APPENDIX 8

Odour Impact Assessment : Linnery Engineering Services

THE ODOUR UNIT

LINNEY ENGINEERING SERVICES

Linnery Engineering Services
On behalf of Strategic Alliance

Proposed Winery Development at Lot 102 Hoffnungsthal Road, Williamstown, South Australia -

Odour Impact Assessment

Final Report

August 2025

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Linnery Engineering Services
On behalf of Strategic Alliance
Proposed Winery Development at Lot 102 Hoffnungsthal Road, Williamstown, South Australia - Odour Impact Assessment
Final Report – August 2025

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ABBREVIATIONS AND DEFINITIONS

Assessment	the odour impact assessment for the Proposed Winery Development
BOD	biochemical oxygen demand
COD	chemical oxygen demand
EPA SA AAQA	EPA SA Ambient Air Quality Assessment (2016)
EPA SA Policy	Environment Protection (Air Quality) Policy 2016 (Air Quality EPP)
EPA SA Separation Guideline	EPA SA Evaluation distances for effective air quality and noise management
FIDOL	frequency, intensity, duration, offensiveness, and location
LES	Linnery Engineering Services
OMP	odour management plan
OOA	operational odour analysis
Proposed Winery Development	proposed winery development by Strategic Alliance at Lot 102 Hoffnungsthal Road, Williamstown, South Australia
SA EPA	South Australian Environmental Protection Authority
SBR	Sequencing batch reactor
SS	suspended solids
TOU	The Odour Unit
WWTP	wastewater treatment plant

UNITS OF MEASUREMENT

ha	hectare
kg	kilogram
kL	kilolitres
km	kilometres
L	litres
m	metres

m^2	square metres
mg/L	milligrams per litre

CHEMICAL NOMENLATURE

$C_6H_8O_7$	citric acid
NaOH	sodium hydroxide

1 INTRODUCTION

In May 2025, Linnery Engineering Services (**LES**) engaged The Odour Unit to undertake an odour impact assessment (**Assessment**) for the proposed winery development by Strategic Alliance at Lot 102 Hoffnungsthal Road, Williamstown, South Australia (the **Proposed Winery Development**). The following report documents the operational odour risk profile, findings, and recommendations of the Assessment for the Proposed Winery Development.

1.1 RELEVANT BACKGROUND AND CONTEXT

As part of the Proposed Winery Development, it is intended to establish an operational winery with a processing capacity of up to 500 tonnes of fruit per annum. The majority of the operational footprint of the Proposed Winery Development will be utilised for vineyard planting, as shown in **Figure 1.1** and Figure **1.2** . While the Proposed Winery Development will be designed for a maximum capacity of just under 500 tonnes, the projected short-to-medium term processing volume is expected to range between 150 tonnes and 300 tonnes annually, depending on market demand. To that end, the Proposed Winery Development will feature the following facets:

- A small-scale winery (processing less than 500 tonnes of fruit annually), which includes a cellar door and function;
- Associated winery wastewater treatment infrastructure; and
- A commercial, multi-level hotel and other associated facilities on the same property, including spa, conference facilities, and car parking on the hillside vantage point overlooking the valley.

The Assessment addresses the small-scale winery and associated winery wastewater treatment infrastructure.

1.1.1 LOCALITY

The locality and floor plan for the Proposed Winery Development are shown in **Figure 1.1** and **Figure 1.2.** As shown in **Figure 1.1**, the Proposed Development will on be situated on approximately 21 hectares (**ha**) of a rural land parcel in Williamstown, South Australia. The land parcel is approximately 310 m above sea level elevation and is on gently rolling hills typical of the southern Barossa Valley. TOU understands that the land is partly planted with vines and bordered by other vineyards, orchards, pastoral paddocks, and small pockets of native woodland.

The access pathway to the Proposed Winery Development will be via Hoffnungsthal Road off Lyndoch Valley Road, within the Barossa Council jurisdiction. The surrounding area includes conservation reserves, including Sandy Creek Conservation Park to the southeast and Warren Reservoir Reserve to the south. As such, the surrounding area is characterised by native forest and wildlife habitat. Furthermore, the broader locality includes the iconic Barossa landscapes of vineyards, undulating hills with creeks feeding into broader catchments and mixed farmland.

1.1.2 OPERATIONAL CONTEXT

The operations at the Proposed Winery Development will focus on producing premium wines and will be designed with flexibility to allow staged expansion up to a 500-tonne

capacity. This will be underpinned by efficient resource use and sustainable production practices in both the design and operation of the winery activities.

The winery will process both red and white grape varieties on-site, with an anticipated production split of approximately 80% red grapes and 20% white grapes. At the time of writing, the specific grape varieties to be planted are yet to be determined. This has a negligible impact on the findings or recommendations documented in the Assessment.

The winemaking infrastructure - including equipment for crushing, fermenting, blending, and filtration - will be housed on-site, as shown in **Figure 1.3**. The operations will incorporate modern processing and filtration technologies to eliminate disposable filter media from waste streams, supporting sustainable operations.

The wine storage for both short- and long-term aging will be accommodated in stainless steel tanks and oak barrels, located in a dedicated, climate-controlled barrel hall. The finished wine products will be filtered and transported off-site for bottling and packaging and returned to the winery for storage and distribution through local channels, including the cellar door and associated function spaces at the Proposed Winery Development.

1.1.3 REGULATORY CONTEXT

It is understood that the Proposed Winery Development falls below the threshold that triggers the requirement for a South Australian Environmental Protection Authority (**SA EPA**) licence under South Australian regulations. Nonetheless, the Proposed Winery Development will be committed to adhering to SA EPA guidelines to ensure future growth remains aligned with regulatory expectations. It promotes environmentally responsible practices in the local area.

To that end, the Assessment considers the following regulatory guidance documents and factors:

- Sensitive receptors, ambient conditions, and relevant legislation and guidance, particularly the: EPA SA Ambient Air Quality Assessment (2016) (**EPA SA AAQA**);
- Environment Protection (Air Quality) Policy 2016 (Air Quality EPP) (**EPA SA Policy**);
- EPA SA Evaluation distances for effective air quality and noise management (**EPA SA Separation Guideline**);
- Existing air quality conditions within the Proposed Winery Development and surrounding areas; and
- Compatibility of proposed developments with odour and air quality emissions, mitigation, and management measures.

1.1.4 SCOPE OF WORK

Based on the scale and nature of operations, the scope of work for the Assessment includes an evaluation of the following aspects surrounding the Proposed Winery Development:

- Winery operations;
- On-site winery wastewater treatment systems; and

- Storage and handling of by-products.

1.2 PURPOSE OF THE ASSESSMENT

This document is the Assessment for others to develop and ratify as part of a documented operational management system for the Proposed Winery Development to identify potential odours and detail the operational activities and control measures for the management and control of odour at the complex, namely:

- Identification of critical odour emissions risk and control points;
- An outline of how the production and migration of odorous compounds is minimised at the complex, including design (where applicable), and operational practices;
- Guidance on operational protocols and management practices that should be employed to anticipate the formation of odours and minimise their release; and
- A determination of the level of impact risks based on the characterisation and evaluation of the operational odour profile for the winery operations, on-site winery wastewater treatment systems, and storage and handling of by-products.

