

BAROSSA ASSESSMENT PANEL

Notice is hereby given that a meeting of the Barossa Assessment Panel will be held at the Council Offices, 43-51 Tanunda Road, Nuriootpa on

Tuesday, 1 July 2025, commencing at 5.00 pm

Aaron Curtis
Assessment Manager



AGENDA

Due to federal copyright law restrictions, attachments associated with the proposed development are available on our website for viewing only and are locked for printing or copying.

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All meetings are recorded and the recording will be available to view on the Council's website.

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1. WELCOME**2. ATTENDANCE****2.1 Present****2.2 Apologies****2.3 Absent****3. CONFIRMATION OF MINUTES****RECOMMENDATION**

That the minutes of the Barossa Assessment Panel meeting held on Tuesday 3 June 2025 be received and confirmed.

4. BUSINESS ARISING**5. DECLARATION OF INTEREST BY MEMBERS OF THE PANEL**

The Minister's Assessment Panel Members – Code of Conduct requires that a member of an assessment panel who has a direct or indirect personal or pecuniary interest in a matter before the assessment panel (other than an indirect interest that exists in common with a substantial class of persons):

- a. must, as soon as he or she becomes aware of his or her interest, disclose the nature and extent of the interest to the assessment panel; and
- b. must not take part in any hearings conducted by the assessment panel, or in any deliberations or decision of the assessment panel, on the matter and must be absent from the meeting when any deliberations are taking place or decision is being made.

A member of an assessment panel will be taken to have an interest in a matter if an associate of the member (within the meaning of section 3(7) of the PDI Act) has an interest in the matter.

Any member that considers that they have an interest must notify the Presiding Member and have it recorded in the minutes as to the nature and extent of the interest.

6. REPORTS – APPLICATION FOR DECISION (PLANNING, DEVELOPMENT AND INFRASTRUCTURE ACT 2016)

6.1 25008814 - Lot 425 Light Pass Road Light Pass

APPLICATION DETAILS

PROPOSAL	Installation and operation of two (2) frost fans (FrostBoss C59)
APPLICANT	Treasury Wine Estates Vintners
OWNER	Treasury Wine Estates Vintners
APPLICATION NO	25008814
CERTIFICATE(S) OF TITLE	CT 5354/845 and CT 5354/478
AREA	16.2 hectares (approximate)
CURRENT USE	Horticulture
PLANNING AND DEVELOPMENT CODE VERSION	Version 2025.6 – 27 March 2025
PLANNING AND DESIGN CODE EXTRACT LINK	Relevant Code Extract
ZONE	Rural Zone
OVERLAYS	Character Preservation District (Not In Township) Hazards (Bushfire - Medium Risk) (Medium) Hazards (Flooding - Evidence Required) Limited Land Division Native Vegetation Prescribed Water Resources Area Water Protection Area
APPLICATION TYPE	Performance Assessed
PUBLIC NOTIFICATION	Notified – No Sign Required
REFERRALS	Nil
PREVIOUS APPLICATIONS	960/462/2003 – Vineyard Identification Sign
ASSESSING OFFICER	Tom Marshall – Senior Assessment Officer Planning
RECOMMENDATION	That Planning Consent be GRANTED subject to Conditions

INTRODUCTION

The applicant is seeking approval for the “*Installation and operation of two (2) frost fans (FrostBoss C59)*” on land comprising two separate allotments as follows:

- Lot 724 Light Pass Road, Light Pass
- Lot 725 Light Pass Road, Light Pass

The proposed development was subject to Performance Assessment and public notification in accordance with Section 107 of the *Planning, Development and Infrastructure Act 2016*.

No representations were received during the public notification period.

This application is subject to decision of the Barossa Assessment Panel (BAP) for the following reason:

- (1) As per the Instrument of Delegation C, adopted by the BAP on 7 June 2022, the BAP will not delegate applications for decision wherein the development is in the nature of a frost fan.

No statutory referrals were applicable.

The site is located in a Rural Zone where horticulture (including viticulture) is an envisaged use. There are no existing frost fans currently operating on the subject site.

The proposed development consists of two frost fans with boundary setbacks as follows:

- Frost Fan 1 – north boundary 502 metres, east boundary 97 metres, south boundary 78 metres and west boundary 199 metres.
- Frost Fan 2 - north boundary 157 metres, east boundary 122 metres, south boundary 443 metres and west boundary 167 metres.

The application is supported by an Environmental Noise Assessment to consider the cumulative noise impact from both proposed fans on surrounding sensitive receivers.

Frost fans generally exhibit a slimline design that reasonably limits visual impact within the rural landscape, insofar as frost fans have become a common form utilised within rural areas as a frost mitigating measure. The applicant has shown, with expert input that the anticipated noise level of the frost fans, when in operation, will not exceed the quantitative noise levels for nearby sensitive receivers (ie, dwellings) as set out in the *Environment Protection (Commercial and Industrial Noise) Policy 2023*. Compliance with this policy is considered the appropriate benchmark to demonstrate that noise levels do not unreasonably impact on non-associated sensitive receivers in the wider locality.

It is considered the proposal supports the existing and ongoing viticultural use of the land and will have an acceptable level of visual impact in the locality. As such, Planning Consent is considered to be warranted, subject to conditions.

SITE AND LOCALITY

The subject site comprises two allotments within the one ownership. The site is bound by Penrice Road to the north, Light Pass Road to the west and adjoining rural properties to the east and south.

The subject site comprises a rectangular shape with a land area of approximately 16.2 hectares, located approximately 2.3 kilometres south-east of the Nuriootpa township and approximately 2.3 kilometres west of the Penrice township. The rural settlement of Light Pass is located approximately 400m north of the site.

The site is predominantly used for viticulture (vineyard) purposes. The site contains no vegetation as the property is almost entirely occupied by vineyards with no existing dwellings or frost fans.

The subject site is surrounded predominantly by existing viticulture with various scattered dwellings surrounding the site (as shown within the Environmental Noise Assessment).

Figure 1 below provides a Zone map and details of the locality of the site.

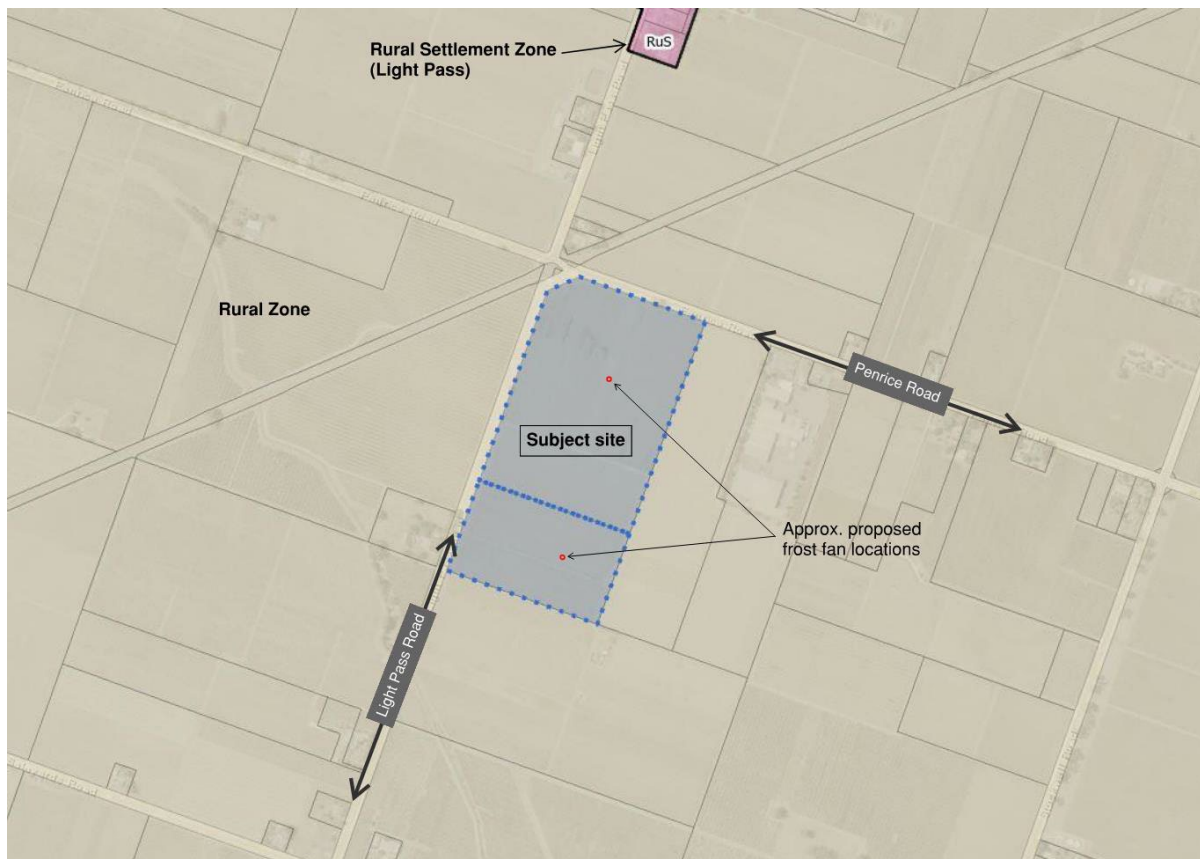


Figure 1: Zoning map

An aerial view of the site and locality are contained in **Figure 2** and **Figure 3**.

Site photos are provided in **Figure 4** to **Figure 9**.

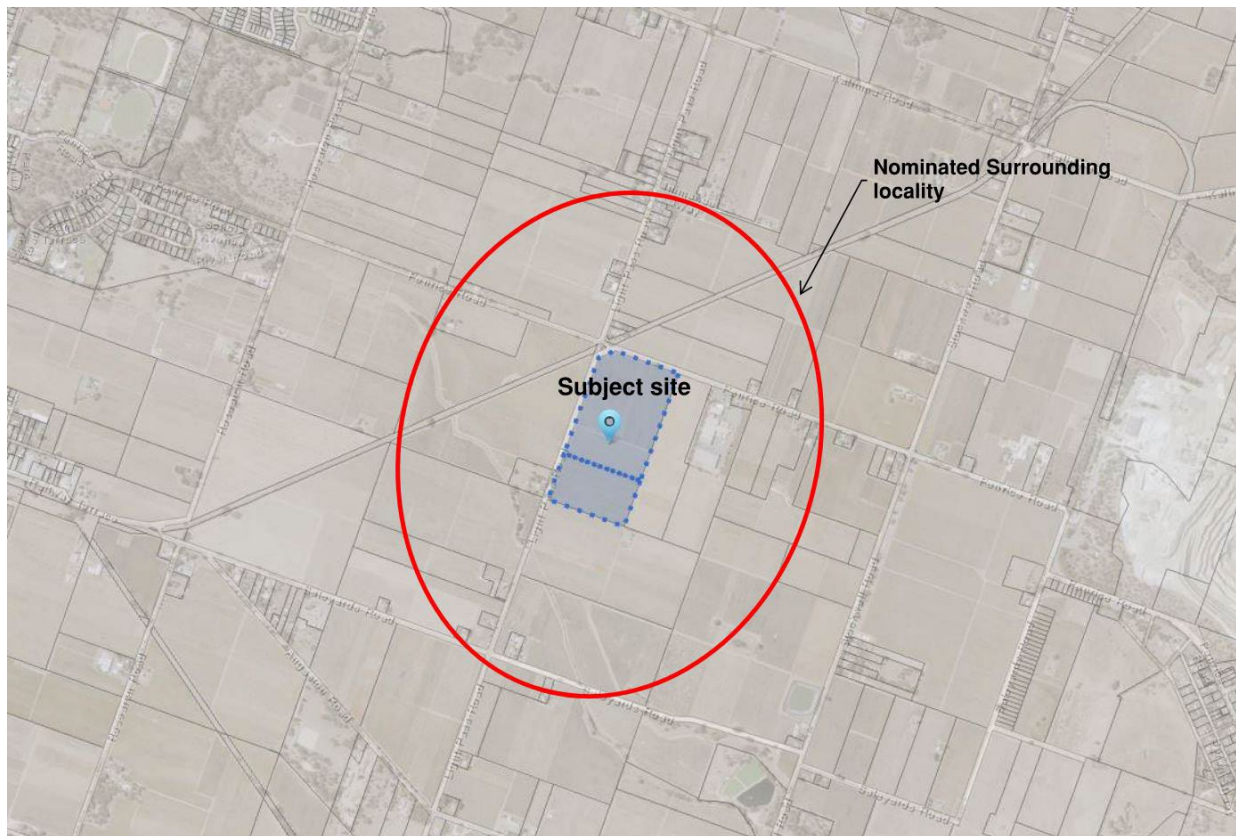


Figure 2 – Aerial – Nominated surrounding locality



Figure 3: Aerial view of subject site



Figure 4: View from Penrice Road looking south-west towards frost fan 2



Figure 5: View from Penrice Road looking south towards frost fan 2



Figure 6: View from Light Pass Road looking east towards frost fan 2



Figure 7: View from Light Pass Road looking north-east towards frost fan 2



Figure 8: View from Light Pass Road looking south-east towards frost fan 1



Figure 9: View from Light Pass Road looking east towards frost fan 1

PROPOSAL

The application seeks approval for the installation of two (2) frost fans (both C59 Frost Boss fans) on the subject site.

The C59 frost fans comprise a metal tower of 10.38 metres in height and 0.508 metres in diameter, with a five-blade fan rotating on a tilted axis mounted at the top of the tower. Each blade has a radius of 2.8 metres. The overall maximum height of the frost fan from ground level to tip of the propeller is 13.5 metres.

Each frost fan will consist of a main tower and propeller blades proposed to be in a galvanised finish. A small tower radio, anemometer and strobe light (solar powered) is located at the midpoint of the tower.

Each frost fan tower will be erected on a concrete foundation measuring 2.29 metres square and with a depth of 0.94 metres.

The frost fans are powered by a Perkins diesel engine contained within a noise attenuated enclosure at the base of the tower.

The frost fans are intended to provide effective permanent protection against cold injury and frost damage to existing vines during night-time periods of temperatures of approximately 1 degree or less (typically on still nights). The frost fans are proposed on the subject site based on the applicants' considerations of the existing landform, direction of cold nocturnal drift and other internal wind shelter effects.

The proposed frost fans have the following approximate allotment boundary setbacks:

- Frost Fan 1 – north 502 metres, east 97 metres, south 78 metres and west 199 metres.
- Frost Fan 2 – north 157 metres, east 122 metres, south 443 metres and west 167 metres.

Attachment 1 contains a copy of the application and associated documentation.

APPLICATION TYPE

The site is located within the Rural Zone under the Planning and Design Code.

The proposed development is not listed in Tables 1-4 of the Rural Zone and therefore defaults to 'Performance Assessed' pathway under Table 3 of the Rural Zone.

The proposed development does not have an applicable Accepted, Deemed to Satisfy or Restricted Pathway in accordance with Table 1, 2 and 4 of the Rural Zone. The application is also not identified within 'Table 3 – Applicable Policies for Performance Assessed Development' within the Rural Zone such that the application is determined to be 'All Other Code Assessed Development' in accordance with Part 1 – Rules of Interpretation of the Planning and Design Code (Version 2025.6).

PUBLIC NOTIFICATION

The application was subject to public notification in accordance with Table 5 – Procedural Matters – Notification of the Rural Zone. The proposed development in nature of a frost fan is a type of development not listed in Table 5 as being exempt from notification. The proposal is not deemed to be a minor form of development.

A summary of the public notification process is contained below:

Representations: No representations were received throughout the public notification period.

Person wishing to be heard: Nil

Applicant The applicant was not required to provide a response due to no representations being received.

Time period for Public Consultation 13 May 2025– 2 June 2025

REFERRALS

External

Pursuant to Schedule 9 of the *Planning, Development and Infrastructure (General Regulations 2017)* and Part 9 of the Planning and Design Code, the application was not subject to any referrals.

