Shadow Flicker Assessment

Macorna Wind Farm

Atmos MWV Pty Ltd

Prepared by:

SLR Consulting Australia Pty Ltd

SLR Project No.: 640.031876.00004

16 April 2026

Revision: R02-v1.0

Making Sustainability Happen

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
R02-v1.0	16 April 2026	P Hayman	P Georgiou	P Georgiou

Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Atmos MWV Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

Executive Summary

SLR Consulting Australia Pty Ltd (SLR) was engaged by Atmos Renewables on behalf of Macorna SPV - Atmos MWV Pty Ltd as trustee for the Atmos MHV Trust to provide a shadow flicker assessment for the proposed Macorna Wind Farm (the Project) within a land development area around the town of Macorna, Victoria. This assessment has been conducted in accordance with the Draft National Wind Farm Development Guidelines and current Victorian legislation (DTP Planning Policy – Development of Wind Energy Facilities) and prepared to support the Environment Effects Statement (EES) referral and associated planning and environmental approval processes.

Shadow Flicker Modelling

Shadow flicker studies normally distinguish between the predictions from two scenarios:

- An “idealised” scenario which involves calculations that do not take into account factors such as weather cloudiness, wind directionality, operational downtime, etc, which reduce the level of shadow flicker experienced by a receiver. These predictions can be considered a “theoretical worst-case” scenario.
- A “real-world” or “actual” scenario which does take into the real-world factors that influence the shadow flicker that would be experienced. These predictions can be considered an “expected” scenario.

Criteria

The widely accepted criteria for shadow flicker are:

- Theoretical Worst-case Scenario:
  - 30 hours per year and 30 minutes per day
- Expected Real-world Scenario:
  - 10 hours per year and 30 minutes per day

Baseline Study Results

The assessment evaluated the Theoretical and Expected shadow flicker from a maximum of 114 proposed WTG locations with respect to 30 sensitive receivers around and within the Project Area.

The Theoretical scenario modelling showed no exceedance of the shadow flicker criteria. The Expected scenario results (taking into account real-world factors such as cloudiness, wind directionality, etc) also showed no exceedance.

Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

DECC	Department of Energy and Climate Change
Hz	Hertz = 1 cycle per second
km	Kilometre(s)
m	Metre
MW	Megawatt
WTG	Wind Turbine Generator

Definitions

Arc second	Unit of angular measurement equal to 1/3600 of a degree
Expected model	Model taking into account real world meteorological and operational factors
Mast	Structure supporting the nacelle and rotor of a wind turbine
Sensitive Receiver	Location where the potential time of shadow flickering impact is calculated
Theoretical model	Model assuming worst case conditions, eg zero cloudiness, etc.
Timestep	Time interval between model calculations
Wind Power Project	An array of wind turbine generators

1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) was engaged by Atmos Renewables on behalf of Macorna SPV - Atmos MWV Pty Ltd as trustee for the Atmos MHV Trust to provide a shadow flicker assessment for the proposed Macorna Wind Farm (the Project) within a land development area around the town of Macorna, Victoria. This assessment has been conducted in accordance with the Draft National Wind Farm Development Guidelines and current Victorian legislation (DTP Planning Policy – Development of Wind Energy Facilities) and prepared to support the Environment Effects Statement (EES) referral and associated planning and environmental approval processes.

1.1 Project Overview

The Macorna Wind Farm (MAWF) is a proposed utility-scale renewable energy development located in northern Victoria. The Project is being developed by Atmos Renewables, on behalf of Macorna SPV – Atmos MWV Pty Ltd as trustee for the Atmos MHV Trust.

The Project will comprise up to 114 wind turbine generators (WTGs) with a combined nameplate capacity of approximately 820.8 megawatts (MW). The turbines are anticipated to be Vestas V172–7.2 MW units, or similar, with a hub height of up to 166 m and a maximum blade tip height of approximately 252 m above ground level.

Electricity generated by the wind farm will be supplied into the National Electricity Market (NEM) via connection to the proposed VNI West Tragowel Terminal Station, which forms part of the Victoria–New South Wales Interconnector West transmission project.

The Project will contribute to Victoria's renewable energy transition and is expected to generate sufficient electricity to power approximately 590,000 homes annually, supporting State targets for renewable energy and emissions reduction.

1.2 Location

The Project is located at Faulkner Road, Tragowel (Victoria) within the Gannawarra and Loddon Shire local government areas, in the Loddon Mallee region of Victoria.