Put simply, based on the impact risk outcomes, the Assessment provides advice on how the Proposed Winery Development could work towards elimination/prevention and/or minimisation of the potential for odour generation through a hierarchy of controls, in the form of engineered, administrative and/or management practices.

1.3 DISCLAIMER AND LIMITATION

This document has been prepared in accordance with the scope of services agreed upon between TOU and LES. The information contained in this document has been relied upon the documents and information supplied by LES in good faith. Therefore, TOU does not accept any liability associated with errors or omissions related to the documents and information relied upon in the preparation of the Assessment for the Proposed Winery Development. Except as otherwise stated in this document, TOU has not verified the accuracy or completeness of such data, surveys, analysis, designs, plans and other information. No responsibility is accepted for the use of any part of this document in any other context or for any other purpose by third parties.

TOU has also assumed that all activities, plant equipment, and infrastructure related to odour emissions management will be operated and maintained in accordance with manufacturer specifications and recommended protocols to ensure sustainable and effective performance. All operating and maintenance protocols must be followed to always minimise odour, supplemented by on-going good housekeeping practices.

1.4 ODOUR OVERVIEW

Odour is a sensory perception triggered by volatile chemical compounds detected by the olfactory system. An odour can be perceived as pleasant or unpleasant, depending on the nature of the gaseous compounds, their concentration, type of odour character, frequency, duration and intensity. For this reason, the frequency, intensity, duration, offensiveness, and location (**FIDOL**) factors are a widely used framework for assessing odour nuisance/impact and assist with evaluating how odours affect the surrounding environment and perception by the receptor (i.e. the person/s detecting or being impacted by an odour).

The FIDOL factors can be described as follows:

- Frequency (**F**) – How often the odour occurs;
- Intensity (**I**) – The strength or concentration of the odour;
- Duration (**D**) – How long the odour persists;
- Offensiveness (**O**) – The degree to which the odour is considered unpleasant; and
- Location (**L**) – The context of the odour impact, including the sensitivity of the affected area.

The FIDOL factors are incorporated as part of the approach adopted in the Assessment.

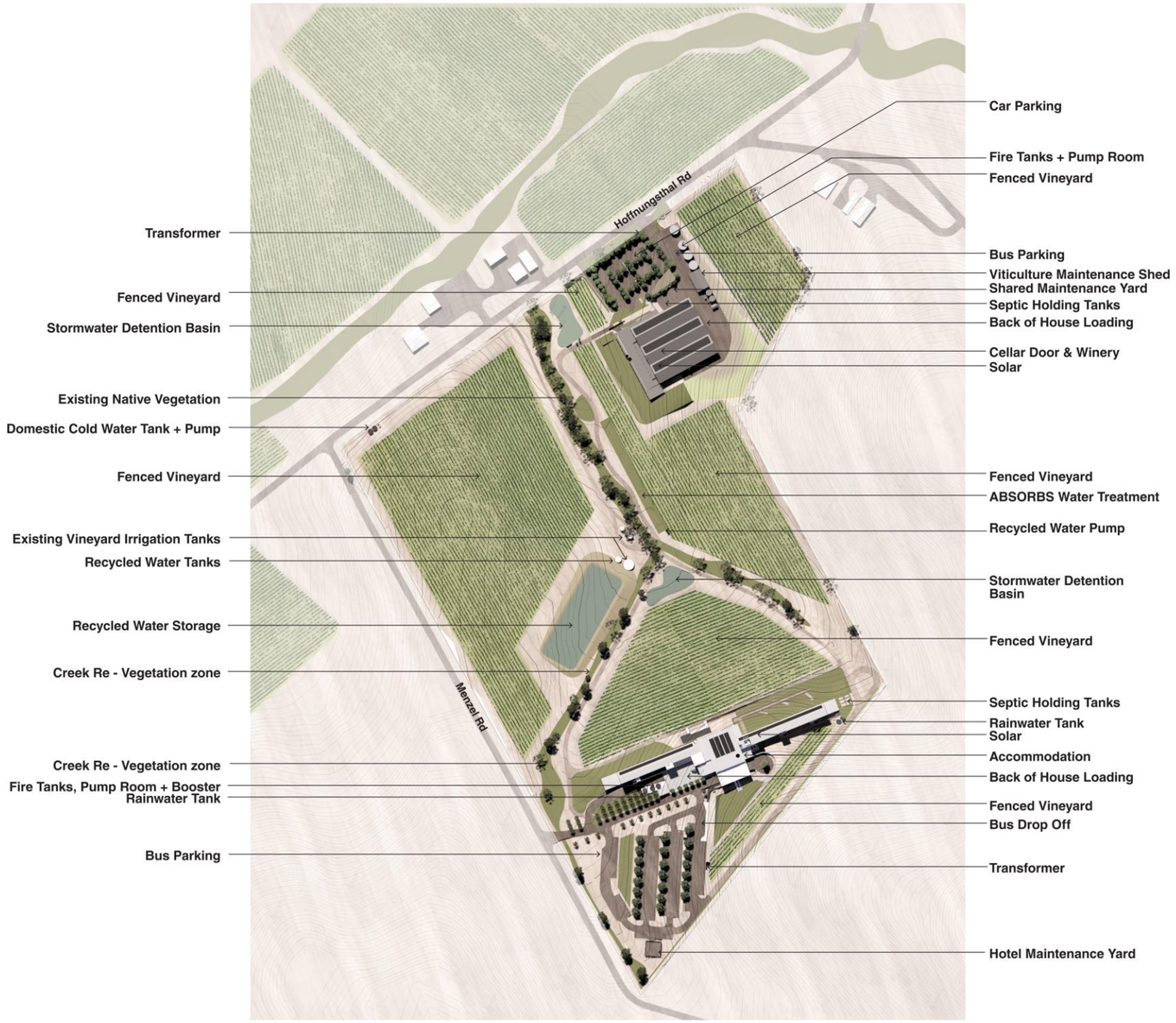
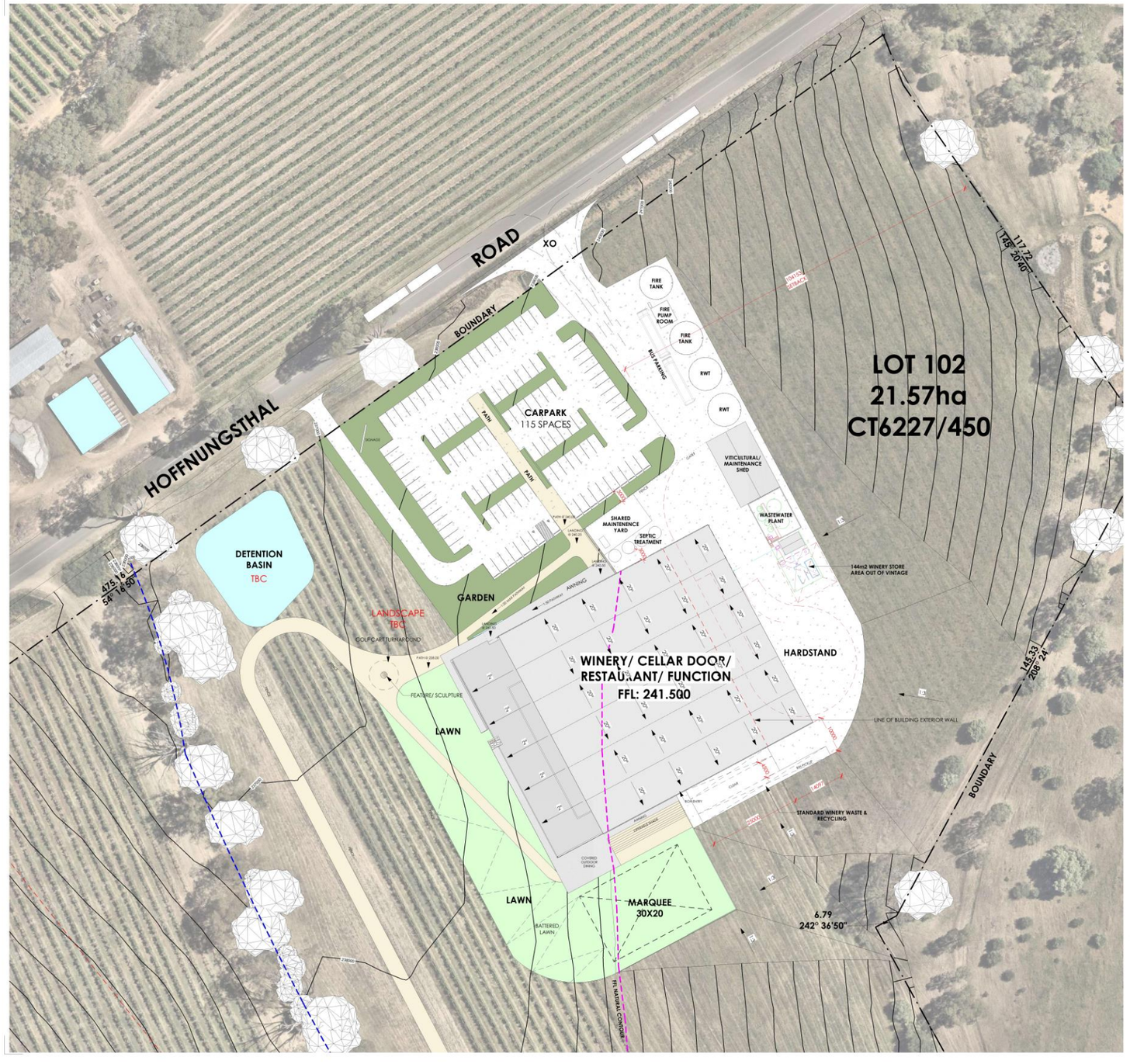