Internal

There were no internal referrals undertaken for this application.

ASSESSMENT

Please refer to the following link, the Planning and Design Code extract for this proposal, Version 2025.6 dated 27 March 2025.

Planning and Design Code Extract Link	Relevant Code Extract
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Seriously at Variance

Pursuant to Section 107(2)(c) of the *Planning, Development and Infrastructure Act 2016*, it is recommended that the Panel determine that the proposed development is not Seriously at Variance with the relevant provisions of the Planning and Design Code.

The existing viticultural land use is envisaged in the Rural Zone. The proposed frost fans are designed to prevent crop loss through frost damage and support ongoing business advancement and viability. Built form and visual impact is considered to be acceptable. The applicant has satisfactorily addressed noise and amenity concerns.

An Environmental Noise Assessment has been provided by Echo Acoustic Consulting. The report has assessed the predicted cumulative noise emissions of the frost fans when measured from the closest non associated dwellings (sensitive receivers). The frost fans will result in predicted noise levels, when measured from the surrounding (non-associated) dwellings of up to a maximum of 55 dB(A) (to the nearest non-associated dwelling). These noise levels achieve the maximum noise thresholds contained in the *Environment Protection (Commercial and Industrial) Noise Policy 2023* based on the zoning applicable to the locality.

Given the above, the proposal is not considered to be Seriously at Variance with the provisions of the Planning and Design Code.

Character Preservation (Barossa Valley) Act 2012

Pursuant to Section 6(2) of the *Character Preservation (Barossa Valley) Act 2012*, having regard to the Objects of the Act, it is recommended that the Panel determine that the proposed development does not adversely impact the character values of the district. The character values of the district are:

- (a) the rural and natural landscape and visual amenity of the district
- (b) the heritage attributes of the district
- (c) the built form of the townships as they relate to the district
- (d) the viticultural, agricultural and associated industries of the district
- (e) the scenic and tourism attributes of the district

Further discussion is contained under the Assessment section below in relation to the Character Preservation District Overlay.

Assessment

Detailed assessment of the proposal has taken place against the relevant provisions of the Planning and Design Code as quoted above. Commentary is provided below under headings:

Land Use

Rural Zone	
Desired Outcomes	
DO1	A zone supporting the economic prosperity of South Australia primarily through the production, processing, storage and distribution of primary produce, forestry and the generation of energy from renewable sources.
DO2	A zone supporting diversification of existing businesses that promote value-adding such as industry, storage and warehousing activities, the sale and consumption of primary produce, tourist development and accommodation.
Relevant Performance Outcomes/Designated Performance Features	
Land use and Intensity	
PO 1.1 The productive value of rural land for a range of primary production activities and associated value adding, processing, warehousing and distribution is supported, protected and maintained.	DTS/DPF 1.1 Development comprises one or more of the following: a) Advertisement b) Agricultural building c) Brewery d) Carport e) Cidery f) Dairy g) Dam h) Distillery i) Dwelling j) Dwelling addition k) Farming l) Horse keeping m) Horticulture n) Industry o) Intensive animal husbandry p) Low intensity animal husbandry q) Outbuilding r) Renewable energy facility s) Shop

	t) Small-scale ground mounted solar power facility u) Stock slaughter works v) Tourist accommodation w) Transport distribution x) Verandah y) Warehouse z) Winery aa) Workers' accommodation
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Rural Zone Performance Outcome (PO) 1.1 speaks of supporting the productive value of rural land. The envisaged land uses for the zone includes horticulture, winery and farming. The subject site has an existing horticulture (viticulture) use and the frost fans are a complementary ancillary form of development intended to reduce crop damage loss and therefore support the ongoing viability and sustainability of the site.

Subject to noise and visual assessment, frost fans are considered an appropriate form of development within the Rural Zone, given their association with horticulture. They positively contribute to the sustainability of the vineyards by providing an effective solution to frost damage, which can have significant economic impact through loss of crop.

Built form and character

Built form and character	
PO 10.1 <i>Large buildings are designed and sited to reduce impacts on scenic and rural vistas by:</i> <i>having substantial setbacks from boundaries and adjacent public roads using low-reflective materials and finishes that blend with the surrounding landscape being located below ridgelines.</i>	DTS/DPF 10.1 None are applicable.

The proposal is for a total of two (2) frost fans consisting of two (2) C59 model frost fans and having a structure with the following features:

- A concrete foundation pad and post baseplate;
- Engine cabinet located at ground level;
- 10.38 metres high tower;
- Gearbox and a 5-blade propeller fan with a 5.6 metre wide diameter.

The top of the main tower/column stands at a height of 10.38 metres with the overall height of the structure (to tip of propeller) being 13.5 metres.

The proposed galvanised finish has a grey colour tone and is the prevailing finish of frost fans used commonly in the Barossa Valley and surrounding regions and is a typical feature of the rural character. The reasonably narrow and cylindrical tower in addition to the fan blades are not considered to be highly reflective and are not considered likely to create any unreasonable visual amenity impacts. The galvanised finish will weather and dull overtime, further receding the visual appearance of the fans. The proposed material and colour are therefore considered acceptable.

The proposed frost fans are sited with large setbacks to all road boundaries with no frost fan within 150 metres of a public road.

The proposed frost fans have the following approximate allotment boundary setbacks:

- Frost Fan 1 – north (Penrice Road) 502 metres, east 97 metres, south 78 metres and west (Light Pass Road) 199 metres.
- Frost Fan 2 – north (Penrice Road) 157 metres, east 122 metres, south 443 metres and west (Light Pass Road) 167 metres.

The subject site gently slopes from the north-west to south-east with no watercourses identified on the subject site. The frost fans will be visible from both the Penrice Road and Light Pass Road streetscapes. Notwithstanding, the proposed fans are not expected to have an unreasonable visual impact given they are generally not a dominant visual element due to their built form and large boundary setbacks. The visual impact of a frost fan is considered to be generally reasonable given the necessity for such a form of development to occur by protecting the economic and primary production potential of the existing and ongoing viticultural land use.

Whilst the height of the proposed frost fan structures is notable, the narrow diameter of the main column/shaft limits the bulk associated with the structure. In addition, the tower is setback a substantive distance from all road boundaries.

Whilst the proposed frost fans will be a visual feature in the landscape from certain view points, frost fans are a common element in the Barossa landscape where the visual appearance of these structures are not considered to be visually obtrusive and their existence has a clear and important function.

Character Preservation Overlay

Character Preservation District Overlay	
Desired Outcomes	
DO1	Recognise, protect and enhance the special character of Character Preservation Districts.
DO2	The long term use of land outside of townships for primary production and associated value adding enterprises is assured and promoted.
Relevant Performance Outcomes/Designated Performance Features	
Built Form and Character	
PO 2.2 Development contributes to and maintains the historic identity and character of townships through appropriate: a) form b) scale c) siting d) design e) landscaping	DTS/DPF 2.2 None are applicable.
Built Form and Character in the Rural Areas	
PO 3.1 Preservation of existing natural features including topography, watercourses and mature trees.	DTS/DPF 3.1 None are applicable.

PO 3.2 <i>Buildings and structures do not interrupt views of the skyline through measures including being sited below ridge lines.</i>	DTS/DPF 3.2 <i>None are applicable.</i>
PO 3.3 <i>Buildings and structures harmonise with the natural features of the landscape and reinforce the rural character through the use of muted, neutral, non-reflective landscape colours on external surfaces.</i>	DTS/DPF 3.3 <i>None are applicable</i>
PO 3.4 <i>Large buildings and structures are sited and oriented to minimise their visual bulk, particularly if close to roads or in open settings where there are no other buildings or mature trees in close proximity.</i>	DTS/DPF 3.4 <i>None are applicable.</i>
PO 3.5 <i>Buildings and structures are grouped to create compact clusters well set back from public roads.</i>	DTS/DPF 3.5 <i>None are applicable.</i>

The Character Preservation District Overlay seeks to recognise, protect and enhance the area's special character with a further remit to assure long term use of the land outside of townships for primary production activities.

The subject site comprises a rectangular shape with a land area of approximately 16.2 hectares located approximately 2.3 kilometres south-east of the Nuriootpa township and approximately 2.3 kilometres north-west of the Penrice township.

The subject site is located within the rural area well outside the bounds of the surrounding township. The local character is defined as being predominantly horticulture (viticulture) activities with various agricultural buildings, scattered dwellings, primary production related business and existing frost fans across various adjoining properties. Frost fans are an increasingly common visual element within the rural parts of the Barossa Valley and have typically been assessed by Councils within the district as an acceptable addition to the existing landscape.

In determining the proposal accords with Overlay policies it is considered important to acknowledge that the structures have an intended purpose of crop protection, and its height and design is a factor of function plus form.

Having regard to the character values of the district, it is considered the proposed frost fans associated with the existing vineyards will not detrimentally affect the special character of the district for the following reasons:

- Frost fan structures are a common feature in the wider locality (as is evident through aerial review of adjoining properties) and in areas of rural landscape across the district.
- Whilst the height of the frost fans are 13.5 metres to the top of the propeller, the narrow diameter of the main column/shaft limits the bulk associated with the structures. Frost fans are noticeable but are not considered highly intrusive to the existing character.
- The galvanised finish of the frost fan is not highly reflective. The grey colour will help minimise the visual impact of the structure.

- The frost fans will support primary production operation within the Rural Zone which in turn helps deliver positive economic outcomes in the area.

Clearance from Overhead Powerlines

General Development Policies	
Clearance from Overhead Powerlines	
Desired Outcomes	
DO1	Protection of human health and safety when undertaking development in the vicinity of overhead transmission powerlines.
Relevant Performance Outcomes/Designated Performance Features	
PO 1.1 Buildings are adequately separated from aboveground powerlines to minimise potential hazard to people and property.	DTS/DPF 1.1 One of the following is satisfied: a) a declaration is provided by or on behalf of the applicant to the effect that the proposal would not be contrary to the regulations prescribed for the purposes of section 86 of the Electricity Act 1996 b) there are no aboveground powerlines adjoining the site that are the subject of the proposed development.

DTS/DPF 1.1 clause has been met and therefore the related PO 1.1 will be achieved.

Interface between Land Uses

General Development Policies	
Interface between Land Uses	
Desired Outcomes	
DO1	Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses.
General Land Use Compatibility	
PO 1.2 Development adjacent to a site containing a sensitive receiver (or lawfully approved sensitive receiver) or zone primarily intended to accommodate sensitive receivers is designed to minimise adverse impacts.	DTS/DPF 1.2 None are applicable.
Activities Generating Noise or Vibration	
PO 4.1 Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.1 Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.
PO 4.2 Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive receivers (or lawfully approved sensitive receivers) and zones primarily intended to accommodate	DTS/DPF 4.2 None are applicable.

sensitive receivers due to noise and vibration by adopting techniques including: a) locating openings of buildings and associated services away from the interface with the adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers. b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers. c) housing plant and equipment within an enclosed structure or acoustic enclosure. d) providing a suitable acoustic barrier between the plant and / or equipment and the adjacent sensitive receiver boundary or zone.	
PO 4.4 External noise into bedrooms is minimised by separating or shielding these rooms from service equipment areas and fixed noise sources located on the same or an adjoining allotment.	DTS/DPF 4.4 Adjacent land is used for residential purposes.
Solar Reflectivity / Glare	
PO 7.1 Development is designed and comprised of materials and finishes that do not unreasonably cause a distraction to adjacent road users and pedestrian areas or unreasonably cause heat loading and micro-climatic impacts on adjacent buildings and land uses as a result of reflective solar glare.	DTS/DPF 7.1 None are applicable.

The primary concern with the operation of frost fans is the potential for noise generation which may impact upon the amenity of sensitive receivers surrounding the site.

The applicant has engaged Echo Acoustic Consulting to undertake an Environmental Noise Assessment of the proposed frost fans to predict cumulative noise levels and assess against criterion established under the *Environment Protection (Commercial and Industrial) Noise Policy 2023*. This noise document has been prepared by the EPA and sets out specifically the noise control provisions applicable to frost fans. The parent legislation for this Policy is the *Environment Protection Act 1993* which incorporates a requirement to ensure the acoustic amenity of a locality is not unreasonably interfered with. The Policy provides specific allowable noise levels for frost control fan operation that is based on a balance between protecting primary production through the effective use of frost fans and minimising the noise impact on neighbouring properties. There are other stipulated operational requirements which should be addressed in a noise assessment such as limiting fan dimensions (i.e., subject to each model specifications) and setting the operating speed to that reasonably required for its effective operation.

As identified in DPF 4.1, compliance with Performance Outcome 4.1 is considered satisfied when the *"Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria"*.

An additional EPA document, the *'EPA Evaluation Distances for Effective Air Quality and Noise Management'* (released 2016 and updated 2023) identifies an evaluation distance of 2,000 metres for a frost fan from a sensitive receiver. This is a recommended evaluation distance to help guide the potential radius of sensitive receivers for a proposed development and is not considered absolute criteria. The guide states that *"If a proponent wishes to reduce the distance, the EPA will request the proponent to demonstrate that adverse impacts are reduced to acceptable levels (or below)."* That is part of the purpose of the Environmental Noise Assessment report to demonstrate impact and recommend any mitigation measures and to show (or otherwise) compliance with the *Environment Protection (Commercial and Industrial) Noise Policy 2023*.

Compliance with the policy is generally required to be demonstrated where a frost fan is proposed within the 2,000 metre evaluation distance in order to demonstrate that the operation will not have an unreasonable acoustic impact on the surrounding sensitive receivers. This is a typical assessment process for frost fans in the Rural Zone.

In their assessment, Echo Acoustic Consulting identify that the applicant will operate the Frost Boss C59 fan at an engine speed of 1,700 rpm which corresponds to fan speed operating at 345 rpm. The report further notes that:

- Noise modelling which accounts for the propagation in noise during the specific meteorological conditions that occur during frost conditions has been considered;
- Two new Frost Boss C59 frost fans being operated with no other existing fans on the subject premises.

In addition, the following operating criteria is proposed as conditions in the Environmental Noise Report:

- (1) The frost fans must not be operated except during a period when frost occurs or is reasonably likely to occur, or as necessary for maintenance work and maintenance work must not be carried out on the fans except between 7.00 am and 10.00 pm on the same day.
- (2) The frost fans must not exceed an equivalent noise level LAeq, of 55 dB(A) when measured over the period of one full rotation of the fan hub about the tower at any sensitive receiver that are of separate occupation which exist in the Rural Zone (or similar) at the time of approval. Where an equivalent noise level LAeq of 55 dB(A) is exceeded then the operation of the fans must be modified to achieve that external noise level, or it must be shown that an equivalent noise level LAeq full rotation of 35 dB(A) is achieved in the habitable rooms of that sensitive receiver.

These suggested conditions align with allowable noise levels in Part 6, Section 21(6) of the Policy. These suggested conditions have been integrated, where appropriate, in recommended Conditions of Consent within this recommendation.

Echo Acoustic Consultants have identified the closest dwellings from the proposed frost fans where noise measurements have been undertaken and assessed. The location of each property is shown in Figure 1 of the Environmental Noise Assessment report and is included below in **Figure 10**. All these dwellings are located in the Rural Zone.

