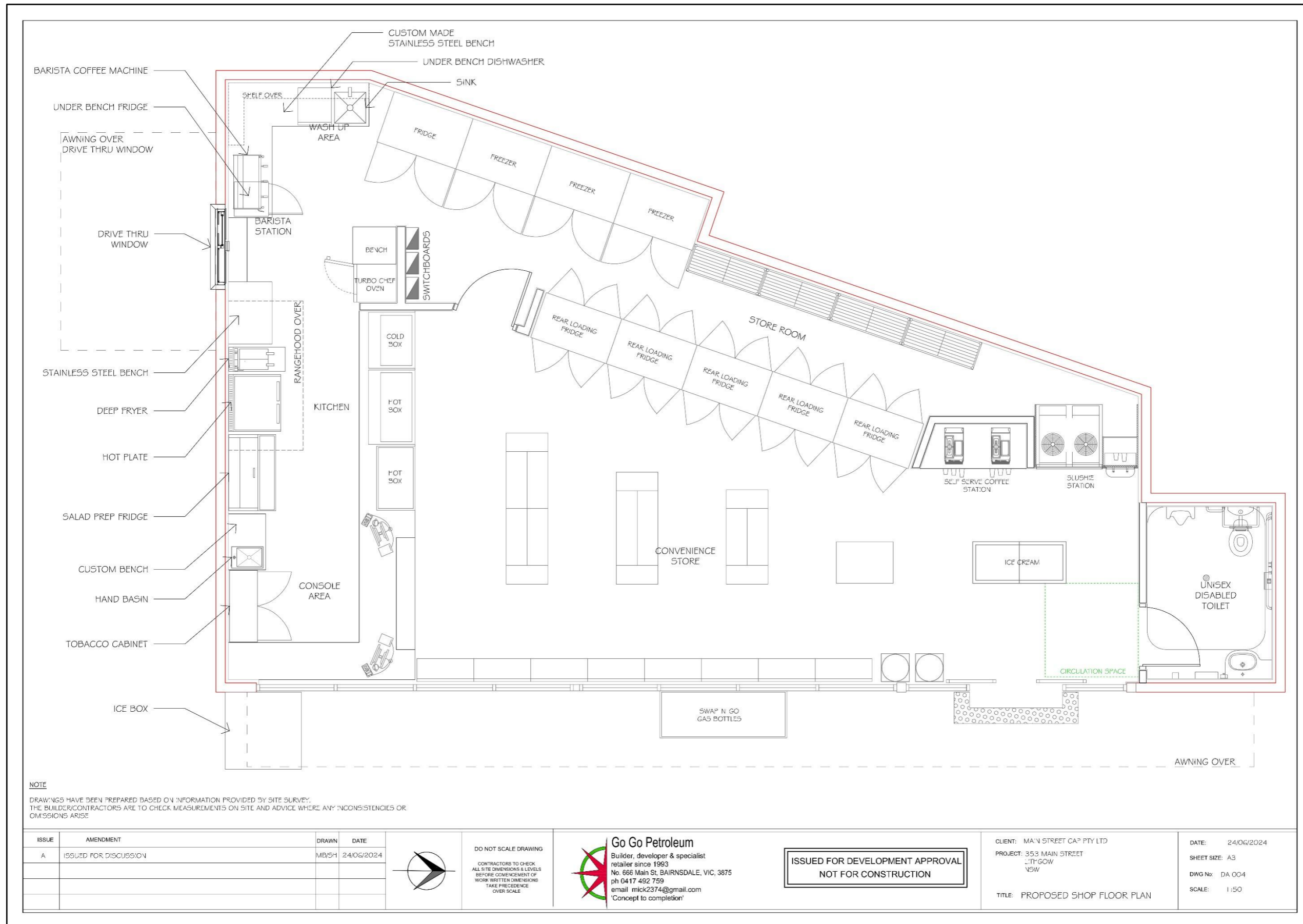


Figure 3.1: Proposed Development: Kitchen Area and Convenience Store Floor Plan

4 OPERATIONAL ODOUR ANALYSIS

A detailed review analysis is intended to assist the Council in conducting an odour and smoke impact risk assessment for applications. As such, an OOSA has been carried out to provide details on the operations and likely odour and smoke emission sources at the Proposed Development, and the management of those emissions to mitigate impact risk.