Figure 1.1 – Locality plan for the Proposed Winery Development



NOTES

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WARNING

Services shown on this drawing are approximate only. The exact locations to be confirmed on site the contractor prior to the commencement of work

Issue	Issued For	By	To	Date
P1	CLIENT REVIEW	JG	AM	27.11.24
P2	CLIENT REVIEW	EM	AM	04.12.24
P3	CLIENT REVIEW	HA	SA	24.04.25
P4	CONSULTANT COORDINATION	HA	SA	20.05.25
P5	CONSULTANT COORDINATION	HA	SA	23.05.25
P6	GEOTECH COORDINATION	HA	SA	02.06.25
P7	CONSULTANT COORDINATION	HA	SA	12.06.25

SITE AREA COVERAGE		m²
SITE	21.57	ha
PROPOSED BUILDING	4881.00	
TOTAL BUILDING AREA	**4881.00**	**m²**

PROPOSED CARPARKS	
STAFF CARPARKS	X
VISITOR CARPARKS	X
DISABLED CARPARKS	2
TOTAL PROPOSED CARPARKS	**125**

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Client
STRATEGIC ALLIANCE

Project Name
AG-TWEEDIES GULLY WINERY

1 SITE PLAN
A200 1 : 500

0 5.0m 10.0m 15.0m 20.0m 25.0m
1:500 @ A1, 1:1,000 @ A3

PRELIMINARY
WORK IN PROGRESS ISSUE
12/06/2025 1:50:04 PM

Project Address
LOT 102 HOFFNUNGSTHAL ROAD
WILLIAMSTOWN SA 5351
CT6227/450

Drawing Title
SITE PLAN

Project Number	Drawn by
2445	HA
	Approved by JG
Drawing Number A002	Issue P7

Figure 1.2 – Site plan for the Proposed Winery Development

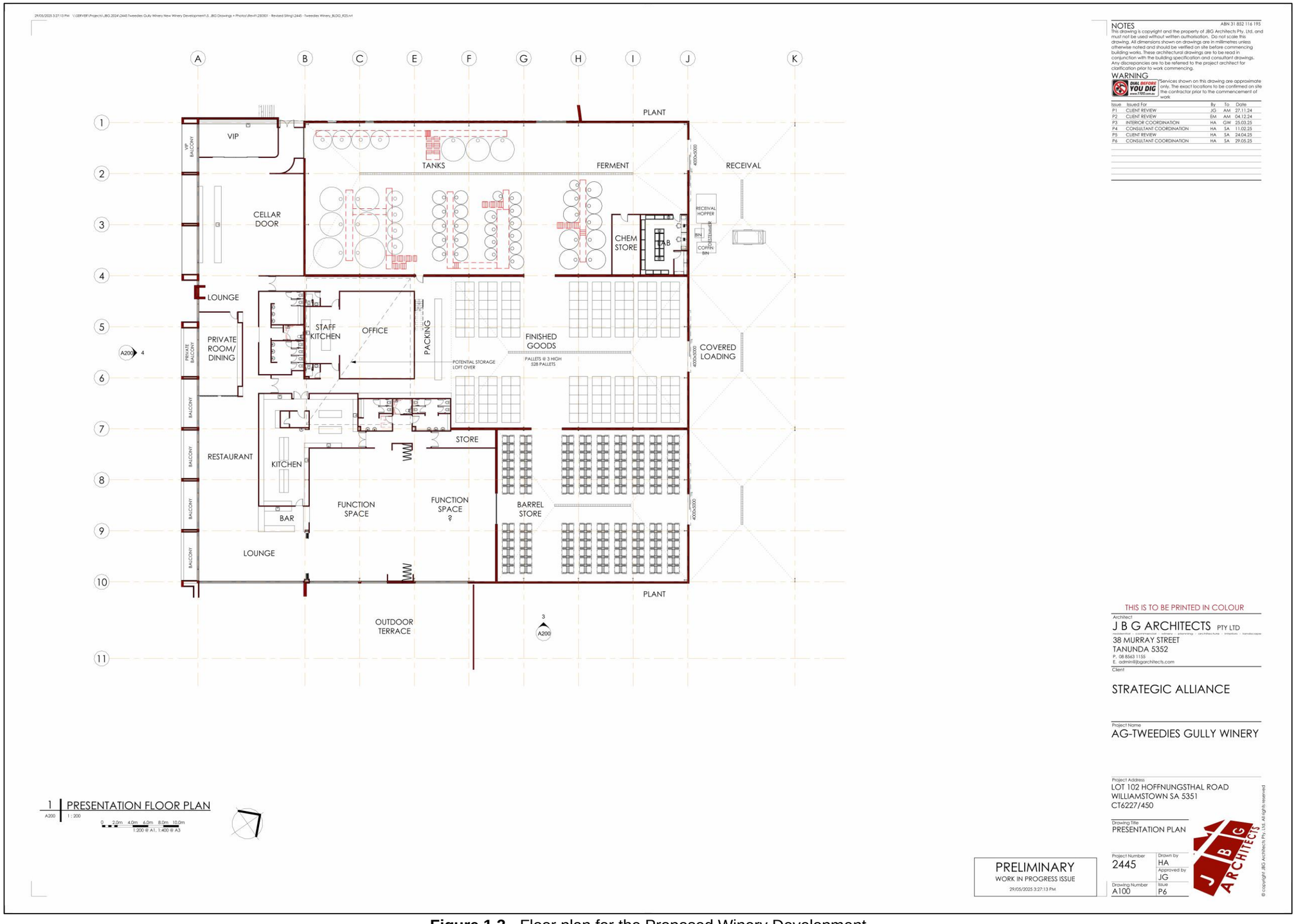

Figure 1.3 - Floor plan for the Proposed Winery Development

2 ODOUR EMISSIONS AND WINERY OPERATIONS

The winemaking process involves several biological and chemical processes, including crushing, fermentation, pressing, and storage, that have the potential to generate odours, particularly during vintage. In general, odour emissions from winery operations are primarily associated with the handling and decomposition of organic material, as well as wastewater storage and treatment. Although the overall odour risk for the Proposed Winery Development can be considered low, particularly given its scale and design focus, the following key emission sources and risk areas are identified as part of the Assessment:

- Grape crushing and pressing;
- Grape marc and stalk storage;
- Lees and filtrate handling;
- Spent cleaning agents;
- On-site Wastewater Treatment Plant (**WWTP**); and
- Emergency Spill Areas.

Each of these key operational areas is evaluated in the context of an operational odour analysis (**OOA**) to characterise the associated odour impact risk and controls necessary to mitigate odour under normal operating conditions in **Section 2.1** to **Section 2.6**. The risk analysis of the OOA outcomes is documented in **Section 3**.

2.1 GRAPE CRUSHING AND PRESSING

The grape crushing and pressing area reflects the primary intake and initial processing area where harvested grapes will be destemmed, crushed, and pressed to extract juice at the Proposed Winery Development. It is understood that this process will result in the majority of the grape stalks being separated and collected with minimal exposure to liquids. Based on the information supplied to the Assessment by LES, the OOA for this operational area is as follows:

- **Odour Source**: the exposure of juice to air, initial fermentation, and organic residues.
- **Odour Characteristics**: sweet and slightly alcoholic, particularly from red varieties.
- **Risk Level**: Medium (vintage period).
- **Controls**: The proposed controls for the grape crushing and pressing operations include:
    - Covered processing area;
    - Rapid processing;
    - Impervious drainage connected to the trade waste system, which flows to the on-site WWTP; and

- Daily washdown routines.

2.2 GRAPE MARC AND STALK STORAGE AREA

The grape marc and stalk storage area is a designated bin area for storing grape marc (skins and seeds) and stalks post-pressing. The material is dry but biodegradable and could become odorous if allowed to decompose. Based on the information supplied to the Assessment by LES, the OOA for this operational area is as follows:

- **Odour Source**: organic decomposition of marc and stalks.
- **Odour Characteristics**: sour, vinegary, or fermented.
- **Risk Level**: low to medium, depending on operating and storage conditions.