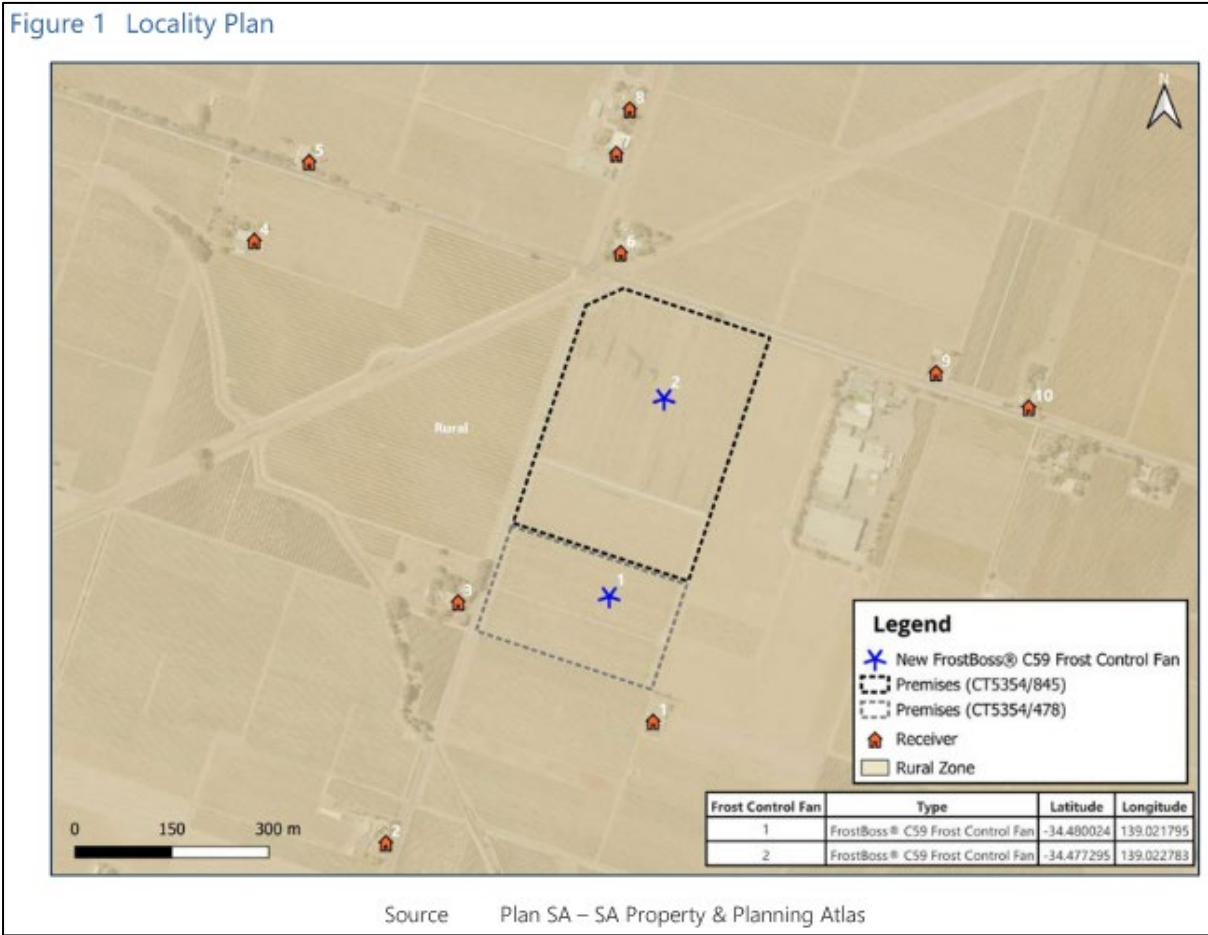


Figure 10: Extract from Environmental Noise Assessment Report of sensitive receivers considered

The predicted noise levels for the 2 x C59 fans operating at low speeds for the identified sensitive receivers are shown below in **Figure 11**.

Table 2 Predicted Noise Levels at Receivers

Receiver	Allowable Noise Level L _{Aeq} (dB(A))	Predicted Noise Level L _{Aeq} (dB(A))	Compliance
1	55	55	Yes
2	55	45	Yes
3	55	54	Yes
4	55	43	Yes
5	55	43	Yes
6	55	54	Yes
7	55	48	Yes
8	55	47	Yes
9	55	48	Yes
10	55	45	Yes

Figure 11: Extract from Environmental Noise Assessment Report of sensitive receiver applicable noise levels

Namely, the indicated most impacted sensitive receivers are 1, 3 and 6 as they have noise levels predicted at 54-55 dB(A). Approximate separation distances between the proposed frost fans and these receivers are:

- Receiver 1 is sited 165 metres south from the nearest proposed (C59) frost fan;
- Receiver 3 is sited 245 metres west from the nearest proposed (C59) frost fan;
- Receiver 6 sited 245 metres north from the nearest proposed (C59) frost fan.

The predicted cumulative noise levels (ie, generated by all frost fans on the subject site) for these dwellings fall below the criterion of 55 dB(A) for sensitive receivers within the Rural Zone. While the *Environment Protection (Commercial and Industrial) Noise Policy 2023* applies a higher allowable noise level sensitive receivers within the Rural Zone, this is based on the understanding the primary intent of the zone is to support ongoing viable agricultural operations.

With regards to the policy threshold, the EPA has previously advised that noise at a certain level such as 55 dB(A) is audible particularly if the background level of noise is low such as a rural area at night-time. However, this threshold has also been established cognisant that frost fans operate occasionally throughout each year when the ambient temperature reaches a very low level of around 1 degree Celsius (usually late night/early morning).

Overall, the Environmental Noise Assessment Report utilises accepted calculation methodology and the conclusions drawn are considered reasonable. Based on the report, the proposal is considered to achieve the *Environment Protection (Commercial and Industrial) Noise Policy 2023* criteria and therefore PO 4.1 is satisfied.

It should also be acknowledged that the primary intent of the Rural Zone is to support and protect farming, horticulture and similar activities. In acknowledging amenity issues, residents should have some expectation of noise, odour or other amenity impacts due to primary production activities occurring (obviously within any set guidelines/parameters). This is supported in the approach previously adopted by the

Environment, Resources and Development (ERD) Court. In *Takhar v District Council of Light* (1994), the Court stated the following:

"Those who choose to live outside of the more settled areas, and thus closer to farming activities, have to be prepared to accept some "strange" odours and noises which are to be experienced in farming areas. That is the price that they might have to pay for escaping from the effects of the urban lifestyle".

Transport, access and parking

General Development Policies	
Transport, Access and Parking	
Desired Outcomes	
DO1	A comprehensive, integrated and connected transport system that is safe, sustainable, efficient, convenient and accessible to all users.
Relevant Performance Outcomes/Designated Performance Features	
Vehicle Access	
PO 3.1 Safe and convenient access minimises impact or interruption on the operation of public roads.	DTS/DPF 3.1 The access is: a) provided via a lawfully existing or authorised driveway or access point or an access point for which consent has been granted as part of an application for the division of land a. or b) not located within six metres of an intersection of two or more roads or a pedestrian activated crossing.
Vehicle parking areas	
PO 6.1 Vehicle parking areas are sited and designed to minimise impact on the operation of public roads by avoiding the use of public roads when moving from one part of a parking area to another.	DTS/DPF 6.1 Movement between vehicle parking areas within the site can occur without the need to use a public road.
PO 6.2 Vehicle parking areas are appropriately located, designed and constructed to minimise impacts on adjacent sensitive receivers through measures such as ensuring they are attractively developed and landscaped, screen fenced, and the like.	DTS/DPF 6.2 None are applicable.
PO 6.3 Vehicle parking areas are designed to provide opportunity for integration and shared use of adjacent car parking areas to reduce the total extent of vehicle parking areas and access points.	DTS/DPF 6.3 None are applicable.

There will be occasional servicing needs for the frost fans. There are internal driveways running through the site that provides access to the locations for the proposed frost fans. There is a cleared pathway with sufficient width to allow parking and entry/exit in a forward direction on the site. Vehicles accessing the site will be for construction/installation and ongoing management and the type of vehicles to be used will be cognisant of the access conditions (ie, farm vehicles such as 4wd). This is

also expected in respect to the ongoing maintenance/servicing. Relevant POs are considered to be met.

Other Overlays

The following Overlays have been considered in the assessment of the proposed development but are not applicable to the proposal given that:

Hazards (Bushfire – Medium Risk) Overlay

The frost fans will be located within the allotment which are accessible via vehicles for maintenance. There are no habitable buildings on-site.

Hazards (Flooding - Evidence Required) Overlay

The frost fans have a minimal footprint and will not contribute to any flooding impacts within the locality.

Limited Land Division Overlay

No division of land is proposed as part of this application.

Native Vegetation Overlay

No native vegetation is identified to be removed as part of the development. The Native Declaration form has been signed by the applicant.

Prescribed Water Resources Area Overlay

The frost fans will be associated with an established vineyard area and will not impact on water use within the prescribed area nor will the proposed fans impact on the flow paths of the existing watercourses.

Water Protection Area Overlay

The proposed development does not involve any activities listed in PO 1.1 and will not alter water use or change water supply arrangements for the existing activity.

CONCLUSION

The proposed development comprises the '*Installation and operation of two (2) frost fans (FrostBoss C59)*'. The application was subject to 'Performance Assessment' and public notification in accordance with Section 107 of the *Planning, Development and Infrastructure Act 2016* with no representations received.

This report has provided a detailed assessment of the proposal against the relevant provisions of the Planning and Design Code.

The nature of the proposed frost fans are intended to support the existing viticultural use of the land. Viticulture is an envisaged use in the Rural Zone.

The primary assessment issues relate to visual impact and noise emission. It is considered that the frost fans will have an acceptable visual impact taking into account their height, slender frame, setbacks and clearly expressed functional form. Frost fans are another built element in the Barossa Valley landscape and while they will be visible, their visual impact is not considered to unreasonably detract from the rural landscape and related special character of the area.

The applicant has demonstrated the predicted noise level of the frost fans (cumulative of all proposed frost fans on the subject site), when in operation, will not exceed the quantitative noise levels for nearby dwellings (sensitive receivers) as set

out in the *Environment Protection (Commercial and Industrial) Noise Policy 2023*. Compliance with this State Government policy is considered sufficient to demonstrate that noise levels are not likely to unreasonably impact the amenity of adjacent sensitive receivers.

This assessment has identified that the proposed development is reasonably consistent with the Desired Outcome and Performance Outcomes of the Rural Zone and other relevant provisions of the Planning and Design Code, such that Planning Consent is warranted, subject to conditions.

RECOMMENDATION 1

Seriously at Variance

The Barossa Assessment Panel, having considered the application, resolves that the development proposal has sufficient merit, and is not Seriously at Variance with the Planning and Design Code.

RECOMMENDATION 2

Character Preservation

Pursuant to Section 6(2) of the *Character Preservation (Barossa Valley) Act 2012*, the Barossa Assessment Panel has had regard to the objects of that Act and, in determining this application, has resolved that there are potential impacts on the character values of the district, but is worthy of further consideration.

RECOMMENDATION 3

Granting of Planning Consent

The Barossa Assessment Panel, having considered the application for consent to carry out development of land and pursuant to the provisions of the *Planning, Development and Infrastructure Act 2016* resolves to GRANT Planning Consent for Application No. 25008814 by Treasury Wine Estate Vintners to undertake the '*Installation and operation of two (2) frost fans (FrostBoss C59)*' at Lot 425 Light Pass Road, Light Pass (CT 5354/845) subject to the following conditions and advisory notes:

Council Conditions

- (1) The development shall be undertaken in accordance with the plans and documentation (as amended) accompanying the application, unless varied by the following conditions.
 - Environmental Noise Assessment by Echo Acoustic Consulting, reference no. 23-72-1, dated 14 March 2025.
 - Structural Drawings for Frost Fans C59 by Design Phase, project no. 1951, sheets 000, S.01 and S.02, issue 1, dated 01/03/2019.
- (2) The frost fan shall be operated in accordance with the provisions of the *Environment Protection (Commercial and Industrial) Noise Policy 2023* relating to frost fans, as amended or superseded from time to time.
- (3) An annual report shall be prepared detailing the prevailing ambient temperature, times and duration the frost fans were in use as well as setting

out any maintenance, repairs, modification or other service. The report(s) shall be provided to the Relevant Authority on request and shall be prepared at least once each calendar year.

- (4) No audible alarm to signal frost malfunction shall be installed. A limiting switch may be installed that immediately turns the frost fan/s off during a malfunction and includes an effective operator warning system that can be remotely monitored, to the satisfaction of the Relevant Authority. A person capable of managing the use and function of the approved frost fan shall be available to attend promptly, at the site, at all times during operations, to the reasonable satisfaction of Council.
- (5) The frost fans must not be operated except during a period when frost occurs or is reasonably likely to occur, or as necessary for maintenance work.
- (6) The frost fans shall be maintained at all times in good repair and condition, in accordance with the manufacturer's specifications. Maintenance, repair, modification work or other service on the frost fan shall only be carried out between 7.00 am and 10.00 pm. A log of all such work shall be kept and produced to the Relevant Authority upon request.
- (7) The frost fans shall be set with a fan 'start' temperature of 1°C and a fan 'stop' temperature of 3°C.
- (8) The operating engine drive speed for the frost fans must be mechanically limited to a maximum of 1700 rpm with fan speed not exceeding a maximum of 345 rpm.

Advisory Notes

- (1) Any portion of Council's infrastructure damaged as a result of work undertaken within the development site or associated with the development shall be repaired/reinstated to Council's satisfaction at the developer's expense.
- (2) Any variation of this approved development and/or the conditions of consent will require a separate request and approval by the relevant authority. Approval of this application does not necessarily imply that future requests for variations would be approved. Any future request will be assessed by having regard to the relevant rules and requirements in force at the time any request is lodged.
- (3) Any works associated with the development such as tree planting, tree removal, footpath renewal or construction of new vehicle entrances proposed to be undertaken within the road reserve (ie the road carriageway, verge or footpath area) requires an independent approval from Council pursuant to the *Local Government Act 1999*. Further enquiries should be directed to the Works and Engineering team on 8563 8444.
- (4) The applicant is reminded of its general environmental duty, as required by Section 25 of the *Environment Protection Act 1993*, to take all reasonable and practicable measures to ensure that the activities on the whole site including during construction, do not pollute the environment in a way which causes or may cause environmental harm.

- (5) Construction shall not take place on any Sunday or Public Holiday or after 7.00 pm or before 7.00 am on any other day, and all practicable steps must be taken during construction to minimise the impact of noise emissions on neighbouring properties.

ATTACHMENTS OR OTHER SUPPORTING REFERENCES

Attachment 1 Application and Associated Documentation

Development Locations

Location 1

Location reference

LOT 425 LIGHT PASS RD LIGHT PASS SA 5355

Title Ref

CT 5354/845

Plan Parcel

F172686 AL425

Additional Location Information**Council**

THE BAROSSA COUNCIL

Zone Overlays

Zones

- Rural

Sub-zones

(None)

Overlays

- Character Preservation District
- Hazards (Bushfire - Medium Risk)
- Hazards (Flooding - Evidence Required)
- Limited Land Division
- Native Vegetation
- Prescribed Water Resources Area
- Water Protection Area

Variations

- Minimum Site Area (Minimum site area is 25 ha)
- Minimum Dwelling Allotment Size (Minimum dwelling allotment size is 25 ha)

Application Contacts

Applicant(s)

Stakeholder info

Treasury Wine Estate Vintners
Level 8 161 Collins St
Melbourne
VIC
5235
Tel. 0428 358 771
george.taylor@tweglobal.com

Contact

Stakeholder info

Mr Aussie Consents
Tel. +6468798312
aussieconsents@frostboss.com

Invoice Contact

Stakeholder info

Mr Aussie Consents
Tel. +6468798312
aussieconsents@frostboss.com

Builder

Stakeholder info

Mr Aussie Consents
Tel. +6468798312
aussieconsents@frostboss.com

Land owners

Stakeholder info

Treasury Wine Estate Vintners
Level 8 161 Collins St
Melbourne
VIC
5235
Tel. 0428 358 771
george.taylor@tweglobal.com

Nature Of Development

Nature of development

Installation and operation of two (2) FrostBoss frost fans in association with the horticulture use of the land

Development Details

Current Use

Viticulture

Proposed Use

Viticulture

Development Cost

\$171,600.00

Proposed Development Details

Installation and operation of two (2) FrostBoss frost fans in association with the horticulture use of the land

Element Details

You have selected the following elements

Other - Rural - \$171,600.00

- Installation and operation of two (2) FrostBoss frost fans in association with the horticulture use of the land

Septic/Sewer information submitted by applicant

Does this development require a new septic system or amendment to an existing septic system? i.e. septic tank and / or wastewater disposal area?