The Project Area covers approximately 23,000 hectares, across approximately 26 landholdings, within a broader 26,000 hectare study area originally investigated for development. The estimated temporary construction disturbance footprint is approximately 750 hectares, of which approximately 40% is expected to remain as operational infrastructure.

The Project Area encompasses land within or near the localities of:

- Macorna
- Macorna North
- Loddon Vale
- Tragowel
- Mincha West

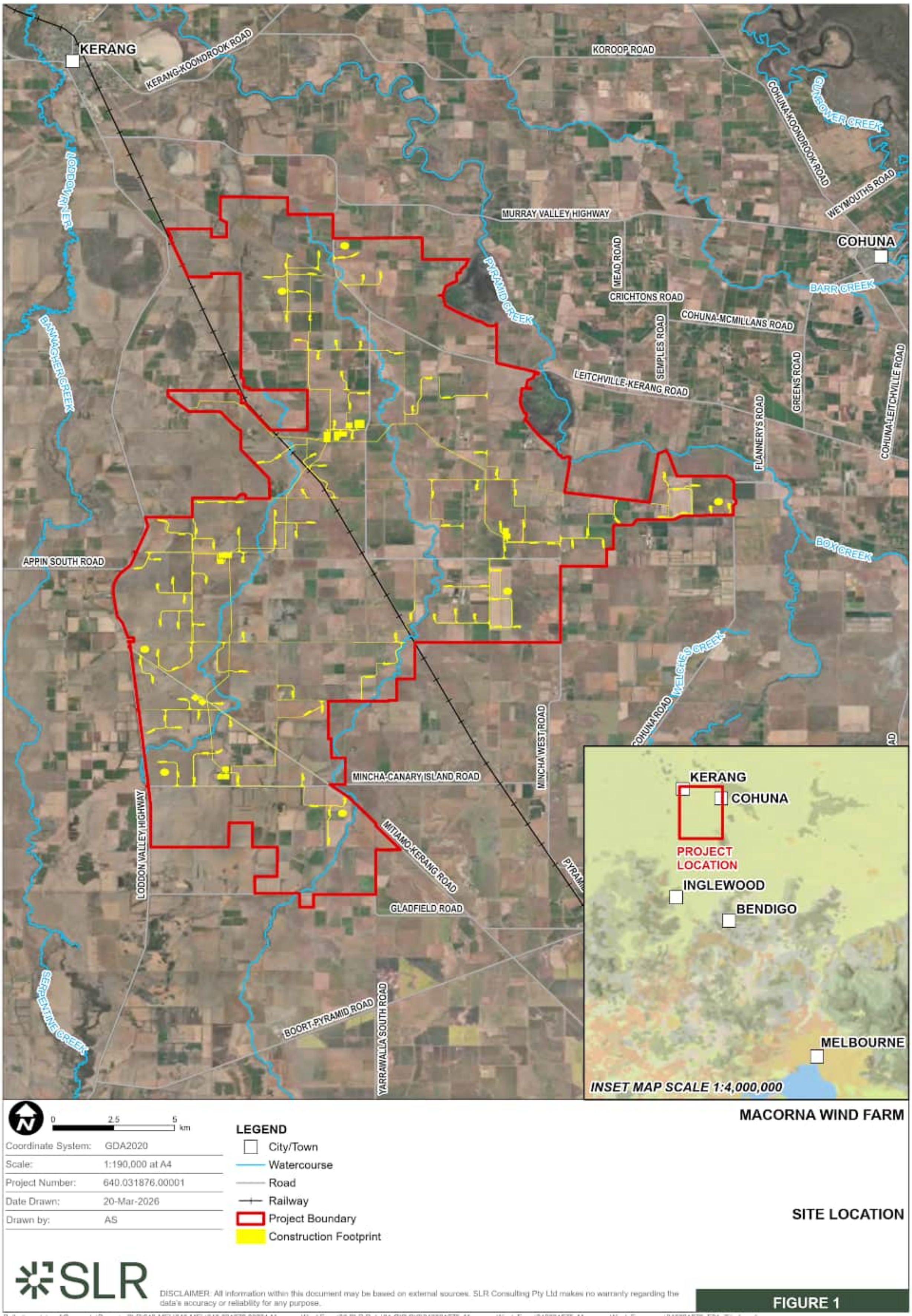
Nearby regional centres include Kerang and Pyramid Hill which are generally greater than 9 kilometres from proposed turbines.