- **Controls**: the proposed controls for the grape marc and stalk storage area include:
  - Dry storage in a combined bin within a trade waste catchment;
  - The planned removal of grape marc and stalk material twice weekly during vintage; and
  - The disposal pathway will be via processors such as Tarac Technologies for resource recovery applications such as ethanol production, animal feed and/or compost.

2.3 LEES AND FILTRATE MANAGEMENT AREA

This area is where settled lees (fine sediment) and filtrate sludge are separated using crossflow filtration systems. Lees are the solid particles that settle at the bottom of wine containers (i.e., tanks or barrels) during and after fermentation. The typical composition of lees includes:

- Dead yeast cells (from fermentation)
- Grape solids (like skin fragments, pulp, seeds)
- Tartrates (natural acids that crystallise)
- Residual proteins or tannins

There are typically two (2) types of lees, including:

- Gross lees – These are heavy, coarse sediments formed shortly after fermentation. This is generally removed early to avoid impact on the flavour profile of the wine product; and
- Fine lees – These are lighter particles that settle more slowly. In some winemaking styles, wines are aged on fine lees to enhance flavour profile, texture, complexity, and stability.

In winery waste management, lees are a key solid-liquid waste stream, often processed separately to recover wine, alcohol, tartaric acid, or reused for compost after treatment. The

filtrate from the winery process will be collected in a sealed tank at the Proposed Winery Development. Based on the information supplied to the Assessment by LES, the OOA for this operational area is as follows:

- **Odour Source**: Concentrated biological solids and residual wine compounds.
- **Odour Characteristics**: fermented, sludge, sulphurous.
- **Risk Level**: Low to Medium, depending on storage conditions and operational management protocols.
- **Controls**: the proposed controls for the lees and filtrate management include:
    - A 12,000L enclosed storage tank in a bunded compound;
    - The frequent removal via sealed tankers; and
    - Transportation off-site for alcohol and nutrient recovery.

2.4 SPENT CLEANING AGENT STORAGE

The spent cleaning agent storage will reflect a controlled zone where diluted sodium hydroxide (**NaOH**) and citric acid (**$C_6H_8O_7$**) solutions used for cleaning winery equipment are collected and stored. Based on the information supplied to the Assessment by LES, the OOA for this operational area is as follows:

- **Odour Source**: Spent chemicals and sterilising agents.
- **Odour Characteristics**: chemical smell, ester, sour.
- **Risk Level**: Low to Medium.
- **Controls**: the proposed controls for the spent cleaning agent storage area, including:
    - A 12,000L storage tank in a bunded zone;
    - The use of road tankers for transportation and removal of chemical streams; and
    - An exclusion zone from other operational zones to avoid cross-contamination and unintended reactions.

2.5 WASTEWATER TREATMENT PLANT

The concept design for the WWTP at the Proposed Winery Development is shown in **Figure 2.1**. The project wastewater volumes under the 300 tpa and 500 tpa operating scenarios are shown in **Figure 2.2** and **Figure 2.3**. Overall, based on the details provided by LES, it is understood that the WWTP will consist of a fully engineered, above-ground, bunded operation where all winery process wastewater will undergo biological treatment using a Sequencing Batch Reactor (**SBR**).

The following section provides a functional description of the WWTP to enable a robust OOA to be undertaken as part of the Assessment. To that end, the OOA is synthesised into the following process flow for WWTP:

- Source and nature of wastewater;
- Pre-treatment and collection;
- Equalisation and buffering;
- Biological treatment process;
- Post-treatment and storage;
- Biosolids and sludge handling;
- Handling of special waste streams;
- Contingency and environmental protection; and
- Treated water quality target.

Each of these operational components at the Proposed Winery Development is described in **Section 2.1** to **Section 2.6**.