No

Certificate of Title information submitted by applicant

Does the Certificate of Title (CT) have one or more constraints registered over the property?

No

Consent Details

Consent list:

- Planning Consent
- Building Consent

Have any of the required consents for this development already been granted using a different system?

No

Planning Consent

Apply Now?

Yes

Who should assess your planning consent?

Assessment panel/Assessment manager at The Barossa Council

If public notification is required for your planning consent, who would you like to erect the public notification sign on the land?

Relevant Authority

Building Consent

Do you wish to have your building consent assessed in multiple stages?

No

Apply Now?

Yes

Who should assess your building consent?

The Barossa Council

Has Construction Industry Training Fund Levy (CITF) been paid?

Yes

CITF Receipt Number

220081

Has a builder been engaged for the proposed development?

Yes

Is the development being constructed by an Owner Builder?

No

Consent Order

Recommended order of consent assessments

1. Planning Consent
2. Building Consent

Do you have a pre-lodgement agreement?

No

Declarations

Electricity Declaration

In accordance with the requirements under Clause 6(1) of Schedule 8 of the Planning, Development and Infrastructure (General) Regulations 2017, the proposed development will involve the construction of a building which would, if

constructed in accordance with the plans submitted, not be contrary to the regulations prescribed for the purposes of section 86 of the Electricity Act 1996.

Native Vegetation Declaration

The proposed development will not or would not, involve the clearance of Native Vegetation under the Native Vegetation Act 1991, including any clearance that may occur in connection with a relevant access point and/or driveway, and/or within 10m of a building (other than a residential building or tourist accommodation), and/or within 20m of a dwelling or addition to an existing dwelling for fire prevention and control, and/or within 50m of residential or tourist accommodation in connection with a requirement under a relevant overlay to establish an asset protection zone in a bushfire prone area.

Submission Declaration

All documents attached to this application have been uploaded with the permission of the relevant rights holders. It has been acknowledged that copies of this application and supporting documentation may be provided to interested persons in accordance with the Act and Regulations.

Documents

Document	Document Type	Date Created
Hopelands distance to boundaries and NADs.pdf	Location Plan	27 Mar 2025 8:48 AM
Statement of Support and Effect - TWE Hopelands V1.pdf	Further Information	27 Mar 2025 8:48 AM
ACOUST~1.pdf	Technical Report - Acoustic	27 Mar 2025 8:48 AM
STRUCT~1.pdf	Engineering Structural	27 Mar 2025 8:48 AM
CITB TWE Hopeland Levy Receipt.pdf	CITF Payment Reference	27 Mar 2025 8:48 AM
CoT TWE Hopelands Vineyard.pdf	Certificate of Title	27 Mar 2025 8:48 AM

Application Created User and Date/Time

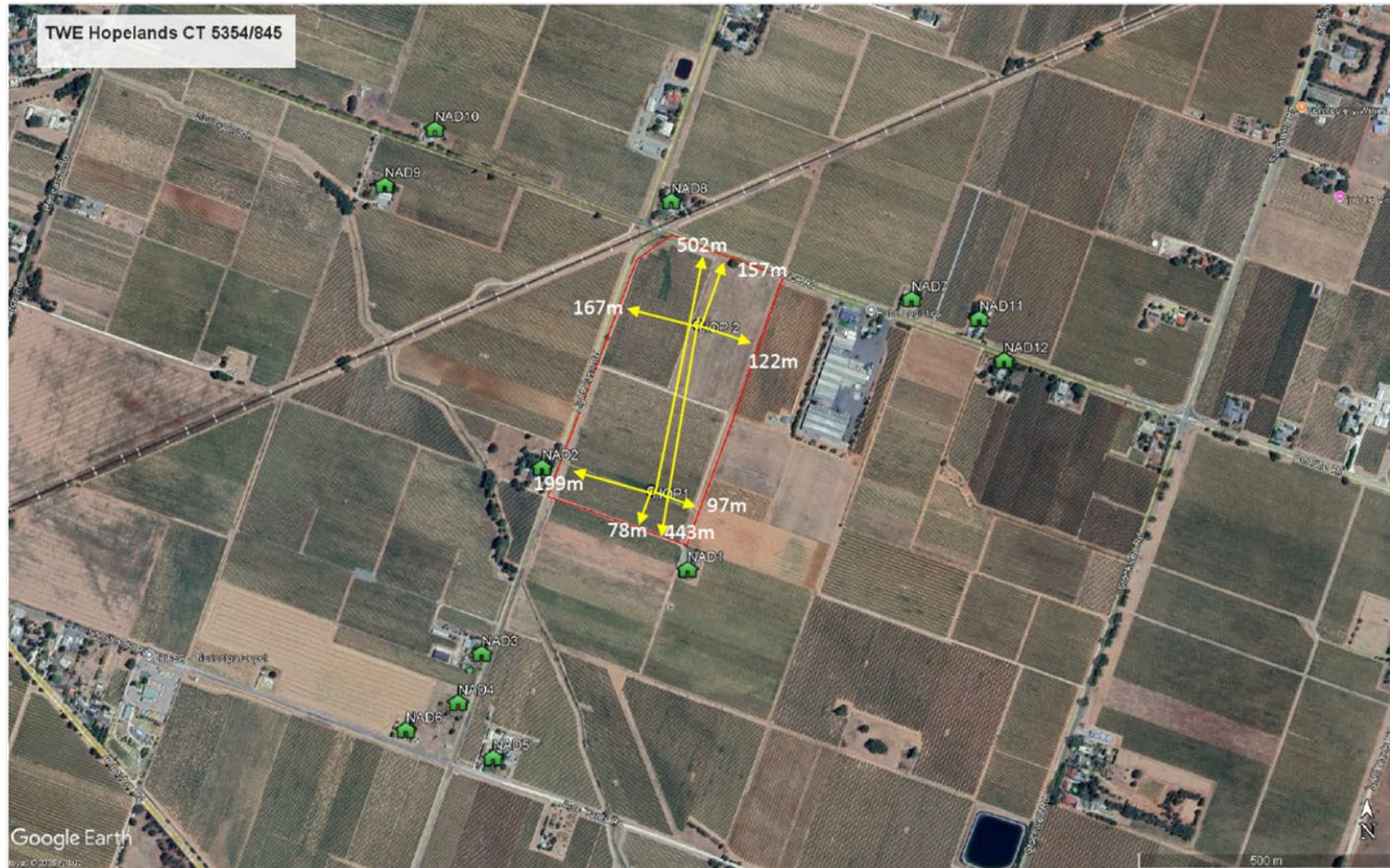
Created User

aussie.consent

Created Date/Time

27 Mar 2025 8:48 AM





Fan	HOP 01	HOP 02
NAD 1	186m	503m
NAD 2	226m	434m
NAD 3	481m	810m
NAD 4	589m	917m
NAD 5	633m	979m
NAD 6	701m	1022m
NAD 7	661m	444m
NAD 8	586m	258m
NAD 9	826m	706m
NAD 10	865m	676m
NAD 11	757m	572m
NAD 12	767m	627m

STATEMENT OF SUPPORT AND EFFECTS.
Assessment of Environmental Effects
On the Use of the Frost Boss C59 Frost Fan
For the Protection of Crops

Treasury Wine Estates
97 Sturt Highway
Nuriootpa SA 5355

CT number

CT 5354/845



1. Introduction:

1.1 Treasury Wine Estates submits the following Statement of Support and Effects on the Environment in respect to an application for a Resource Consent for the installation of 2 FrostBoss® C59 frost fans at Lot 425 Light Pass Rd Light Pass SA.

1.2 The proposed installation is designed to provide effective permanent protection against cold injury and frost damage to the vineyard.

1.3 The proposed Frost Fan blade is considered within the industry to be the best available in terms of technology and design in the context of performance, effectiveness and noise minimization.

1.4 It is anticipated that the frost fan will only be used on an occasional or infrequent basis. **However, actual usage will be dictated by the weather;** namely the occurrence of crop threatening frost events taking place at a time when buds and fruit are susceptible to cold injury or frost damage. FrostBoss® machines in the area average approx. 30 to 45 hours of run time per annum.

1.5 The intended months of operation are September through to November; but crop threatening frost and cold air events can occur at any time. Usage will be restricted to nights when the ambient temperature reaches a critical level..

1.5.1 In practice, the wind machine will start automatically when temperatures fall to an appropriate critical level. Generally, these low temperatures are reached in the early hours of the morning. Temperatures start to rise again just after sun rise, and the machines will automatically shut off when the measured temperature at

the affected crop position reaches +2°C above the start temperature. Estimated start temperature to avoid crop damage will be 1.0° and stop temperature will be 3.0°.

1.5.2 Temperatures and machines performance within the vineyard will be closely monitored electronically/remotely on 'frost risk nights' by the manager / owner.

1.5.3 In addition to these events, it will also be necessary to run the frost fan at least once a month for maintenance reasons. This will be carried out during normal daylight hours.

1.6 The maps below shows the optimum placement position for the proposed frost fans and takes into consideration the following 'placement' factors:

- To provide frost protection to the frost susceptible blocks
- The predominant direction of the cold nocturnal (nighttime) drift
- The size and shape of the block in relation to the nocturnal drift direction
- The topography of the block and in particular features that have the potential to stall or dam the cold air flowing through the vineyard,

The placement option selected focuses on retarding the development of frost within the vineyard.



2 Background:

2.1 Recent experience suggests that the need for permanent frost protection is now required for this vineyard. In particular, the occurrence and frequency of crop threatening frost events appears to be increasing through spring.

2.2 The primary concern has been the increasingly unpredictable nature of the weather; in particular, the increasing frequency and severity of frost events throughout the region.

2.3 The use of frost fans for the frost protection of vineyards is ***a well recognised and well accepted farming practice***. The frost fan draws down warm air from the inversion, mixing it with the cold air that is already flowing through the field, thereby lifting ambient temperatures within the field and preventing cold injury damage and frost damage to the crop.

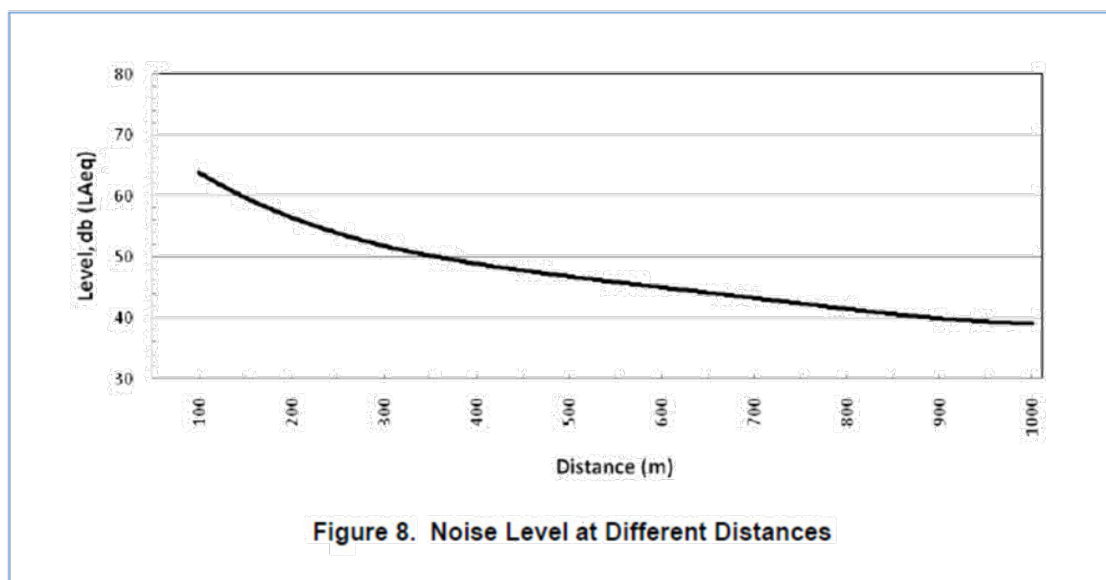
2.4 Careful consideration has been given to the many and varied alternative methods of frost protection, but the frost fan offers the best overall solution for this site. Should this application fail the vineyard will be protected by the next best option which could be use of a helicopter flying repeatedly over the property.

3 Assessment of Effects:

3.1 **Physical effects:** The frost fan consists of a tower 10.5 metres in height and 0.5 metres in diameter, and a 5.5 metre diameter 4-blade fan. The overall height to the top of the fan tip is 13.3 metres. The unit is powered by a Perkins diesel engine which is housed in a noise attenuated lockable enclosure which sits at the bottom of the tower. The fan rotates around the tower every 6mins 40 seconds.

3.2 **Landscape effects:** The fan assembly and upper portion of the towers will be visible from a distance, but less so up close. Similarly, from the surrounding properties but the frost fan is generally hidden behind the external or internal trees. The visual impact will be minimal as the galvanized tower and the painted composite blades are a grey colour that blends with the colour of the sky. In many cases the roadside trees provide natural screening.

3.3 **Noise effects: C59** Recent independent noise testing showed the noise level of the Frost Boss C59 Frost Fan, when run at its designed maximum operating engine speed of 1800 rpm, (fan speed of 365pm) was to be 55 LeAq at 180 metres, 50 dBA LeAq at 300 metres. (See Hegley Acoustic Consultants report dated April 2016 attached).



The major source of noise from a frost fans is from the fan, followed by the engine, and then the gearboxes and other rotating machinery (radiator fan, turbo charger, alternator, etc). The noise from the fan is the product of the blade efficiency (the shape and the length) and the speed of rotation.

As previously mentioned the fans would run approx. 40 hours per annum between September through November. Using monitored fan run times from similar sized vineyards the longest duration of continuous operation would be 8 hours with most 2-5 hours in duration..

3.4 Lessening the Environmental Effects:

Ways to mitigate the environmental effects of the noise are:

- That the hours of operation be restricted to the times when the danger of frost damage is imminent or for maintenance purposes.
- That the frost fans shall be operated in such a manner to start when the air temperature on the orchard drops to the critical crop temperature or below
- The FrostBoss C49 frost fan shall be run at a maximum engine speed of 1760rpm
- The frost fans shall be maintained annually in accordance with the manufacturer's specifications. (see section 4)
- Operation of the frost fans for maintenance purposes shall take place only between the hours of 8am and 5pm on weekdays or for emergency maintenance at other times.
- Installation of C49 (Composite) blades

3.5 Effect on Livestock. Livestock is generally not affected by noise that they are accustomed to. Sheep, cattle, horses and pigs are usually very docile and in practice do not get unsettled by noise from Frost Fans or sources that they have heard before; tractors, trucks, trains etc. (Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife. NERC 88/29 AFESC TR88.14 June 1988 Engineering Services Centre US Airforce.

3.6 Effect on neighboring properties (with regard to temperature).

The frost fans have no climactic or effect on temperatures outside their effective radius. They do no "dam up" or "push" cold air, their effect is to simply bring warmer inversion air from the inversion layer to crop level by forced convection, which is carried across the vineyard by the naturally occurring nocturnal drift. A frost fan CAN NOT make a neighboring or adjoining property colder.