The following section addresses potential sources of odour and smoke and the control protocol that will be implemented for all identified significant odour emission source/s at the Proposed Development, based on the proposed activities documented in **Section 3** of the OSIA.

4.1 ODOUR AND SMOKE EMISSIONS OPERATIONS REVIEW

The normal operational condition from the Proposed Development that is likely to emit odour will be from the transfer of motor spirits and kitchen cooking activities.

The abnormal operational conditions that could emit odour or smoke include:

- A fault or sub-optimal operation of the motor spirit transfer and storage emissions control system (**ECS**) equipment;
- A fault or sub-optimal operation of the kitchen ECS equipment;
- Solid and liquid waste handling within the service yard, including the management of the grease traps and refuse area; and/or
- Poor housekeeping.

4.2 MAJOR ODOUR AND SMOKE SOURCES

4.2.1 Major Odour Emission Sources

From an odour perspective, the major sources of odour emissions will be the transfer and storage of motor spirits and LPG and kitchen cooking activities. A conceptual site model representing all major and minor odour emissions at the Proposed Development is presented in **Figure 9**. The odorous sources have been identified as:

- Motor Spirit Deliveries – transfer from truck to storage tanks;
- Motor Spirit Sales – transfer from storage tank to vehicle via bowsers;
- Motor Spirit storage tank vents; and
- Deep fryer and hot plate cooking activities.

Under atypical or upset conditions, such as a failure in one or more-unit components of any ECS installed, any discharge point will have the potential to cause off-site odour impact. For this reason, the implementation of an appropriate operating and

maintenance schedule will be required as a means of preventative maintenance and to ensure that the treatment performance is consistently working in an optimum condition.

No major sources of smoke were identified during the OSIA under normal operating conditions.

4.2.2 Minor Odour and Smoke Emission Sources

Based on the details provided, the odour emission sources at the Proposed Development that are categorised to have a minor odour risk potential are as follows:

- Grease arrestor;
- Refuse area;
- Amenities ventilation;
- General kitchen preparation and production activities; and
- Retail convenience store activities.

The location of the refuse area, as provided in the waste management plan, is shown in **Figure 4.1**.

These areas have been categorised as minor emission sources, provided good housekeeping practices are maintained and a waste management plan is habitually implemented. This detail is reflected in the conceptual site model, as shown in **Figure 4.2**.

No minor sources of smoke were identified during the OSIA under normal operating conditions.