2.5.1 SOURCE AND NATURE OF WASTEWATER

The Proposed Winery Development is expected to generate approximately up to 1,500 kilolitres (**kL**) of wastewater annually (under the 500 tpa operational scenario). This wastewater volume is primarily generated from washdown activities, tank cleaning, and processing operations. The wastewater generation rate will be dependent on seasonal factors, with peak flows during the vintage period (February to May), and especially in March when production is expected to be at its peak.

The wastewater is projected to consist of organic material from grape processing (including juice and pulp residues) and cleaning chemicals, resulting in high chemical oxygen demand (**COD**) concentrations up to 12,000 milligrams per litre (**mg/L**). Furthermore, a portion of the stormwater from defined catchment areas will also be captured and included in the WWTP design, requiring careful control and treatment to avoid environmental harm and enable reuse. All wastewater streams flowing to the WWTP will be via gravity drains with screens at each collection point, as shown in **Figure 2.1**, and flow into a main sump that will act as a settling zone screen. The volume capacity of the Main Sump will be 3 kL. This is described further in **Section 2.5.2**.

2.5.2 PRE-TREATMENT AND COLLECTION

As mentioned in **Section 2.5.1**, the first stage of wastewater management begins with floor drains that are fitted with screens to intercept solids such as grape skins and seeds. The wastewater will flow by gravity to a main sump, which has a settling zone for finer particles and a screen basket to prevent clogging of downstream pumps. The sump will be designed with a high-level alarm to alert operators of potential overflows. This pre-treatment step reduces the solid load entering the WWTP process, protecting equipment and improving

overall treatment utility and efficiency. Following pre-treatment and collection, the wastewater flows to an equalisation and buffering step, as described in **Section 2.5.3**.

2.5.3 EQUALISATION AND BUFFERING

From the Main Sump, as shown in **Figure 2.1**, the wastewater will be pumped to a 120 kL Surge Tank, which acts as a flow equalisation and buffering unit. The function of the Surge Tank will be to manage and store variable in-flows from the winery operations, especially during high activity periods, allowing a consistent feed to the WWTP. It will also facilitate and provide a degree of settling of fine solids and will be equipped with an air mixer to prevent stagnant zones and/or anoxic/anaerobic conditions. The Surge Tank will play a critical role in stabilising the wastewater load entering the biological treatment stage (SBR), helping to protect performance and prevent system overloads.

2.5.4 BIOLOGICAL TREATMENT PROCESS

The SBR will be the core of the biological treatment process for the WWTP and is designed to aerobically degrade organic matter in the wastewater. As per a conventional SBR wastewater system, it will operate in a batch mode with defined cycles for filling, aeration, settling, and decanting. The wastewater will be mixed with microorganisms that consume the organic contaminants (measured as COD), and clean water is separated from the sludge through settling. The SBR wastewater system includes a blower for oxygen supply, a decant pump, and instrumentation for controlling dissolved oxygen and process timing. The SBR is designed to treat up to 13.9 kL per day, removing up to 167 kilograms (**kg**) of COD daily. Following treatment at the SBR, the treated wastewater and sludge will flow to the buffer tank and sludge tank, respectively.

2.5.5 POST-TREATMENT AND STORAGE

After treatment in the SBR, as detailed in **Section 2.5.4**, the clarified water will be transferred to a 14 kL Buffer Tank before being passed into Absorbs system, where any remaining fine solids are polished from the treated water. The polished water will flow to a Storage Dam shared with treated sewage effluent. The treated water in the Storage Dam will be suitable for reuse, particularly for irrigation of the vineyards and landscaped areas at the Proposed Winery Development. This reuse will reduce demand for freshwater and enhance the sustainability footprint of the operation at the Proposed Winery Development. The treated wastewater quality targets are outlined in **Section 2.5.9**.

2.5.6 BIOSOLIDS AND SLUDGE HANDLING

As a by-product of the SBR process, biological sludge (biosolids) accumulates in the SBR vessel and will be periodically removed and transferred to a 22 kL conical sludge tank. This thickened sludge, with an estimated generation volume of 144 kL per year, can either be irrigated on-site to vineyard and pasture areas or transported off-site for further processing or disposal. It is understood that the WWTP will be designed with a degree of flexibility in performance to accommodate varying weather, regulatory requirements, and/or nutrient management plans, to ensure safe and beneficial reuse or removal of biomass.

2.5.7 HANDLING OF SPECIAL WASTE STREAMS

The high-strength or chemically reactive waste streams at the Proposed Winery Development will be managed separately from the general wastewater. The Tank Lees, which can be rich in organic solids and potassium, will be stored in dedicated tanks and trucked off-site to limit COD and salt loading on the WWTP. Similarly, spent cleaning agents, particularly NaOH-based solutions, will be collected in separate 12,000 litre (**L**) tanks to avoid any potential operational disruption of the biological treatment process.

These waste streams will be managed through commercial disposal arrangements with specialised recovery or treatment facilities.

2.5.8 CONTINGENCY AND ENVIRONMENTAL PROTECTION

It is understood that the WWTP design at the Proposed Winery Development will incorporate contingency measures to handle system overloads or failures. If the SBR reaches capacity or requires maintenance, wastewater can be temporarily diverted for pasture irrigation (under controlled conditions) or trucked off-site. The WWTP and storage areas will also be fully bunded to contain spills, and all tanks are equipped with high-level alarms. The WWTP has been designed to accommodate sufficient emergency storage capacity to handle significant spills and rainfall events, complying with EPA SA requirements and ensuring no release of untreated wastewater into the environment.

2.5.9 TREATED WATER QUALITY TARGET

The treated wastewater produced by this system is designed to meet quality targets suitable for irrigation reuse. Specifically, the water will have a biochemical oxygen demand (**BOD**) of less than 30 mg/L and suspended solids (**SS**) of less than 30 mg/L. These performance targets align with SA EPA guidelines for treated effluent reuse, ensuring it is safe for application to vineyard and landscape areas without causing soil degradation or pollution.

2.5.10 OOA OUTCOME

Based on the information documented in **Section 2.5.1** and **Section 2.5.9**, the OOA for this operational area is as follows:

- **Odour Source**: Untreated wastewater, biological digestion process, and sludge buildup.
- **Odour Characteristics**: Sulphidic, fermented, pungent (if not properly aerated) and musty (normal operating conditions).
- **Risk Level**: Moderate to High, depending on operating conditions.
- **Controls**: the proposed controls for the WWTP process include:
    - Aerobic treatment process via the adoption of SBR technology;
    - Bunded surge and sludge tanks;
    - Proper sludge handling;
    - Biomass reused on-site or transported off-site; and
    - Provisions for emergency overflow and spill events (refer to **Section 2.6**).

2.6 EMERGENCY SPILL MANAGEMENT ZONES

The Proposed Winery Development will be characterised by an integrated site-wide containment configuration, which is understood to be designed to manage unexpected tank failures, leaks, or process spills. This applies to the winery operations and WWTP catchment areas. Based on the information supplied to the Assessment by LES, the OOA for this operational area is as follows:

- **Odour Source**: Sudden release of juice, wine, wastewater, or sludge.
- **Odour Characteristics**: Dependent on substance; may be wine-like, acidic, or sulphidic, nitrogenous, fermented.
- **Risk Level**: Low to high, depending on safeguards and operational and management practices.
- **Controls**: the proposed controls for emergency spill management include
    - Winery emergency bund volume: 128.6 kL;
    - WWTP emergency bund volume: 146.8 kL;
    - Gravity drainage to pump chambers;
    - Manual and automated pump-back capabilities; and
    - Bunds sized for 120% of the largest tank plus 5% annual exceedance probability rainfall event.