3.7 Frost Fan Specs:

Frost Fan Specs

- Frost Fan Model: Frost Boss C59 Diesel Frost Fan
- Engine specifications Perkins 6 cylinder Diesel powered;
- Engine casing N.Z. Frost Fans noise attenuated factory Cabinet
- Gear Box Ratios Top Box Amarillo ratio 1.6364:1

Bottom Box Amarillo ratio 2.563:1

Overall ratio of 4.194

- Operating Engine RPM 1800 (C59) - Low noise mode Fan 3 (1750 RPM)
- Tower height 10.5m
- Blade RPM 365 (C59) – low noise mode Fan 3 (355 RPM)
- Blade Length and Type C59 FrostBoss Blade – 5.5m diameter – fixed pitch

Manufactured in composite materials by NZ Frost Fans

4 Machine Maintenance

4.1 The frost fan will be serviced annually. Unlike a vehicle, it is the lack of use that can cause the problems. The preventative maintenance is imperative to maintain reliability and longevity of the frost fan so that it is ready to perform when needed. The maintenance program is carried out by experienced FrostBoss staff and involved in this annual maintenance and safety check is:

- A thorough general check over & adjustment where necessary
- Grease the universal joints, inspect the hanger bearings, adjust the slew & check the blades for deterioration
- Oil & grease the drive shaft joints inside the tower

- Change the engine oil & engine filter. Change the fuel filter
- Remove the air filter inspect & clean it
- Check the belts, hoses, light units, flapper & exhaust systems & all connections
- Examine cabinet door fastenings & hinges, remove spiders and spray down
- Check condition of radiator coolant and gearbox oil
- Check throttle connections & adjustments
- Check start function & test
- Check tower hold down bolts & tighten if necessary
- Test run the frost fan
- Check fuel level & report to owner if fuel is low
- Inspect area surrounding frost fan for tree growth near the blades & safe access to site

5 Operational Requirements for Frost Fans

- The hours of operation are restricted to times when danger of frost damage is imminent or for maintenance purposes. The frost fan shall only be operated for frost protection and when the air temperature on the vineyard drops to a critical level for the trees (measured at 1.0 meters above ground level)
- The frost fans will cease operation when the air temperature reaches +2°C above the start temperature.
- Frost Boss machines are fitted with an anemometer to prevent the machines operating when wind speeds exceed 10kph.
- The thermometer used to determine the temperature shall be in calibrated by a suitably qualified AFF technician in order to ensure that it accurately measures temperature.
- The frost fan shall be run at a maximum engine speed of 1800rpm
- Operation of the machines for maintenance purposes shall take place only between the hours of 0800am and 05.00pm on weekdays. Test operations outside these hours may take place only for noise monitoring with Council's approval or for emergency
- The frost fan shall be remote electronically monitored at all times
- The frost fans shall be maintained annually in accordance with the manufacturer's specifications and service records shall be made available to council upon request
- The frost fans shall only be operated for protection of crops from bud burst each Spring.
- The vineyard manager or a person appropriately trained to manage frost risk by the use of frost fans shall always be present on the vineyard while any frost fan is operating on this vineyard

Structural Drawings for Frost Fans C59

NO.	DATE	DESCRIPTION
1	01/03/2019	ISSUE

Drawing Index

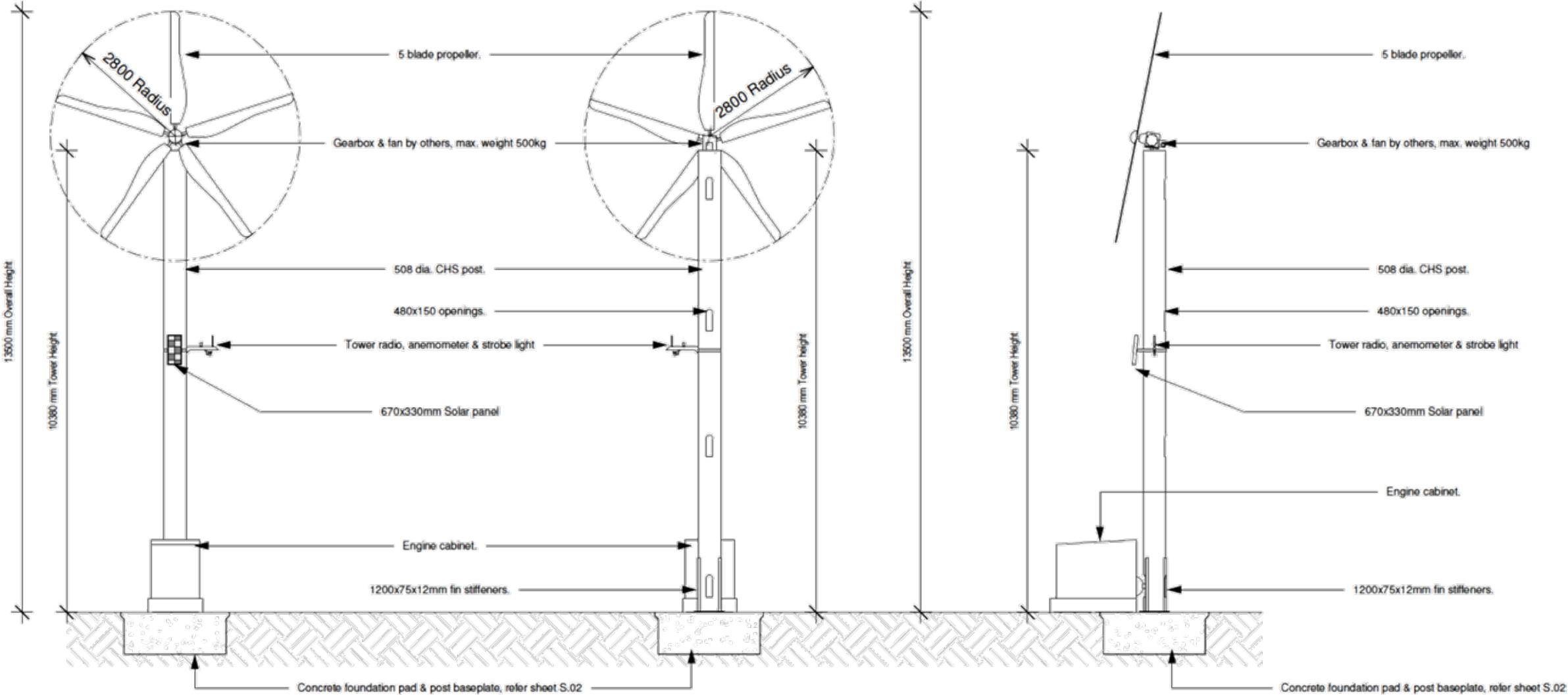
S - Series

Sheet No.	Sheet Name	Issue Date	Rev. No.
S.01	C59 Tower Elevations	01/03/2019	1
S.02	C59 Foundation & Baseplate Details	01/03/2019	1



PH: 06 878 5130	
114 QUEEN STREET EAST, HASTINGS	
PROJECT TITLE	
Frost Boss C59	
PROJECT ADDRESS	
1429 Omaha Road, Twyford	
CLIENT NAME	
Frost Fans	
SHEET NAME	
Cover Page	
DATE	01/03/2019
DRAWN BY	KB
PROJECT NO.	SHEET NO.
1951	000

NO.	DATE	DESCRIPTION
1	01/03/2019	ISSUE



1 C59 Frost Fans
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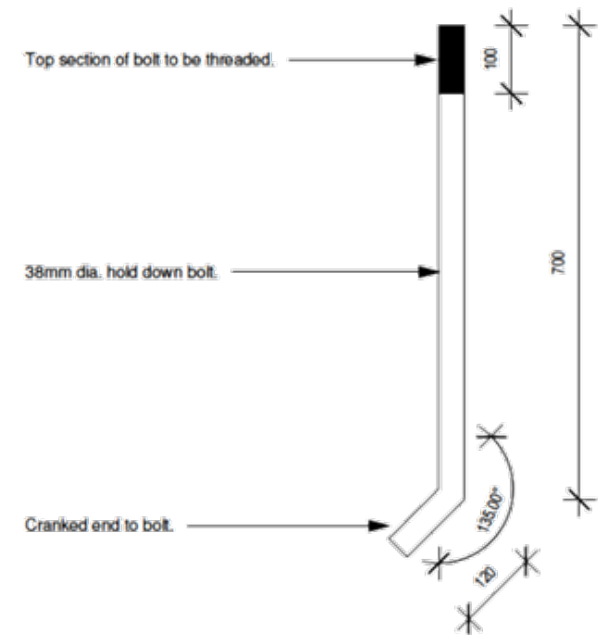


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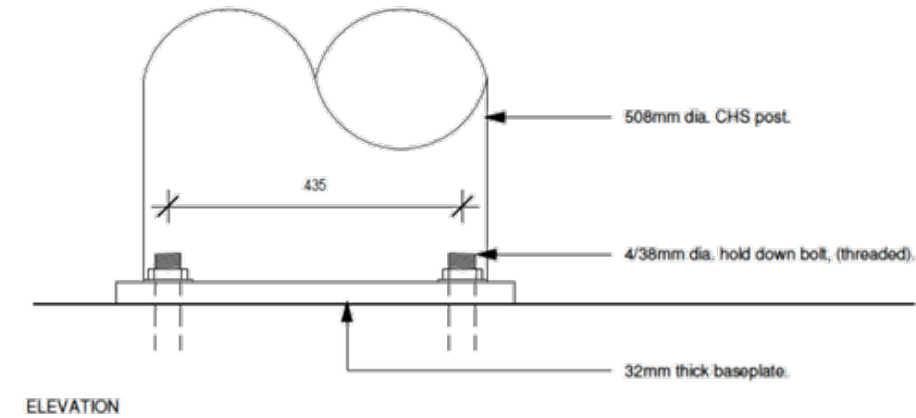
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Frost Boss C59
PROJECT ADDRESS
1429 Omaha Road, Tawford
CLIENT NAME
Frost Fans
SHEET NAME
C59 Tower Elevations

DATE: 01/03/2019
DRAWN BY: KB
PROJECT NO.: 1951
SHEET NO.: S.01

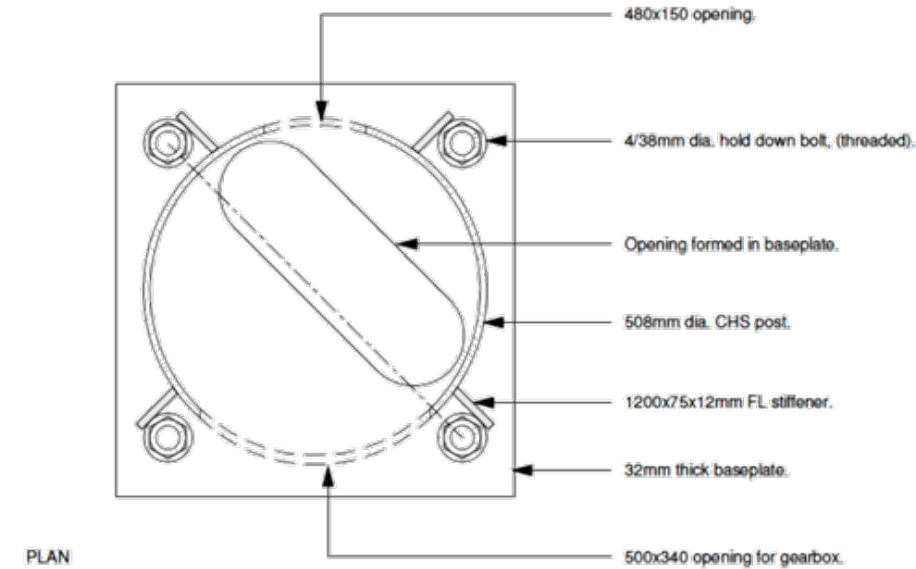
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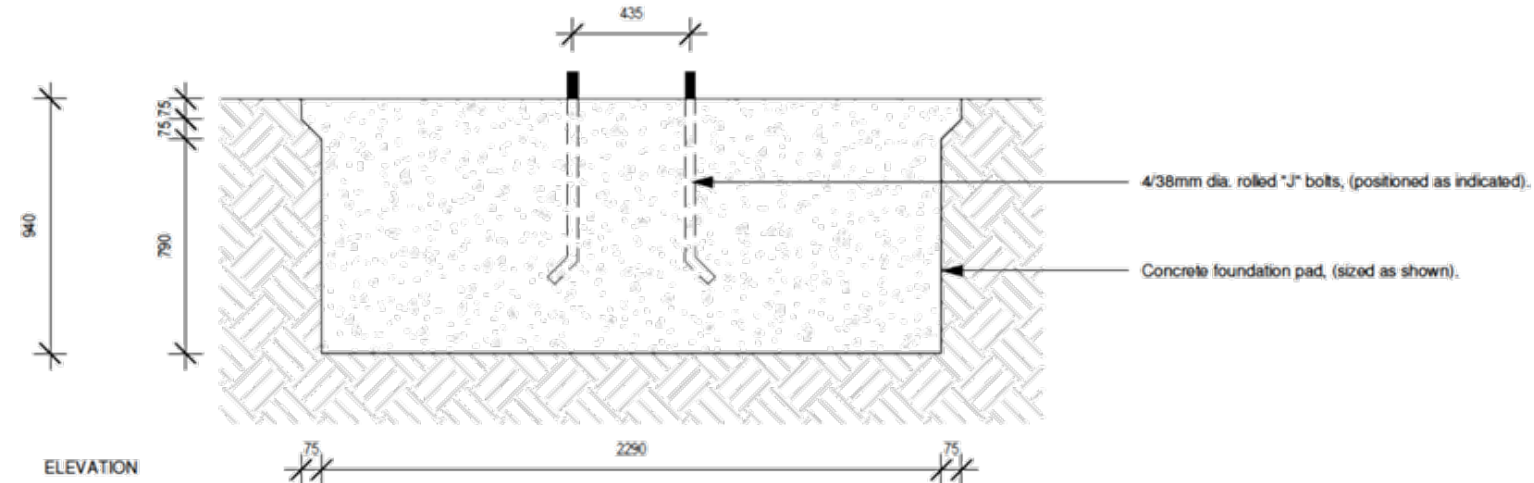
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1 : 10 @ A3