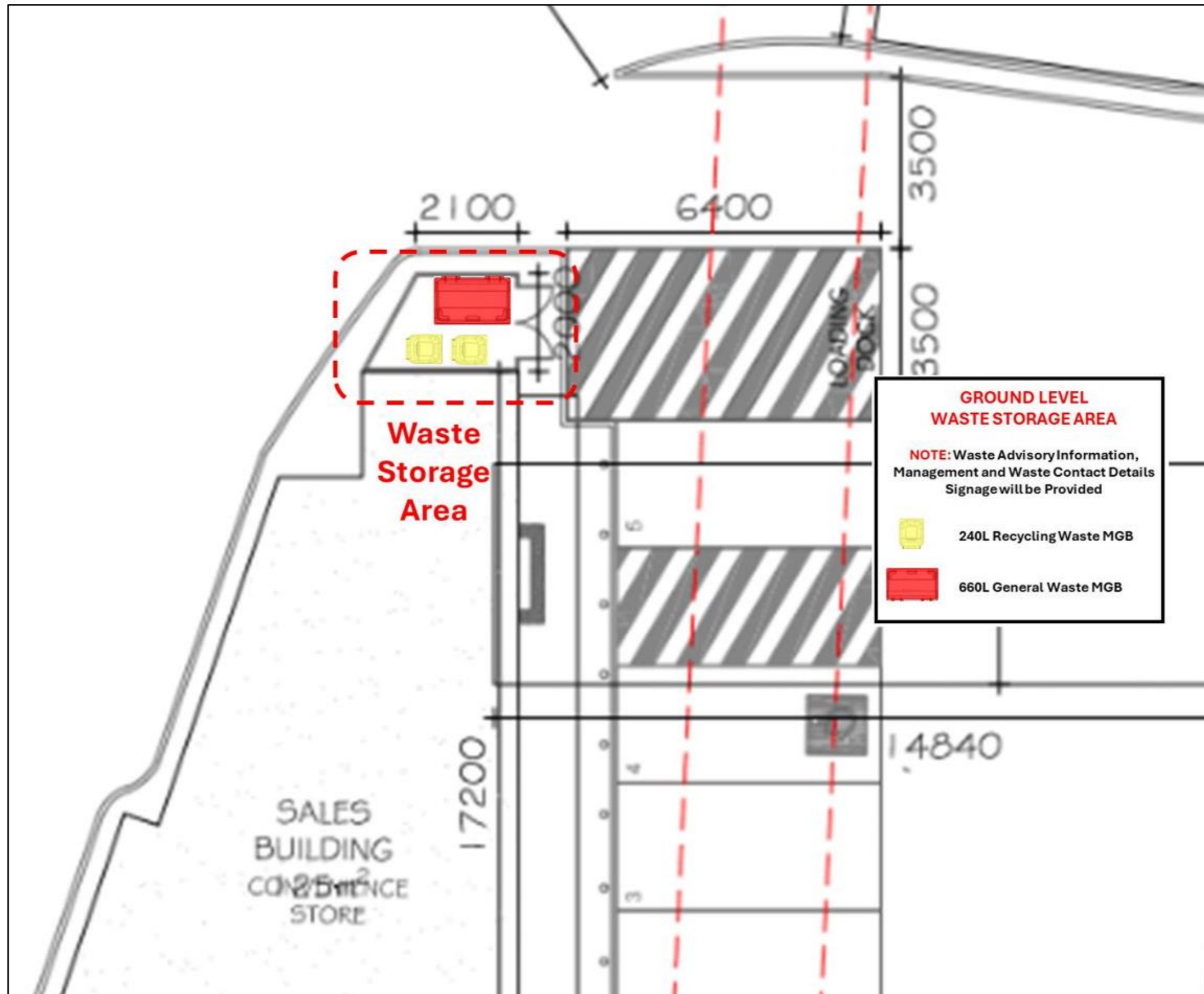


Figure 4.1: Site plan showing the location of the refuse area at the Proposed Development

	AIR CONTAMINANT SOURCE	AIR CONTAMINANT RELEASE MECHANISM	ENVIRONMENT TRANSPORT	EXPOSURE PATHWAYS	RECEPTORS
MAJOR	<p>Motor Spirit Deliveries</p> <p>Motor Spirit Sales</p> <p>Motor Spirit Storage Tanks</p> <p>Kitchen Exhaust Discharge Points</p>	<p>Transfer of motor spirits to storage tanks</p> <p>Transfer of motor spirits to vehicles</p> <p>Vent discharge</p> <p>Kitchen cooking activities under normal operating conditions</p>	<p>Transport by air</p>	<p>Inhalation</p>	<ul style="list-style-type: none"> - Nearby residential dwellings - Nearby commercial area - Nearby sportsground
MINOR	<p>General kitchen preparation and production activities</p> <p>Retail Convenience Store</p> <p>Staff and patron Amenities</p> <p>Grease trap</p> <p>Refuse Area</p>	<p>Fugitive emission release at ground level by either sub-optimal operation of the mechanical exhaust air extraction system</p> <p>Prolonged storage and poor housekeeping</p> <p>Waste management plan not strictly adhered to</p>	<p>Transport by air</p>	<p>Inhalation</p>	<ul style="list-style-type: none"> - Nearby residential dwellings - Nearby commercial area - Nearby sportsground

Figure 4.2: Odour and smoke emission sources conceptual model for the Proposed Development

5 AIR EMISSIONS CONTROL SYSTEMS

5.1 MAJOR ODOUR AND SMOKE EMISSION SOURCES

As mentioned in **Section 4.2**, the transfer and storage of motor spirits and the kitchen cooking activities will be the major odour emission sources in the Proposed Development. As such, an emissions control system for both the motor spirit transfer and storage tanks and kitchen activities will be required to minimise the risk of odour adversely affecting the surrounding area during normal operating hours and periods of high kitchen demand. The design of the ECS for each activity at the Proposed Development is detailed below.