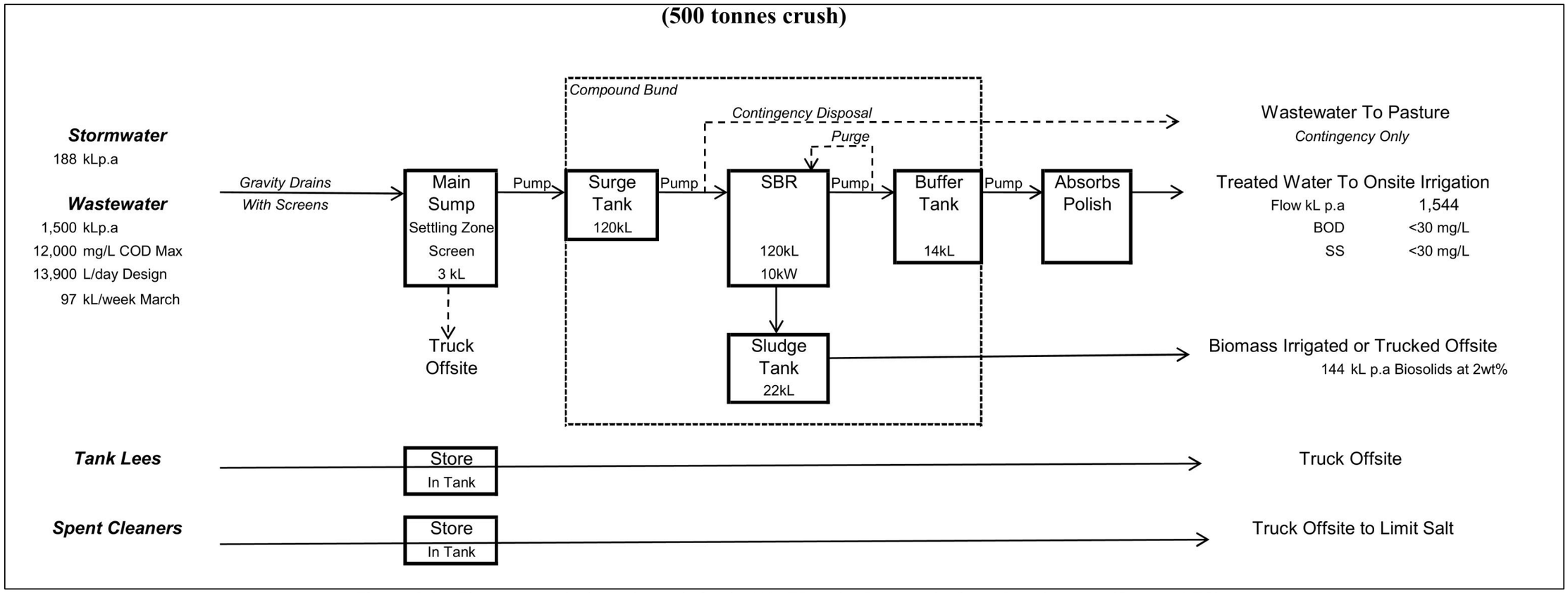

Figure 2.1 – The concept design schematic for the WWTP at the Proposed Winery Development (Source: LES)

300 tonnes p.a

300 tonne crush at 3.0 kL/tonne = 900 kL
400 m2 catchment for rainfall into treatment bund

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Wastewater Pattern %		6%	7%	29%	12%	7%	3%	4%	6%	6%	7%	8%	6%	100%
Wastewater Volume	kL/month	53	64	259	105	59	29	38	57	53	65	70	50	900
Vintage	kL		427											
	L/day		4800											
Peak Month	kL/month			259										
	L/day			8300										
Peak Day (200% of Average)	L/day			16600										

STORMWATER														
Rainfall (Nuri PIRSA Mean Months)	mm	16	22	23	32	48	56	57	57	56	38	35	29	469
Runoff To Wastewater	kL/month	6	9	9	13	19	22	23	23	22	15	14	12	188
Max Recorded Day (Nuri PIRSA)	mm	30	53	70	40	54	34	33	22	44	45	33	77	
Runoff To Wastewater	kL/day	12	21	28	16	22	14	13	9	18	18	13	31	

TOTAL	kL/month	59	73	268	118	78	51	60	79	75	80	84	62	1088

Figure 2.2 – The projected wastewater balance at the Proposed Winery Development under 300 tpa (Source: LES)

500 tonnes p.a

500 tonne crush at 3 kL/tonne = 1500 kL
400 m2 catchment for rainfall into treatment bund

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Wastewater Pattern %		6%	7%	29%	12%	7%	3%	4%	6%	6%	7%	8%	6%	100%
Wastewater Volume	kL/month	88	107	431	175	98	49	63	94	89	108	117	84	1500
Vintage	kL		712											
	L/day		8000											
Peak Month	kL/month			431										
	L/day			13900										
Peak Day	L/day			27800										

STORMWATER														
Rainfall (Nuri PIRSA Mean Months)	mm	16	22	23	32	48	56	57	57	56	38	35	29	469
Runoff To Wastewater	kL/month	6	9	9	13	19	22	23	23	22	15	14	12	188
Max Recorded Day (Nuri PIRSA)	mm	30	53	70	40	54	34	33	22	44	45	33	77	
Runoff To Wastewater	kL/day	12	21	28	16	22	14	13	9	18	18	13	31	

TOTAL	kL/month	94	116	441	187	117	71	85	117	111	123	131	96	1688

Figure 2.3 – The projected wastewater balance at the Proposed Winery Development under 500 tpa (Source: LES)

3 KEY ODOROUS ACTIVITIES RISK ANALYSIS

The following section documents each key odour-generating activity, as identified in **Section 2,** where a risk ranking has been assigned based on the risk evaluation assignment matrix outlined in **Table 3.1**. This ranking considers the potential odour impact before and after mitigation measures are applied.

3.1 OOA ANALYSIS OUTCOMES

The risk categories outlined in **Table 3.1** reflects the potential odour impact on the surrounding environment, nearby communities, and overall air quality at the Proposed Winery Project. These definitions help in understanding the significance of each risk level, as follows:

- **Negligible Risk**:
    - Odour emissions are minimal or non-detectable. Any potential odour would be highly localised and very unlikely to cause discomfort or complaints from surrounding receptors.
    - Overall, the activity is considered to be within acceptable air quality standards with no noticeable odour impact to the surrounding environment, nearby communities, and overall air quality.
- **Low Risk**:
    - Odour emissions are present but at a level that is unlikely to cause significant discomfort or complaints.
    - Any odour is typically transient, occurring under specific conditions such as peak operational hours or adverse weather patterns. While detectable, it remains within acceptable and/or regulatory thresholds and is not expected to cause sustained odour nuisance to the surrounding environment, nearby communities, and overall air quality.
- **Medium Risk**:
    - Odour emissions are moderate and have the potential to be perceptible beyond the immediate vicinity of the source. Under certain conditions, such as unfavourable meteorological factors (e.g., low wind dispersion) or operational conditions (spillages, poor housekeeping or sub-optimal maintenance of equipment), odour may result in intermittent complaints.
    - While not a persistent issue, mitigation measures are required to prevent odour present an unacceptable and/or regulatory thresholds concern or causing prolonged impact; and
- **High Risk**:
    - Odour emissions are significant and have a high likelihood of being detected at considerable distances from the source. Without effective mitigation,

odour levels may lead to frequent complaints, lead to unacceptable air quality, regulatory non-compliance, and potential operational restrictions.