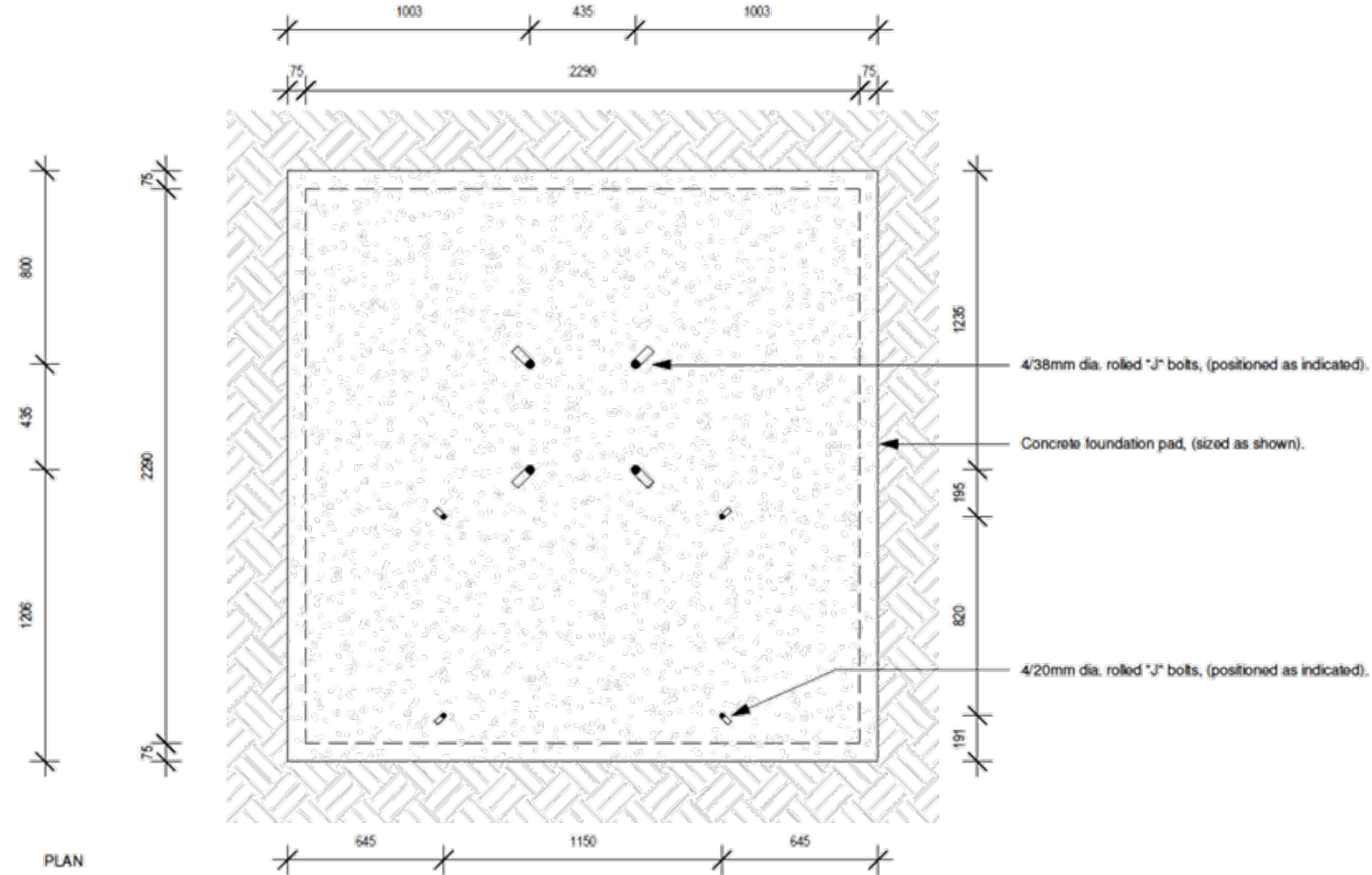
2 Engine HD Bolt
1 : 10 @ A3



3 Tower Baseplate
1 : 10 @ A3



ELEVATION



4 Tower Foundation
1 : 25 @ A3



PH: 06 878 5130
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PROJECT TITLE
Frost Boss C59
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1429 Omaha Road, Tawford
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Frost Fans
SHEET NAME
C59 Foundation & Baseplate Details
DATE
01/03/2019
DRAWN BY
KB
PROJECT NO.
1951
SHEET NO.
S.02



06 879 8312
info@frosboss.com
frostboss.com

268 Twartz Rd
Gawler Belt, South Australia
Australia 5118

Attn: Tom Marshall

Request for Information

Applicant: Treasury Wine Estate Vintners

Application ID: 25008814

Subject Land:

LOT 425 LIGHT PASS RD LIGHT PASS SA 5355

Title ref.: CT 5354/845 Plan Parcel: F172686 AL425 Council: THE BAROSSA COUNCIL

LOT 425 LIGHT PASS RD LIGHT PASS SA 5355

Title ref.: CT 5354/478 Plan Parcel: F172685 AL424 Council: THE BAROSSA COUNCIL

Dear Tom,

Please see attached mapping identifying the area of influence of the two frost fans.

The elliptical coverage pattern is determined by the Katabatic drift. This drift has been identified in this location based on existing knowledge of the region and geographical determinants.

The vineyard was extensively damaged by previous frost events and the frost damage was extensively recorded and plotted in the days following the frost event in September.

Please don't hesitate to contact me if you need additional information.

Regards,

Ian Mason

National Sales Manager - Australia

FrostBoss® is the global brand of Australian Frost Fans Pty Ltd



Cumulative Frost Fan policy

Environmental noise assessments consider the noise from a frost fan installation against Part 6 of the *Environment Protection (Commercial and Industrial Noise) Policy 2023* (the **Policy**). The Policy provides specific allowable noise levels for frost control fans which enable the protection of primary produce whilst minimising the impact on sensitive receivers.

The allowable noise levels have been established to assess frost control fans on a premises-by-premises basis, in the same way the Policy does for other activities.

That is, the Policy only considers the noise from frost fans on a single premises.

The Policy has been designed in this way and must therefore only be considered on a premises-by-premises basis without accounting for the noise from fans on other premises for the following reasons:

1. due to cumulative nature of noise, any noise policy which required cumulative impacts from noise sources on other premises to be included would result in a first in best dressed outcome. For example, a frost fan installation designed to the noise limit of the Policy could result in no other grower within the area being able to install even a single fan
2. In terms of equity, due to the cumulative nature of noise, any noise policy which required cumulative impacts from noise sources on other premises could result in one rule for one grower and a different rule for another
3. detailed information is required for installations on other premises to confirm compliance, which cannot always be readily accessed and is reliant on other growers
4. in issues of compliance, it is impractical for compliance to be linked to the actions of other landowners over which there is no control
5. in the future, a compliant installation might become non-compliant due to the future installation of other frost fans on other premises.

For the reasons outlined above, any noise policy which establishes cumulative requirements to account for frost fans on other premises would need to be specifically designed to include measures which overcame the

above inequity issues, the technical issue of not having sufficient detail on neighbouring installations, and the impractical compliance issues.

The Policy does not include any such measures and will result in a range of issues for growers in the region if applied beyond the boundaries of its intended use.

In summary, the Policy (the frost fan component of which was initiated and operating since 1999), is not used for cumulative impacts from separate premises (for the reasons outlined above) and only applies to fans on the premises under assessment. This is because, in establishing the allowable noise levels, the Policy inherently accounts for the fact that the area might contain multiple installations.



Lot 425 Light Pass Road, Light Pass (CT5354/845 and CT5354/478)

Environmental Noise Assessment

14 March 2025

Reference ID: 23-72-1



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Tables

Table 1 Maximum Fan and Engine Drive Speeds 5

Table 2 Predicted Noise Levels at Receivers..... 5

Abbreviations

Code	Planning and Design Code Version 2025.4 dated 27 February 2025, PlanSA.
CONCAWE	Conservation of Clean Air and Water in Europe
dB(A)	Decibel in A-weighting
DO	Desired Outcome of the Code
DTS / DPF	Deemed-to-Satisfy Criteria / Designated Performance Feature of the Code
EP Act	<i>Environment Protection Act 1993</i>
EPA	South Australian Environment Protection Authority
L _{Aeq}	Equivalent noise level in A-weighting
PO	Performance Outcome of the Code
Policy	<i>The Environment Protection (Commercial and Industrial Noise) Policy 2023</i>



Premises	The land on which the frost control fan is located, as shown in Figure 1
Receiver	A sensitive receiver that is of separate occupation, being not on the premises or not under the same ownership as the frost control fan. In this assessment, the receivers are the dwellings identified in Figure 1
rpm	revolutions per minute

Glossary

A-weighting	A mathematical adjustment to the measured noise levels to represent the human response to sound. An A-weighted noise level is presented as dB(A)
Decibel	The logarithmic unit of measurement to define the magnitude of a fluctuating air pressure wave. The descriptor is dB and is used as the unit for sound or noise level
Equivalent noise level	The noise level which is equivalent to a noise level which varies over time. The descriptor is L_{Aeq} and it is the A-weighted source noise level (continuous) referenced in the Policy. The L_{Aeq} is also referenced as an average noise level for simplicity
Frost control fan	A fan that operates during frost conditions used to mitigate the detrimental impacts of frosts on agricultural crops
Noise	An interchangeable term with sound but which is most often described as unwanted sound
Sensitive receiver	The same meaning as under <i>Part 8 Administrative Terms and Definitions</i> of the Code. Defined as: a. any use for residential purposes or land zoned primarily for residential purposes; b. child care facility; c. educational facility; d. hospital; e. supported accommodation; f. tourist accommodation.
Sound	An activity or operation which generates a fluctuating air pressure wave. The ear drum can perceive both the frequency (pitch) and the magnitude (loudness) of the fluctuations to convert those waves to sound
Sound pressure level	The magnitude of sound (or noise) at a position. The sound pressure level can vary according to location relative to the noise source, and operational, meteorological and topographical influences. The terms Sound Pressure Level and Noise Level are used interchangeably in this assessment



Background

Frosts occur for relatively short durations and on infrequent occurrence in South Australian agricultural areas when air temperatures at ground level drop below 0 degrees Celsius. During a frost, agricultural crops can be damaged.

Frosts typically occur in the early hours of the morning before dawn when the meteorological conditions result in the air temperature at 10 (to 50) metres above ground level being warmer than the sub-zero degree temperatures at ground level.

Frost control fans are used to draw warmer air down into the agricultural crops at ground level. The frost control fans are triggered when the temperature at ground level approaches frost conditions, and they continue to operate until the temperature at ground level rises.

Frost control fans (comprising five fixed pitch blades in this instance) are located on a galvanised tower with a height in the order of 10m and are powered by a diesel engine. The noise level generated by a frost control fan is associated with the aerodynamic noise of the blades that varies as the fan hub rotates 360 degrees around the tower. The noise from the engine does not contribute to the aerodynamic noise from the blades at distances required to satisfy environmental noise requirements.

The *Environment Protection (Commercial and Industrial Noise) Policy 2023* (the **Policy**) provides specific allowable noise levels for frost control fan operation that are based on a balance between protecting primary production in a Rural Zone through the effective use of frost control fans and minimising the impact on receivers.

The balance changes depending on the land use zone in which the receivers are located, with lower allowable noise levels applying in a Rural Living Zone or a Residential Zone.

Environmental noise assessments predict the noise level for comparison against the Policy. The influence of frost conditions on noise propagation are well understood and the noise levels generated by frost control fans can be predicted with accuracy (further discussion is provided in Appendix A).

The predicted noise level can (and must) account for the cumulative effect of all frost control fans on a premises operating together (where there are more than one installed). Where the Policy cannot be achieved, the environmental noise assessment determines whether the frost control fans can be relocated, reselected, operated at reduced speed, or alternatively if measures can be incorporated at receivers, to satisfy the Policy.



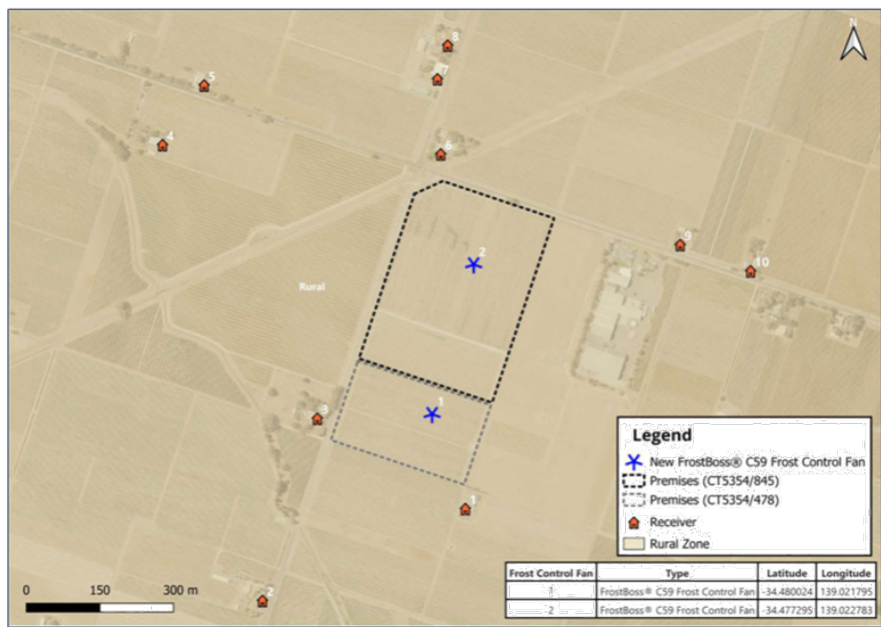
Introduction

This assessment considers the noise associated with the proposal for two new FrostBoss® C59 frost control fans (with a diesel engine and five fixed pitch fan blades) at Lot 425 Light Pass Road, Light Pass, in the Barossa Council. The frost control fans are located on separate premises being land titles CT5354/845 and CT5354/478. There are no existing frost control fans at either premises.

The noise from the frost control fans has been predicted to the surrounding sensitive receivers that are of a separate occupation (**receivers**) based on sound pressure level measurements made of an equivalent FrostBoss® C59 frost control fan in frost conditions.

The location of the frost control fans (including coordinates), the receivers, and the premises are shown in Figure 1 below.

Figure 1 Locality Plan



Source Plan SA – SA Property & Planning Atlas

The allowable noise level of the Policy is to be achieved from the operation of the frost control fan on each premises. This assessment considers the cumulative noise from the frost control fans on two adjacent premises operating simultaneously. Where the cumulative noise from the operation of the frost control fans on both premises achieves the allowable noise level, the noise from the operation of each frost control fan on each premises will also satisfy the allowable noise level.



Assessment Criteria

Planning and Design Code

The frost control fans and the receivers are in a Rural Zone of the Planning and Design Code Version 2025.4 dated 27 February 2025 (the **Code**). The following provisions within the Code are considered relevant to the environmental noise assessment (*emphasis added*).

Interface between Land Uses (Part 4 – General Development Policies)

Desired Outcome DO 1

Development is located and designed to *mitigate adverse effects* on or from neighbouring and proximate land uses.

Performance Outcome PO 1.2

Development adjacent to a site containing a sensitive receiver (or lawfully approved sensitive receiver) or zone primarily intended to accommodate sensitive receivers is *designed to minimise adverse impacts*.

Performance Outcome PO 2.1

Non-residential development *does not unreasonably impact the amenity* of sensitive receivers (or lawfully approved sensitive receivers) or an adjacent zone primarily for sensitive receivers through its hours of operation having regard to:

- a) the nature of the development
- b) measures to mitigate off-site impacts
- c) the extent to which the development is desired in the zone
- d) measures that might be taken in an adjacent zone primarily for sensitive receivers that mitigate adverse impacts without unreasonably compromising the intended use of that land.

Performance Outcome PO 4.1

Development that emits noise (other than music) *does not unreasonably impact the amenity* of sensitive receivers (or lawfully approved sensitive receivers).

Deemed-to-Satisfy Criteria / Designated Performance Feature DTS / DPF 4.1

Noise that affects sensitive receivers achieves the relevant Environment Protection (Commercial and Industrial Noise) Policy criteria.



Environment Protection (Commercial and Industrial Noise) Policy 2023

Interface between land uses *DTS / DPF 4.1* references the relevant Environment Protection (Commercial and Industrial Noise) Policy criteria. The relevant policy is the *Environment Protection (Commercial and Industrial Noise) Policy 2023* (the **Policy**).

The Policy was developed under the *Environment Protection Act 1993* (the **EP Act**). The EP Act incorporates a requirement to ensure that noise does not unreasonably interfere with the enjoyment of the area. Part 6 of the Policy provides specific allowable noise levels for frost control fans that are based on a balance between protecting primary production through the effective use of frost control fans and minimising the impact on receivers.

With the EP Act and Interface between land uses *PO 4.1* being consistent with the intent of the other relevant Code provisions listed above; compliance with the Policy is considered to satisfy all other *Desired Outcomes* and *Performance Outcomes* relevant to this assessment.

Part 6 of the Policy establishes an allowable noise level within both a habitable room (with windows closed), and an external location outside a habitable room. Where the external allowable noise levels are achieved, then noise from the frost control fans is not considered excessive. Where the external allowable noise levels are not achieved, then the habitable room becomes the location for the assessment.

This assessment has been made against the external allowable noise levels of the Policy that apply to frost control fans.

The allowable noise level varies depending on the land use zoning in which the receivers are located. For a location in a zone where Residential or Rural Living is principally promoted, the external allowable noise level at a receiver is an A-weighted equivalent sound pressure level¹ (L_{Aeq}) of 45 dB(A)². For all other zones the external allowable noise level at a receiver is an L_{Aeq} of 55 dB(A)².