5.1.1 Motor Spirit Transfer Air Emissions Control System – Deliveries

Stage One vapour recovery system (**VR1**) restricts the odorous compounds during the unloading of motor spirits into storage tanks. As the storage tank fills, the pressure inside the storage tank increases, which displaces vapour. The VR1 system collects the displaced vapour and returns it to the delivery vehicle, refer to **Figure 5.1** for a typical VR1 diagram.

The appropriate inspections and maintenance need to be carried out on the stage one vapour recovery system to ensure no fugitive odours appear over time and should be carried out in accordance with the installation requirements and NSW regulations and follow the draft guidelines in *NSW EPA Standards and Best Practice Guide for Vapour Recovery at Service Stations 2012 (VRR)*.

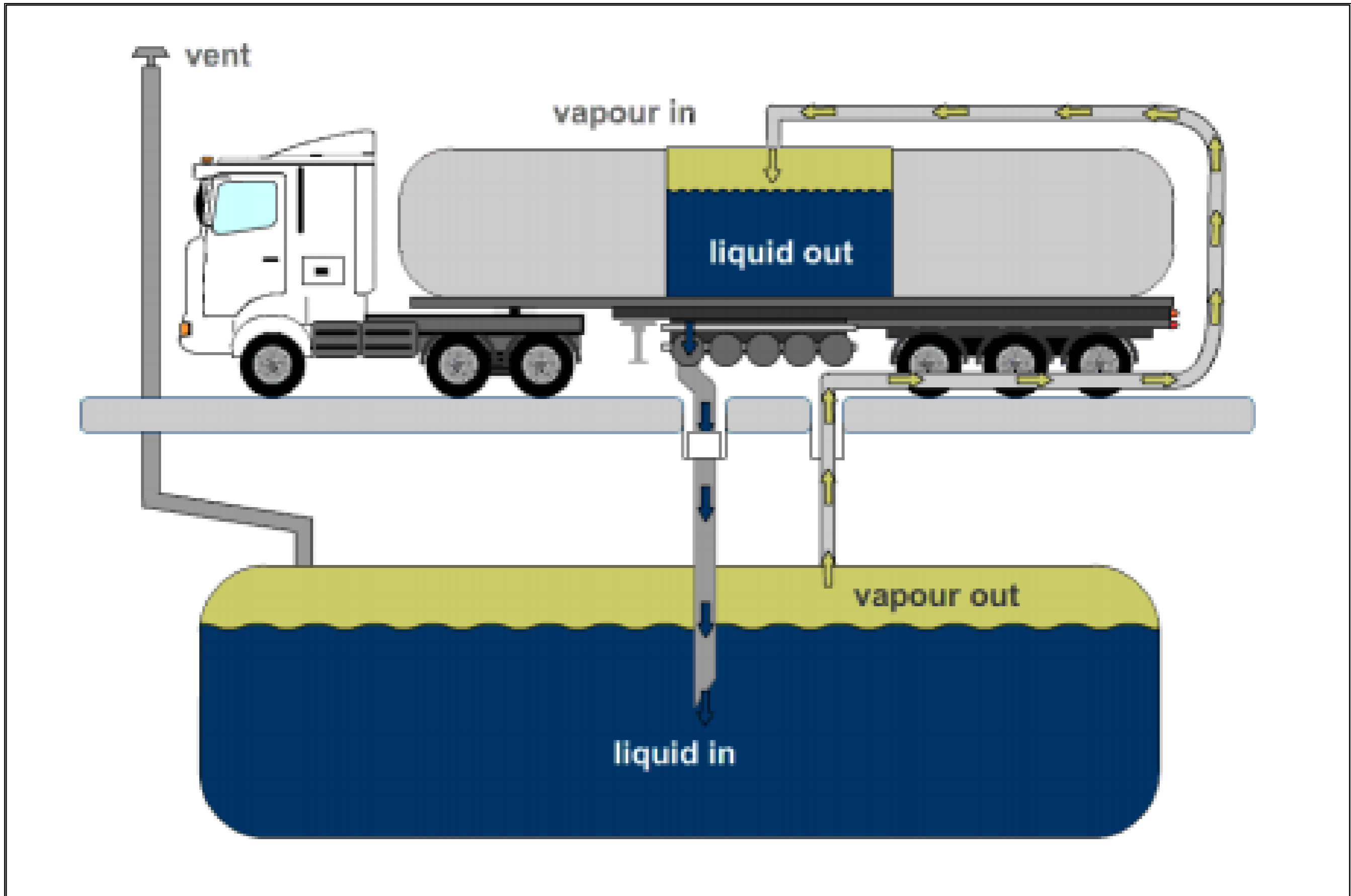


Figure 5.1: Example of VR1 (Source: VRR)