- The high-risk activities typically involve processes with a strong potential to release high levels of odour emissions, such as organic decomposition, winery processing, solid waste management, and wastewater treatment. It is also associated with atypical/upset conditions such as prolonged and unresolved spillage incidents, poor housekeeping or sub-optimal maintenance of critical plant equipment for the effective management of odour.

Table 3.1 - Odour Activity Risk Matrix

Odour Mitigation Effectiveness	Source Odour Potential		
	Low	Moderate	High
Ineffective	Low Risk	Medium Risk	High Risk
Moderately Effective	Negligible Risk	Low Risk	Medium Risk
Highly Effective	Negligible Risk	Negligible Risk	Low Risk

The rankings for each odour activity are illustrated in **Table 3.2**. The assignment of risk ranking outcomes in **Table 3.2** are based on the following factors:

- Nature and characteristic of the activity/process;
- The proposed design and configuration of the activity/process;
- TOU's extensive knowledge and skills in the field of odour science and generation from a range of different chemical and/or biological pathways;
- The details contained in **Section 2** of the Assessment; and
- The post-mitigation odour risk rating score is also based on the adoption of the recommendations made in **Section 4.2**.

Table 3.2 – Proposed Winery Development Key OOA Ranking Outcome

Odour Activity	Odour Risk Rating Pre-Mitigation	Odour Risk Rating Post-Mitigation
Vintage Period		
Grape crushing and pressing	Medium	Low
Grape marc and stalk storage	Medium	Low
Lees and Filtrate Management Area	Medium	Low
Spent Cleaning Agent Storage	Medium	Low
WWTP	High	Low
Emergency Spill Management Zones	High	Low
Non-Vintage Period		
Grape crushing and pressing	Negligible	Negligible
Grape marc and stalk storage	Negligible	Negligible
Lees and Filtrate Management Area	Negligible	Negligible
Spent Cleaning Agent Storage	Medium	Low

Table 3.2 (continued) - Proposed Winery Development Key OOA Ranking Outcome		
Odour Activity	**Odour Risk Rating Pre-Mitigation**	**Odour Risk Rating Post-Mitigation**
WWTP	Medium	Low
Emergency Spill Management Zones	Medium	Low

3.2 SEPARATION DISTANCE ANALYSIS

As per the EPA SA Separation Guideline, a separation distance, also referred to as an "evaluation distance", serves a critical function in protecting nearby sensitive land uses from the environmental impacts of industrial or agricultural operations, including wineries. These distances help manage risks related to air quality (such as odour and dust) and noise emissions that might arise during winery operations, particularly during the peak vintage period when processing, fermentation, and waste treatment are most active.

The applicable criteria from the EPA SA Separation Guideline for the Proposed Winery Development are shown in **Figure 3.1**. Based on the treated wastewater quality target that will be in the Storage Dam (< 30 mg/L as detailed in **Section 2.5.9**), the applicable evaluation distance for the Proposed Winery Development is **300 m**. This is also based on the adoption of a mechanically aerated aerobic process (SBR), storage of high-quality treatment wastewater in the Storage Dam, and operational contingency for the overall management of on-site sewage, wastewater, and stormwater, as described in **Section 2.5.8** and **Section 2.6**.

As highlighted in **Figure 3.1,** the evaluation distance incorporates the following receptors (which is understood to have a single residential dwelling incorporated as part each existing development):

- Lyndoch Lavender Farm & Café; and
- Norm's Farm Bed & Breakfast.

Activity	Additional activity notes	Evaluation distance (metres)	Description of typical activities and potential air or noise impacts
Wineries or distilleries • Development Regulations, Schedules 21 5(7) & 22 6(11) • Environment Protection Act, Schedule 1 6(11)	Mechanically treated wastewater (including the use of aeration devices) Wastewater storage lagoons without any aeration device: • BOD >4,000 mg/l • BOD >1,000 and <4,000 mg/l • BOD >100 and <1,000 mg/l • BOD <100 mg/l • Bottling only.	300 1,000 750 500 300 300	Odours and air emissions can result from the storage and management of raw materials, byproducts from the winemaking process and wastewater. Anaerobic decomposition of organic matter and solids produces odour, which can cause nuisance. Winery equipment such as pumps, chillers and crushers can be a source of noise at wineries and distilleries. Vehicles can also be a source of noise as well as dust, particularly during vintage. Deliveries at night time can increase the potential for annoyance.

Figure 3.1 - Separation distance criteria as per the EPA SA Separation Guideline for winery operations

Given the above, it is highly recommended that an odour management plan (**OMP**) be developed as part of the Proposed Winery Development that incorporates a trigger action response plan and establishes a communication channel with these two (2) neighbouring locations contained within the 300 m to ensure that:

- The frequency, duration and intensity of the event are mitigated as far as reasonably practicable to minimise odour emission release; and

- Sufficient notification is provided if an abnormal/atypical circumstance were to arise at the Proposed Winery Development.

This is detailed as part of a series of recommendations in **Section 4.2**. Otherwise, under normal operating conditions, odour emissions are expected to pose a low risk, as outlined in **Table 3.1** during both vintage and non-vintage periods.