In this circumstance, an L_{Aeq} of 55 dB(A) applies at the receivers in the Rural Zone. The allowable noise level is to be achieved from all frost control fans on a premises operating at the same time.

This assessment considers the cumulative noise from the frost control fans on two adjacent premises operating simultaneously, being one new FrostBoss® C59 frost control fan on each premises. There are no existing frost control fans at either premises.

The Policy also requires that the frost control fans must not be operated except during a period when frost occurs or is reasonably likely to occur, or as necessary for maintenance work and maintenance work must not be carried out on the frost control fans except between 7.00 a.m. and 10.00 p.m. on the same day.

¹ The allowable noise level for a frost control fan is considered to be over the period of one full rotation of the fan hub about the tower.

² The allowable noise level within a habitable room is 20 dB(A) less than the external allowable noise levels.



Assessment

The Policy is utilised by this assessment to satisfy the Code requirements.

The following inputs have been utilised for the assessment of the frost control fans (over the full rotation of the fan hub about the tower) and are the basis for the predicted noise levels provided in Table 2:

1. noise modelling using *Conservation of Clean Air and Water in Europe (CONCAWE)* meteorological category 6 conditions (being a frost with a light breeze from the frost control fans to the receivers), which results in the most conservative (highest) noise levels at the receivers
2. noise measurements of an equivalent FrostBoss® C59 frost control fan in Ebenezer, South Australia (refer Appendix A for further noise prediction validation information)
3. the operation of the frost control fans with coordinates as detailed in Figure 1
4. the receivers and land use zoning as depicted in Figure 1
5. the frost control fans restricted to the maximum fan and engine drive speeds³ as detailed in Table 1.

Table 1 Maximum Fan and Engine Drive Speeds

Frost Control Fan	Type	Maximum Fan Speed	Maximum Engine Drive Speed
1	FrostBoss® C59 Frost Control Fan	345rpm	1700rpm
2	FrostBoss® C59 Frost Control Fan	345rpm	1700rpm

Table 2 Predicted Noise Levels at Receivers

Receiver	Allowable Noise Level L _{Aeq} (dB(A))	Predicted Noise Level L _{Aeq} (dB(A))	Compliance
1	55	55	Yes
2	55	45	Yes
3	55	54	Yes
4	55	43	Yes
5	55	43	Yes
6	55	54	Yes
7	55	48	Yes
8	55	47	Yes
9	55	48	Yes
10	55	45	Yes

With reference to Table 2, the cumulative noise from the operation of the new frost control fans on two premises will comply with the allowable noise level of the Policy. Where the cumulative noise from the operation of the frost control fans on both premises achieves the allowable noise level, the noise from the operation of each frost control fan on each premises will also satisfy the allowable noise level.

³ The fan and engine drive speeds represent low operating speeds for a FrostBoss® C59 frost control fan

Conclusion

This environmental noise assessment considers the noise from two new FrostBoss® C59 frost control fans on the two premises at Lot 425 Light Pass Road, Light Pass, with land titles CT5354/845 and CT5354/478.

The assessment predicts the noise level from the frost control fans and compares that noise level against the specific requirements of Part 6 of the *Environment Protection (Commercial and Industrial Noise) Policy 2023*.

The assessment determines that the cumulative noise from the operation of the frost control fans at the two adjacent premises can achieve the allowable noise level of the *Environment Protection (Commercial and Industrial Noise) Policy 2023*.

Where the cumulative noise from the operation of the frost control fans on both premises achieves the allowable noise level, the noise from the operation of each frost control fan on each premises will also satisfy the allowable noise level of the *Environment Protection (Commercial and Industrial Noise) Policy 2023*.

In complying with the *Environment Protection (Commercial and Industrial Noise) Policy 2023*, the frost control fans will satisfy the relevant Planning and Design Code provisions.

The following example conditions of operation are provided to ensure consistency with this assessment and the mandatory provisions in the *Environment Protection (Commercial and Industrial Noise) Policy 2023*. The conditions apply to the operation of each frost control fan on each premises, being land titles CT5354/845 and CT5354/478:

1. The frost fan must not be operated except during a period when frost occurs or is reasonably likely to occur, or as necessary for maintenance work and maintenance work must not be carried out on the frost control fan fans except between 7.00 a.m. and 10.00 p.m. on the same day
2. The frost fan must not exceed an equivalent noise level L_{Aeq} of 55 dB(A) when measured over the period of one full rotation of the fan hub about the tower at any dwellings that are of separate occupation which exist in the Rural Zone (or similar) at the time of approval. Where an equivalent noise level L_{Aeq} of 55 dB(A) is exceeded then the operation of the frost control fan must be modified to achieve that external noise level, or it must be shown that an equivalent noise level L_{Aeq} of 35 dB(A) is achieved in the habitable rooms of that dwelling.



Appendix A: Noise Prediction Validation

Sound pressure level measurements have been made of a FrostBoss® C59 frost control fan operating at 538 Carrara Hill Road, Ebenezer, South Australia.

The measurements are utilised to inform the predicted noise levels from frost control fans, including the proposed frost control fans at Lot 425 Light Pass Road, Light Pass on land titles CT5354/845 and CT5354/478.

The sound pressure level measurements were made by Echo Acoustics in July 2024 under meteorological conditions which were consistent with frost formation and frost control fan operation in practice.

The equivalent A-weighted sound pressure level over one full rotation of the fan hub about the tower was measured at a range of distances and for different frost control fan operating speeds. The results were validated against the CONCAWE noise model. The CONCAWE noise model is utilised in this assessment to predict the noise levels from the frost control fans.

The correlation between the noise measurements and predicted noise levels utilising the CONCAWE noise model indicate a high level of accuracy, and a marginally conservative prediction result at distances required to achieve the Policy (i.e. the predictions in this assessment are marginally higher than the levels measured for actual frost control fan operation).



References

Planning and Design Code Version 2025.4 dated 27 February 2025, PlanSA

Propagation of Noise from Petroleum and Petrochemical Complexes to Neighbouring Communities, Conservation of Clean Air and Water in Europe, 1981

South Australian *Environment Protection Act 1993*

South Australian *Environment Protection (Commercial and Industrial Noise) Policy 2023*

South Australian "Guidelines for the Use of the Environment Protection (Commercial and Industrial Noise) Policy 2023"



Document Details

Distribution:

Issue date	14 March 2025
Issued to	FrostBoss®
Description	Environmental Noise Assessment

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FROST BOSS C59 FROST FAN

FIELD TEST

ASSESSMENT OF NOISE

Report No 15136

Prepared for:

*New Zealand Frost Fans Ltd
Hastings
August 2015*

Prepared by:

A blue ink signature of Nevil Hegley, written over a dotted line.

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1 INTRODUCTION

This report sets out the results of field measurements undertaken on the night of Thursday 28 May 2015 of a Frost Boss C59 frost fan. Measurements were undertaken at 180m and 300m from the frost fan operating at an engine speed of 1840rpm and fan speed at 365rpm at 1445 Omahu Road, Hastings, as shown on Figure 1.



Figure 1. Test Location at 1429 Omahu Road

2 TEST CONDITIONS

The weather throughout the noise monitoring period was fine. The cloud varied between 3/8 cover at the start of testing to 4/8 cover at the completion of the testing. An ambient wind was of variable speed and throughout the testing the wind was blowing from the frost fan towards the monitoring position (south westerly). The reported wind speed is a 30 second moving average, updated every 5 seconds, and is sent to the data logger at 2 minute intervals. The canopy temperature is measured 1m above the ground and the tower temperature is measured 10m above the ground at the top of the tower. Where the tower temperature is above the canopy temperature (which occurred throughout the monitoring period) this indicates a temperature inversion is present and the wind speed is measured 6.5m above the ground from a tower mounted spar.

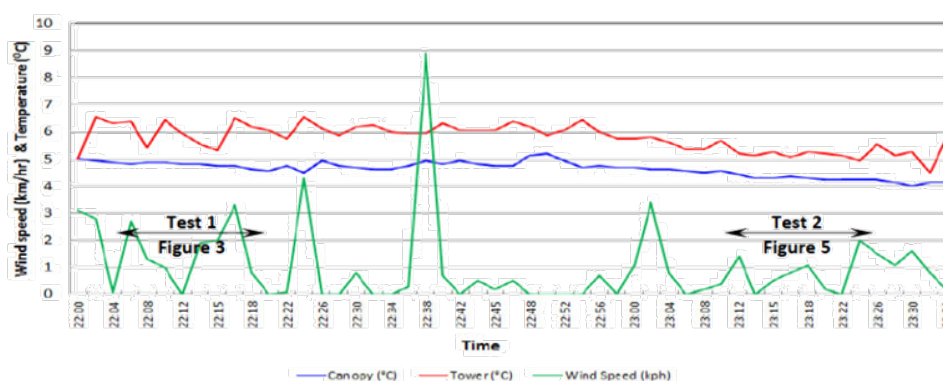


Figure 2. Wind Speed and Temperature during Testing

The meteorological conditions were compatible with those set out for Category 6 in Concawe¹, which gives enhanced meteorological conditions. When testing commenced the temperature was 5°C and it dropped to 4°C at the completion of

¹ The Propagation of Noise from Petroleum and Petrochemical Complexes to Neighbouring Communities, Report No 4/81, May 1981 prepared by C J Manning, Acoustic Technology for Concawe's Special Task Force on Noise Propagation

the testing. The weather conditions were considered ideal for monitoring noise from the frost fan.

The topography was flat and the apple trees in the orchard were in a dormant state with very few leaves.

The technical information of the frost fan tested is:

• Frost Fan model	FrostBoss C59 (prototype)
• Engine	Cummins 6BT5.9 Turbo diesel
• Engine cabinet	Standard FrostBoss steel cabinet
• Exhaust	Standard single chamber internal muffler
• Blade type	Standard C9 series composite blade
• Fan diameter	5.5m
• Tower height	10.5m
• Pitch	fixed
• Upper gearbox	DeRan GB11 ratio 1.68 to 1
• Lower gearbox	Amarillo 85W ratio 3.0 to 1
• Overall ratio	5.04
• Fan speed	365 rpm
• Engine speed	1840 rpm

Commercial Fan

• Frost fan model	FrostBoss C59 (production model)
• Engine	Perkins 1106D-70TA Turbo Diesel
• Engine cabinet	Standard FrostBoss steel cabinet
• Exhaust	Standard single chamber internal muffler
• Blade type	Standard C9 series composite blade
• Fan diameter	5.5m
• Tower height	10.5m
• Pitch	fixed
• Upper gearbox	Amarillo UD105 ratio 1.6364 to 1
• Lower gearbox	Amarillo 85W ratio 3.0 to 1
• Overall ratio	4.9091
• Fan speed	365 rpm
• Engine speed	1792 rpm

As shown above, the tested frost fan has some small differences to the proposed commercial frost fan. The differences are a different engine and slightly different overall gear ratios to the C59 fan system that will be marketed by NZ Frost Fans.

The test engine was a 5.9 litre, 6 cylinder, Cummins turbo-diesel whereas the production engine will be a 6.0 litre, 6 cylinder, Perkins turbo-diesel. Both engines have similar mufflers and the cabinet design is the same for both engines with a similar noise output at the same engine speed.

The C59 fan is designed to run at 365 rpm, regardless of the engine driving it. The test fan had an overall gear ratio from the fan to the engine of 5.04, therefore the engine speed is 365 rpm x 5.04, which equals 1,840 rpm. The production fan will have an overall gear ratio from the fan to the engine of 4.9091, therefore the engine speed is 365 rpm x 4.9091, which equals 1,792 rpm. Thus, the commercially available frost fan will operate at 48 rpm lower engine speed compared to the test fan so theoretically the engine noise will be slightly lower than the engine tested. Regardless, it is noted that the engine noise does not control the measured noise; the noise into the environment is controlled by the fan itself.

The equipment used for the measurements was:

- Brüel & Kjær 2250 Hand-held Analyser platform with Sound Level Meter Software BZ 7222, Frequency Analysis Software and BZ 7225 Enhanced Logging Software. Re-calibration is next due in September 2015;
- Brüel & Kjær ½" type 4189 microphone, serial number 2650951. Re-calibration is next due in September 2015;
- Brüel & Kjær 4230 calibrator serial number 930422. Re-calibration is next due in September 2015;
- Brüel & Kjær type UA0237 90mm diameter windscreen;
- All measurements were undertaken in accordance with the requirements of *NZS 6801:2008 Acoustics - Measurement of Environmental Sound* and assessed in accordance with the requirements of *NZS 6802:2008 Acoustics – Environmental Noise*.

3 TEST RESULTS WITH FAN AT 365RPM AND 300M

Two measurements were undertaken at 300m downwind of the frost fan. Figure 3 shows the real time noise trace of the frost fan as measured over a 15 minute period, which gave two full rotations of the frost fan.

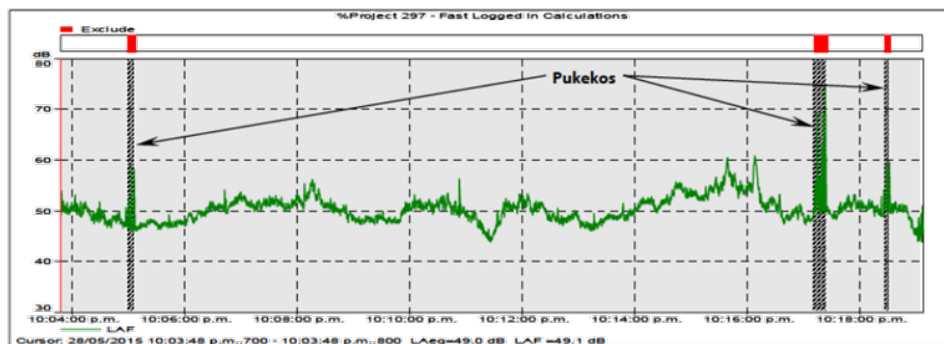


Figure 3. Real Time Noise Trace at 300m, commenced 10:04pm

Figure 4 shows the sound spectrum in one third octave bands for the test undertaken at 300m.

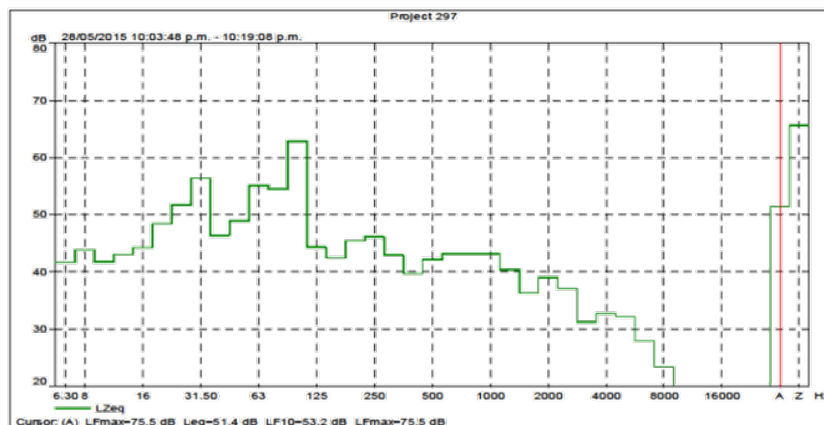


Figure 4. 1/3 Octave Spectrum at 300m – Total Test Duration

Based on the measured level at 300m the noise over a 15 minute period for the Frost Boss C59 frost fan at 365rpm is 50dB L_{Aeq} .

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A second 15 minute test was undertaken from 11:11pm at the same location at 300m from the frost fan and at 365rpm as shown on Figure 5. In this case the noise level was also 50dB LAeq.