5.1.2 Motor Spirit Transfer Air Emissions Control System – Storage

Pressure build up within a storage tank, either during periods of filling or changes in climatic conditions, results in vapour release through the storage tank vent. A pressure release valve is fitted to prevent hazardous pressures building up. The pressure relief valve should remain closed except under adverse conditions.

Should vapours released during pressure build-ups be problematic, a carbon filter could be fitted to the vent outlet. If installed, the carbon would need to be replaced regularly, and the date of the change would be recorded in the odour log.

5.1.3 Motor Spirit Transfer Air Emissions Control System – Sales

Stage two vapour recovery (**VR2**) is designed for use at the bowser as a vehicle is being filled with fuel. The VR2 system captures displaced vapour at the filling point and returns it to the storage tank. The fuel dispenser line utilises both fuel and vapour return systems, with the vapour being drawn through the return line by a vacuum pump. The VRR states that VR2 systems are intended to limit the emission of fuel vapour when vehicles refuel by recovering at least 85% of the displaced vapour, refer to **Figure 5.2** for a typical VR2 diagram.

Appropriate inspections and maintenance need to be carried out on the stage two vapour recovery system to ensure no fugitive odours appear over time and should be carried out in accordance with the VRR.

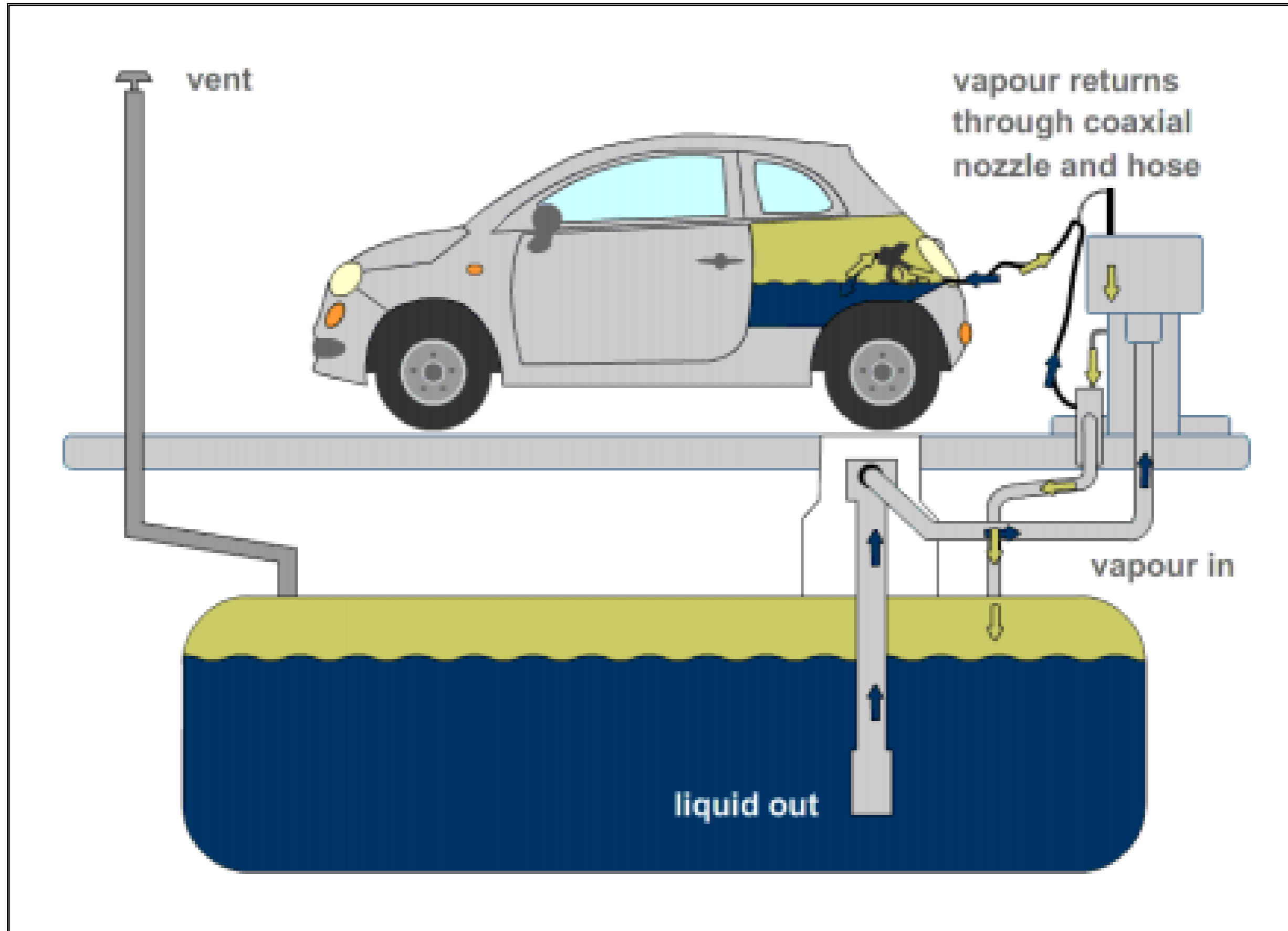


Figure 5.2: Example of VR2 (Source: VRR)

5.1.4 Motor Spirit Spillage

Any fuel spills should be cleaned up immediately using an appropriate motor spirit spill kit. In the event of a fuel spill causing an odour event an odour entry form shall be completed and filed in the odour log, refer to **Section 6** of this report for an odour entry form example.

5.1.5 Kitchen Cooking Activities

At the time of the OSIA, no mechanical exhaust ventilation drawings had been provided to TOU for the collection and treatment of kitchen activity emissions. As such, recommendations for an appropriate ECS for kitchen activities have been included in **Section 7**.

6 ODOUR REPORTING POLICY

An odour log will be available to all staff members to record odour observations from both staff and members of the public.