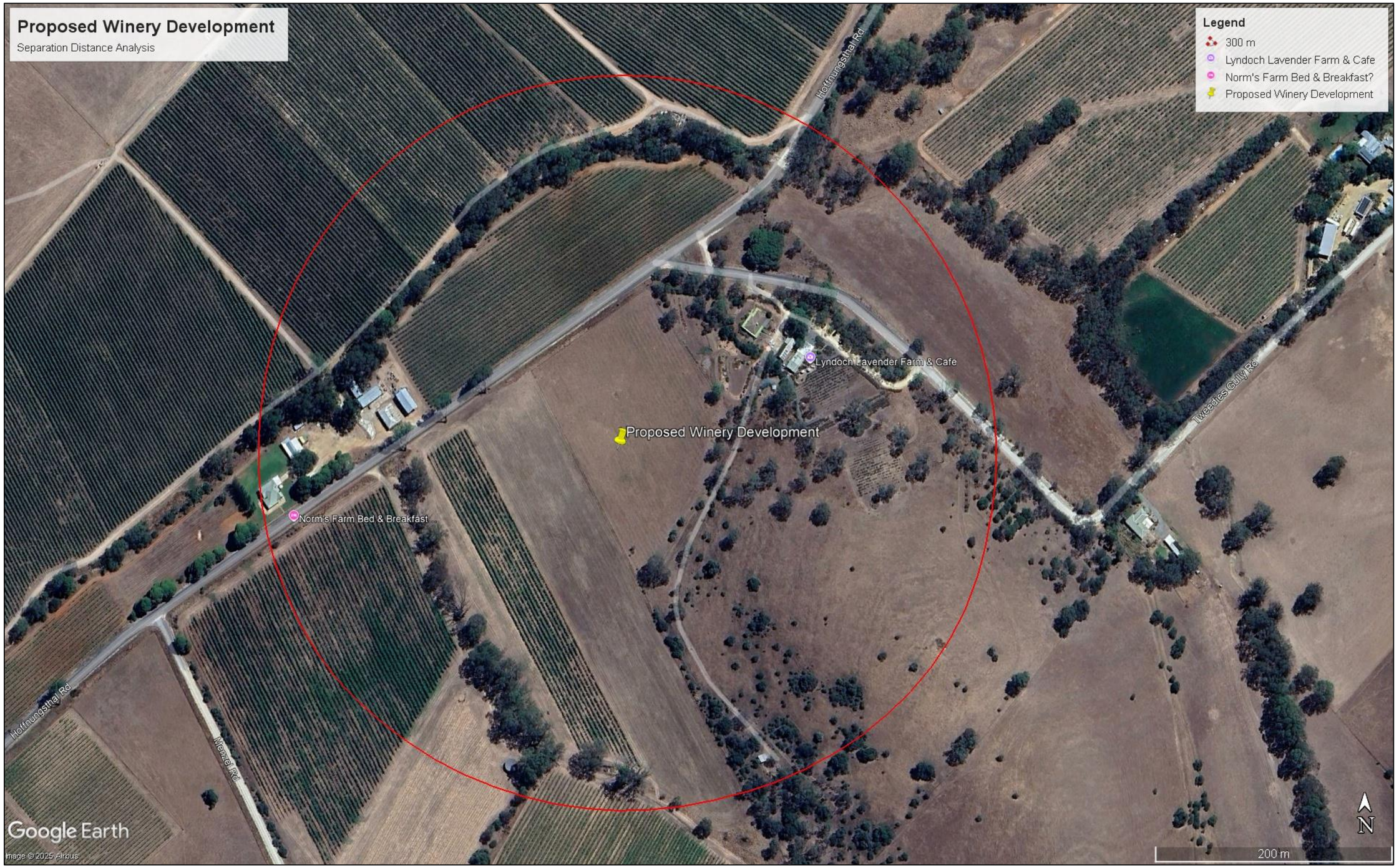

Figure 3.2 – Separation distance analysis in the context of the Proposed Development (Google Earth, Access Date: 11 July 2025)

4 ASSESSMENT FINDINGS AND RECOMMENDATIONS

4.1 ASSESSMENT FINDINGS

The Assessment has undertaken an OOA of all operational activities at the Proposed Winery Development. Based on the outcomes of the OOA, the Assessment has evaluated that all reasonably and practicable measures have been implemented to manage future odour emissions from the winery operations. This finding is supported by the following information contained in **Section 2** and **Section 3** of the Assessment:

- The site location is compatible with the intended land-use;
- There is a range of engineered controls to manage odour emissions from all operational activities;
- The implementation of additional measures identified in **Section 4.2**;
- The administrative and monitoring controls that will be implemented as part of the winery operations; and
- The scale and nature of the proposed winery operations.

The consideration of the above factors is consistent with the guidance provided in the EPA SA AAQA.

4.2 ASSESSMENT RECOMMENDATIONS

Based on the findings of the Assessment, the following recommendations are made as part of good practice and to ensure the residual odour impact risk of the Proposed Winery Development remains low under both typical and atypical/upset operational scenarios: (noting these are in addition to existing controls proposed and documented in **Section 2** of the Assessment):

- **Engineering Controls**: For the enclosed winery operations, no details have been provided regarding the management of building ventilation air. Notwithstanding this, it is understood that there will be a mechanical ventilation air management system installed to manage indoor carbon dioxide levels for operator safety and comfort. From an odour emissions perspective, the mechanical ventilation air management should consist of the following design features, in addition to this safety requirement:

    a. A high-rate airflow extraction and dispersion building ventilation air management system. This will be adopted to enable a well-ventilated building environment. The extracted building ventilation air should be designed to discharge to the atmosphere with favourable initial plume dispersion properties;

    b. The extracted building ventilation air should be discharged to the atmosphere at the roof level and at an appropriately designed velocity;

    c. A fully enclosed building fabric with a net inflow of fresh air supplied by engineered openings only. This will require the building airflow extraction rate to be compatible with the design of the fully enclosed building fabric,

such that a differential negative pressure will be achieved within the indoor airspace; and

d. The design objective of the building design and building ventilation air management system should be to minimise the potential for fugitive emission release at ground level or from ingress/egress areas involving doorways, pedestrian access, or vehicle ingress/egress routes.

- **Administrative Controls:**

a. Develop a site-specific OMP documenting a hierarchy of controls in the form of, but not limited to, engineered, administrative, and/or management practices, including:

i. Identification of critical odour emissions risk and control points;

ii. An outline of how the production and migration of odorous compounds is minimised at the Proposed Winery Development, including design (where applicable) and operational practices;

iii. Standard operating procedures, equipment, material of construction, and management practices employed within the complex to anticipate the formation of odours and minimise their release;

iv. Trigger action response plan, particularly surrounding abnormal/upset operating conditions;

v. An outline of the key staff and responsibilities with respect to odour management;

vi. An operation and maintenance protocol for the winery operations;

vii. An outline of the reporting requirements with respect to odour; and

viii. Integrate/link any relevant environmental documentation with respect to odour to this OMP. The OMP should seek to find a practical balance between maintaining the quality and efficiency of process operations and the ability to control odour emission generation.

b. Implementation of an environmental complaint management system should be implemented at the Proposed Winery Development, and into which all environmental complaints, including odour, are documented. The following is recorded in the complaints form:

i. Name of complainant and contact details (if they wish to be identified). Details are required to enable the Proposed Winery Development to report back to the person once the complaint is investigated. The method by which the complaint was made should also be recorded.

ii. Nature of complaint – noise, dust/smoke, odour, spill, incident, etc.

iii. Duration of the problem (dates and times).

iv. Meteorological conditions at the time of the complaint.

v. Where an odour complaint is lodged, an odour descriptor should be recorded.

vi. Any other relevant details.

- **Monitoring Controls:** Procurement of a wind monitoring station to continually monitor and provide regular feedback on weather conditions. The meteorological station should be installed to Australian Standards 2922 and 2923.

4.3 CONCLUDING REMARKS

Overall, the proposed odour management infrastructure for the Proposed Winery Development has been assessed as capable of effectively eliminating, controlling, or reducing odour emissions, as far as reasonably practicable, through the implementation of engineering controls, management practices, and administrative protocols (this includes those identified and recommended in the Assessment). This will ensure that odour impact risks are minimised to a level consistent with the general environmental duty under *Section 25* of the *Environment Protection Act 1993* at the Proposed Winery Development. Furthermore, based on the findings and recommendations of the Assessment, it is considered that there is no trigger for initiating a dispersion modelling-based odour impact assessment to provide additional guidance on the odour risk potential of the Proposed Winery Development.

End of Document