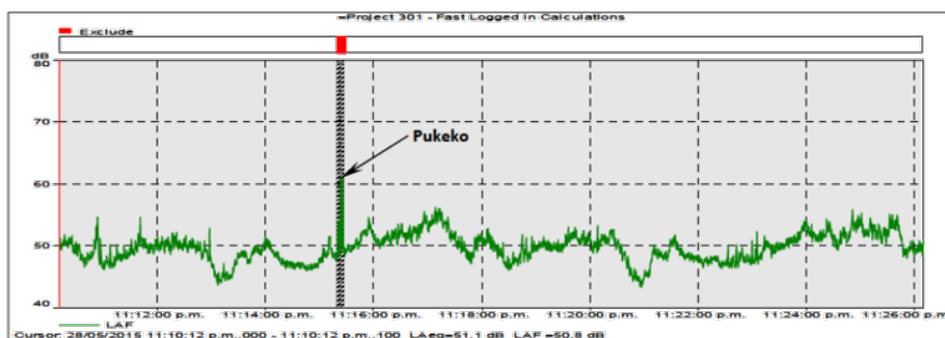


Figure 5. Real Time Noise Trace, commenced 11:11pm

Figure 6 shows the sound spectrum in one third octave bands for this second test starting at 11:11pm and at 300m.

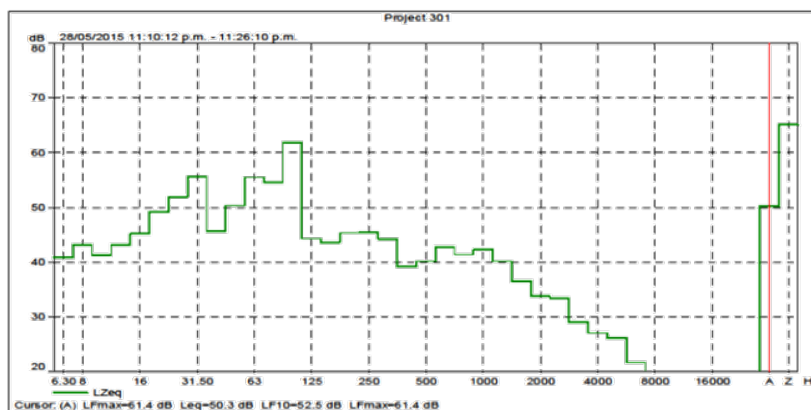


Figure 6. 1/3 Octave Spectrum at 300m – Total Test Duration

Appendix B4 of NZS 6802:2008 Acoustics – Environmental Noise sets the test to determine if there is a tone to the sound of interest. To determine if a tone is present the relevant section of the Standard states:

B4.2 Objective test methods

Where there is doubt about the presence of tonality, the following two methods provide an objective measure for tonality. The simplified test method may be carried out using one-third octave band measurement equipment. The reference test method requires the use of narrow band analysis. If the simplified method does not indicate tonality, it may still be necessary to use the reference method to confirm the presence or absence of tonality. In addition, the reference method can properly assess modulated tones or complex tones.

B4.3 Simplified test method for tonality

A test for the presence of a prominent discrete-frequency spectral component (tonality) can be made by comparing the levels of neighbouring one-third octave bands in the sound spectrum. An adjustment for tonality shall be applied if the LEQ in a one-third-octave band exceeds the arithmetic mean of the LEQ in both adjacent bands by more than the values given in table B2.

Table B2 - One-third octave band level differences

One-third octave band	Level difference
25 - 125 Hz	15dB
160 - 400 Hz	8dB
500 - 10000 Hz	5dB
NOTE - At frequencies below 500Hz the criterion could be too severe and tones might be identified where none is actually audible. For complex spectra the method is often inadequate and the reference method should be used.	

A check of the individual frequencies as set out on Figures 4 and 6 (1/3 octave bands) shows there is no tonal characteristic to the sound that warrants an adjustment to the measurements. In addition, there are no other characteristics, such as a whacking sound often associated with frost fans, which would attract a 5dB penalty due to a special audible characteristic to the sound. Thus, a level of 50dB L_{Aeq} equates to the rating level for the C59 frost fan operating at 365rpm.

4 TEST RESULTS WITH FAN AT 365RPM AND 180M

Figure 7 shows the real time noise trace of the frost fan as measured over a 15 minute period when at 180m downwind, which gave two full rotations of the frost fan.

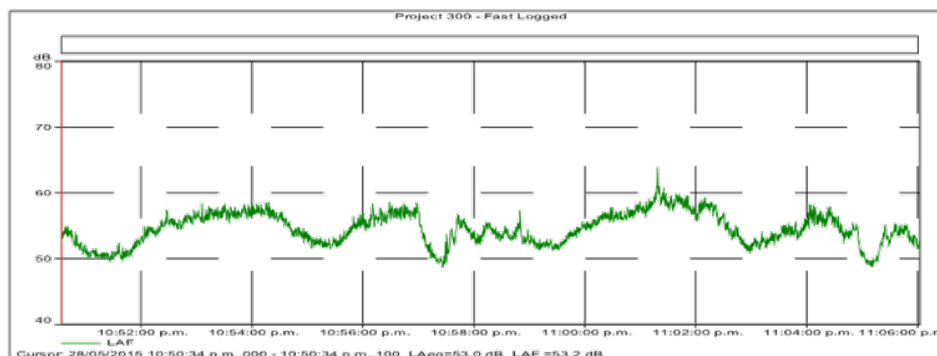


Figure 7. Real Time Noise Trace at 180m

Figure 8 shows the sound spectrum in one third octave bands for the test undertaken at 180m.

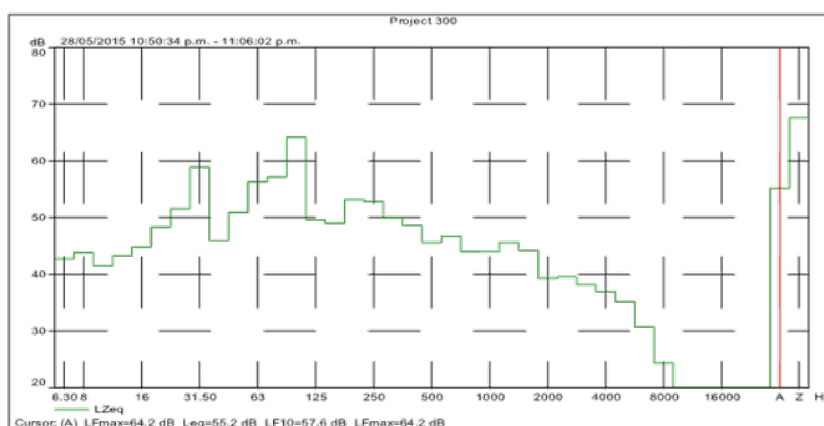


Figure 8. 1/3 Octave Spectrum at 180m – Total Test Duration

Based on the measured level at 180m the noise over a 15 minute period for the Frost Boss C59 frost fan at 365rpm is 55dB L_{Aeq} .

As for the 300m distance, there are no special audible characteristic to the frost fan at 180m.

5 SUMMARY OF RESULTS

A summary of the measured levels of the Frost Boss C59 Frost Fan is set out in Table 1.

	Octave Level , Hz									
	31.5	63	125	250	500	1k	2k	4k	8k	A
365rpm at 300m – L _{Aeq}	57	59	62	50	46	46	40	32	18	50
365rpm at 180m – L _{Aeq}	60	60	64	57	52	49	46	42	27	55

Based on 15 minute measurement

Table 1. Measured Noise Levels (dB)

6 TEST VARIABLES

6.1 Wind Speed

The above testing was undertaken with wind speeds between 0 – 3km/hr although there the frost fan is designed to operate in wind speed up to 8km/hr so the effects of an increased wind speed has been assessed.

The two potential effects of a change in the wind to that will increase the noise level as received 300m downwind are the positive effects of the sound transmission of noise to the receiver due to the wind and the effects of an increase in the wind on the fan blades and hence a higher noise level or special any audible characteristics may be generated at source.

The analysis of sound propagation has been based on meteorological conditions as set out in Concawe report addressed above and checked against the requirements of ISO 9613-1 *Acoustics - Attenuation of Sound During Propagation Outdoors. Part 1: Calculation of the Absorption of Sound by the Atmosphere* and ISO 9613-2 *Acoustics - Attenuation of Sound During Propagation Outdoors. Part 2: General Method of Calculation*. Each of these

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documents is referred to in NZS6801:2008. The above measurements of the C59 frost fan were undertaken in Concawe meteorological category 6 conditions. Using the same method to assess the effects of an increased wind to a steady 8km/hr will give a potential increase of 0.5 – 1dB with an 8km/hr wind. A similar result is found if ISO 9613-1/2 is used.

The above is for a constant wind speed of 8km/hr. Figure 9 shows a weather trace over a random 24 hour period with wind speeds representative of the conditions required for a frost fan to operate. As shown on Figure 9 (as also shown on Figure 2) the wind varies continuously there will never be a period with a constant wind throughout any 15 minute measurement so the best that can be achieved is a typical wind pattern.

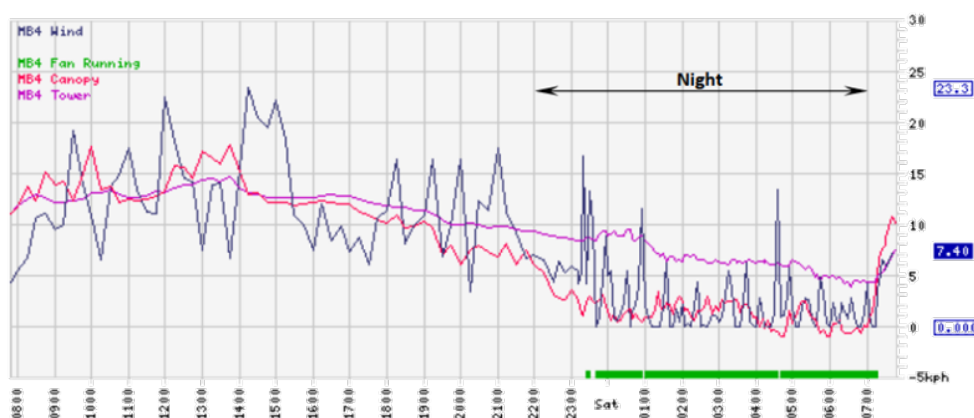


Figure 9. 24 Hour Wind Speed Plot

As set out above, when measured at the same location, and excluding outside noise influences, the same noise level of 50dB L_{Aeq} at 300m (Figures 3 and 5) was measured in different wind speeds. Figure 2 shows the wind condition during the actual measurement period with an average wind speed of 2.5km/hr (0 – 3.3km/hr) for the first measurement and an average wind speed of 1km/hr (0 – 2km/hr) for the second measurement.

In each case the wind varied throughout the 15 minute monitoring period with no apparent change to the measured noise level. The wind was from a stable direction throughout the monitoring. If the wind speed is higher the wind direction is not normally as stable so the receiver noise will drop as the wind deviates from the direct downwind situation.

From the noise trace shown in Figure 5 it can be seen the noise varies by 11dB as the frost fan rotates around the tower with a small component of this variation being due to the variation of the wind speed.

The frost fan noise requirement in the District Plan as set out in Rule 36.2.7.1.2 states:

- a) Subject to (b), sound levels shall be measured in accordance with the provisions of NZS 6801:2008 Acoustics – Measurement of Environmental Sound and assessed in accordance with the provisions of NZS 6802: 2008 Acoustics – Environmental Noise;*

Section 5.2 Measurement Time Intervals of NZS 6802:2008 states:

A sound environment shall be assessed as it relates to a prescribed time frame, for example, day, evening or night. Thus an appropriate survey period (or periods) shall be selected so that relevant and representative samples of the sound under investigation are obtained ...

In calm conditions the noise level will be similar at any point around the frost fan. However, if it is assumed the steady wind speed of 8km/hr is blowing the noise level will vary by typically 7dB due solely to the effects of being upwind or downwind of the frost fan with approximately an increase of 3dB if downwind and a 4dB reduction if upwind. Clause 7.1.2 of NZS6801:2008 Acoustics - Measurement of Environmental Sound states:

To demonstrate compliance, measurements should include or be appropriately adjusted to slightly positive propagation conditions, which are the upper limits of the meteorological window. Therefore when

predicting sound levels it is recommended that slightly enhanced propagation is assumed. Where meteorological conditions vary so that sound from an activity might comply one day but not on another and adjustments are not practical, sufficient measurements shall be made to provide an adequate description of the variation.

The variation in the noise level for a frost fan is from a negative to positive wind. A negative wind will obviously not fulfill the requirements of NZS6801. If an 8km/hr downwind is adopted this is at the extreme of the measurement range so considered to be more than "slightly positive" plus such a wind is not representative of the actual conditions. A positive wind of 2 – 4km/hr is in the upper noise range from a frost fan (a calculated 0.5 - 1dB lower than the maximum noise likely to be experienced for the C59 frost fan with a steady 8km/hr wind) so is considered to easily satisfy the requirements of NSZ6801.

6.2 Special Audible Characteristics

The second potential change of noise from a frost fan is related to any special audible characteristics that may develop as the wind speed increases at the frost fan.

In addressing this effect previous testing undertaken of the C49 frost fan (which has identical blades as the C59) and the C59 frost fan has been made.

When monitoring the C59 frost fan the wind varied from 0 – 3.3km/hr as shown on Figure 2 above. In addition, between testing there was one period when the wind speed increased to a high of 9km/hr. There was no subjective effect of the higher wind speed on the spectral content of the sound during the different wind speeds and no impulsive noise generated by the wind gust.

From previous tests on the C49 frost fan with a fan speed of 395rpm (engine speed of 1,700rpm) and speed of 418rpm (engine speed of 1,800rpm) in wind conditions ranging from calm to km/hr none of these tests had a tonal sound or exhibited any impulsive sound. The C59 has a fan speed of 365rpm (engine

speed of 1,840rpm). Table 2 sets out the comparison of the fans and their tip speeds.

Fan Type	C49	C49	C59
Fan diameter (m)	5.5		
Blade type	Standard C9 series composite		
Fan speed (rpm)	395	418	365
Engine speed (rpm)	1,700	1,800	1,840
Fan tip speed (m/s)	114	120	105
Fan tip speed (km/hr)	410	432	378

Table 2. Comparison of Fan Tip Speeds

The field testing of the C49 frost fan has demonstrated the fan does not exhibit either a tonal or impulsive sound at different operating speeds. From the above table the tip speed of the C59 fan is 32km/hr slower than the C49 operating at 395rpm and 54km/hr slower than the C49 fan operating at 418rpm. In each case the only variation to the operation is the speed of the fan tip; all other aspects of the fan are identical.

As the C59 is operating at the lowest tip speed, and it is the tip speed that controls the tone and impulsive sound, it is reasonable to conclude the C59 will not have any special audible characteristics over a wind speed range of 0 – 8km/hr. This is because the C59 is operating at a lower tip speed and this is the reason the noise has been reduced compared with the C49 (and other types of frost fan).

7 CONCLUSIONS

Based on the above the Frost Boss C59 Frost Fan will not have any tonal or impulsive sound when operating in wind conditions varying from 0 – 8km/hr.

When measured in accordance with the requirements of NZS 6801:2008 *Acoustics - Measurement of Environmental Sound* and assessed in accordance with the requirements of NZS 6802:2008 *Acoustics – Environmental Noise* the noise from the Frost Boss C59 frost fan operating at 365rpm is 50dB L_{Aeq} when measured at 300m and 55dB L_{Aeq} when measured at 180m.

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7. REPORTS – REVIEW OF ASSESSMENT MANAGER DECISIONS (PLANNING, DEVELOPMENT AND INFRASTRUCTURE ACT 2016)

Nil.

8. REPORTS – PANEL UPDATES

Nil.

9. REPORTS – OTHER BUSINESS

Nil.

10. REPORTS – CONFIDENTIAL

Nil.

11. NEXT MEETING

Tuesday 5 August 2025 commencing at 5.00 pm

12. CLOSURE OF MEETING

The Presiding Member will declare the meeting closed.