If a staff member detects an odour beyond the site boundary, an odour entry form should be completed. Should an odour complaint be made to the Proposed Development an odour entry form should be completed with the complainant. All odour entry forms are to be stored with the odour log.

The vapour recovery systems must be tested according to the installation requirements and state legislation. Each test must be entered in the odour log.

An example of an odour complaint form, with an odour intensity scale included for reference, is shown in **Figure 6.1**.

Odour Intensity Scale (VDI 3882)		
Odour Strength	Intensity Rank (code)	Interpretation (meaning)
Not detectable	0	No odour detected
Very Weak	1	Odour is barely detectable, character difficult to determine
Weak	2	Odour is weak, character becoming evident
Distinct	3	Odour and character clearly distinct
Strong	4	Strong odour detectable
Very Strong	5	Very strong odour detectable
Extremely Strong	6	Unpleasant to remain in the area

Odour Entry Example

Date of Observation	
Time of Observation	
Weather conditions (sunny, dry, rain, fog, snow etc)	
Temperature (hot, very warm, warm, mild, cold or degrees if known)*	
Wind strength (calm, light, steady, strong, gusting)*	
Wind direction (e.g. from NE)*	
What does the odour smell like (Please circle response)	sweet cooking oils/fats petrol, fuel solvent, varnish chemical, glue oily, tar, acrid Other (describe if possible).....
Frequency – Was the odour constant or intermittent?	
Intensity – How strong was the odour? (Please circle) Refer to odour intensity scale for meaning	0 1 2 3 4 5 6
Duration – How long did the odour last?	
Offensiveness - Was the character or strength of the odour offensive?	
Location – Where was the odour experienced	
Any other comments	

Figure 6.1: Odour complaint form example

7 ASSESSMENT FINDINGS AND RECOMMENDATIONS

Based on the review of supplied documents and the design of the air emission control systems relating to the Proposed Development, the following findings are made:

7.1 MAJOR ODOUR AND SMOKE EMISSION SOURCES

The major odour emission sources are identified to be the transfer and storage of motor spirits and cooking kitchen activities. There were no major sources of smoke identified during the OSIA under normal operating conditions.

7.1.1 Transfer and Storage of Motor Spirits

The VR1 and/or VR2 vapour recovery systems to be adopted at the Proposed Development are recommended by the VRR as best management practices for service stations. The appropriate inspections and maintenance must be carried out to ensure no fugitive odour emissions occur over time.

Motor spirit storage tanks should be fitted with a pressure relief valve and a carbon filter at the storage tank vent outlet to ensure fugitive emissions are treated during filling and during periods of higher temperatures.

7.1.2 Kitchen Cooking Activities

As no mechanical ventilation exhaust system was available to TOU at the time of the OSIA recommendations for the appropriate level of odour control in **Section 7.3**.

7.1.2.1 Compliance Requirements

The design and specifications of the kitchen ECS at the Proposed Development will need to be designed and installed to ensure compliance with Australian Standards 1668.1-2015, 1668.2-2012 and 1530-1994, reflecting current industry best practice in the food retail sector. The certificate of compliance will be required as part of the commencement of operations for the Proposed Development

7.2 MINOR ODOUR AND SMOKE EMISSION SOURCES

All minor odour emission sources, including the solid waste generation points, grease arrestor, refuse storage area and fugitive emission release points (i.e. doorways), are considered to be negligible, provided good housekeeping practices are implemented and maintained. The grease arrestor and refuse area should be located a minimum 5 m away from any boundary. At the time of the OSIA, the grease arrestor had not been included in the architectural drawings.

There were no minor sources of smoke identified during the OSIA under normal operating conditions.

7.3 KEY RECOMMENDATIONS

The following recommendations are made based on the OSIA findings:

- Architectural drawings issued at the construction certificate stage are to include the location of the grease arrestor;

- The commissioning of a kitchen mechanical exhaust system design by an appropriately qualified person who can meet the requirements outlined in **Section 7.1.2.1** and, as a minimum, includes the following technologies:
 1. Pre-treatment via grease filters installed in kitchen extraction hoods;
 2. Primary treatment via an ozone generator retrofitted as part of the kitchen exhaust air extraction system. The ozone treatment must provide adequate contact time between the ozone and the discharge point to be effective. The use of ozone is a well-known, powerful oxidant that is conventionally used in commercial kitchen applications to promote the rapid oxidation of complex gaseous compounds in kitchen exhaust streams to 'inert', non-odorous compounds; and
 3. The kitchen mechanical exhaust discharge point should be placed on the roof of the Proposed Development with no impediment installed, such as a rain cap, to ensure sufficient vertical velocity is achieved.
- Subject to a review of the as constructed drawings, it may be necessary to conduct a field-based validation assessment at the Proposed Development, once constructed and commencing normal business activities. During this validation assessment, it is recommended that the following works are undertaken:
 1. Inspection of all major and minor emissions sources, as identified in the OSIA;
 2. Validate that any mechanical exhaust system has been installed as documented in the OSIA;
 3. Verify all equipment specifications installed for the emission control system and ensure that it is suitable for the design exhaust airflow loading and service duty;
 4. Odour sampling and testing of the emissions control system to validate the odour removal performance under all operating scenarios, namely:
 - **Non-peak operating scenario:** this represents an operating scenario defined by low to medium demand levels in the kitchen cooking activities and ingress of future patrons; and
 - **Peak operating scenario:** this represents an operating scenario defined by high demand levels in the dining and kitchen cooking activities and ingress of future patrons.

This work should be completed according to Australian Standard / New Zealand Standard (**AS/NZS 4323.3**) 4323.3, the relevant NSW EPA odour guidelines, and at a NATA Accredited Odour Laboratory;

5. Implementation of an appropriate operating and maintenance plan as a means of preventative maintenance and to ensure that the mechanical exhaust air system and emissions control system is operated in an optimum condition under normal business operation; and
6. Supply of a site-specific design certificate of compliance issued by a suitably qualified mechanical engineer for the mechanical exhaust and emissions control system in its entirety.

The outcomes from follow-up inspection visit will be used as a basis to determine the need for further odour mitigation and to ensure that the Proposed Development can sustainably operate without causing a negative impact on the general amenity from an odour viewpoint.

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