The Project Area is predominantly used for agricultural activities. The landscape is generally flat and largely cleared of native vegetation, with small pockets of remnant vegetation remaining.

The Project Area is also located adjacent to the proposed VNI West Tragowel Terminal Station and within the draft North West Renewable Energy Zone (REZ) identified in the Victorian Transmission Plan.

The Project Area is shown in **Figure 1**.

Figure 1 Project Location



2.0 Project Description

The Project will comprise a range of permanent and temporary infrastructure required for construction and operation of the wind farm.

2.1 Wind Turbine Generators

The wind farm will include up to 114 wind turbine generators. Each turbine will consist of a tower, nacelle, hub and rotor assembly mounted on a reinforced concrete foundation. Key indicative specifications include:

- Rotor diameter: up to 172 m
- Blade length: up to 86 m
- Hub height: up to 166 m
- Maximum blade tip height: approximately 252 m

Each turbine will include a hardstand and assembly area used during construction for turbine installation and crane operations.

2.2 Electrical Infrastructure

The Project will include a network of underground and overhead electrical infrastructure to connect the turbines to the electricity grid. This will include:

- Underground 33 kV electrical and communication cabling connecting turbines to substations
- Up to four collector substations located within the Project Area
- Internal overhead transmission lines connecting the collector substations to the grid connection point
- Connection to the VNI West Tragowel Terminal Station at 500 kV

A battery energy storage system (BESS) may also be incorporated at collector substations. Each BESS is anticipated to have a capacity of up to 150 MW / 600 MWh and would support grid stability by storing electricity during periods of high supply and discharging during peak demand.

2.3 Operations and Maintenance Facility

The Project will include an operations and maintenance (O&M) facility, comprising an office and workshop building along with external storage areas and associated infrastructure. The facility will support routine servicing and monitoring of the wind farm during its operational life.

2.4 Meteorological Monitoring

The Project will include up to seven permanent meteorological masts installed within the Project Area to monitor wind conditions and support operational forecasting and performance monitoring. Temporary wind monitoring masts may also be installed during the development phase.

2.5 Access Tracks and Civil Infrastructure

A network of internal access tracks will be constructed to support both construction and operational activities. These include:

- Internal access tracks typically 6.5 m wide for operational access
- 30–40 m wide corridors for oversize and overmass vehicle movements during construction

Additional civil infrastructure will include turbine foundations, crane hardstands, laydown areas and drainage works.

2.6 Temporary Construction Infrastructure

Temporary infrastructure required during construction may include:

- Construction compounds and laydown areas
- Concrete batching plants
- Turbine component storage areas
- Temporary offices and amenities
- Construction workforce accommodation facilities
- Temporary fencing, washdown areas and site access controls

These facilities will be progressively removed or rehabilitated following completion of construction.

2.7 Proposed WTG Model

The wind turbine generators (WTGs) nominally selected for the Project are the Vestas V172-7.2 model. This model range includes a modular nacelle design that allows a range of models to be manufactured using the same base componentry, thereby reducing cost. The V172-7.2 model has the following technical features relevant to this study.

Table 1 WTG Details

Parameter	Representative Characteristics
Make model	Vestas V172
Rated power	7.2 MW
Rotor diameter	172 m (approx. blade length = 84 m)
Hub height	150 m or 166 m
Cut-in wind speed	3 m/s
Rotor swept area	23,235 m^2
Wind class	IEC S
Max Blade Width	4.35 m
Average Chord Width	2.81 m
Blade Width at 90% length	1.26 m

This model has the option for different hub heights. SLR has been directed to use 166 m for the shadow flicker assessment.

3.0 Preliminary WTG Layout and Description

The proposed turbine layout in shown in **Figure 2**. The turbines are located throughout the Project Area with the town of Macorna central to the site.

Figure 3 shows the primary dimensions and components of the chosen WTG. All WTGs generally consist of the following:

- Foundation – in-ground mass concrete to support the WTG.
- Tower – a tapered steel column.
- Nacelle – placed on top of the tower and houses the generator as well as other components. The nacelle can rotate to face the wind direction with the rotor hub attached to the front.
- Blades – virtually all modern WTGs have three blades forming the rotor attached to a central hub. The blades can be rotated about their spanwise axis to provide control over the speed of the rotor.

Figure 2 Turbine Layout

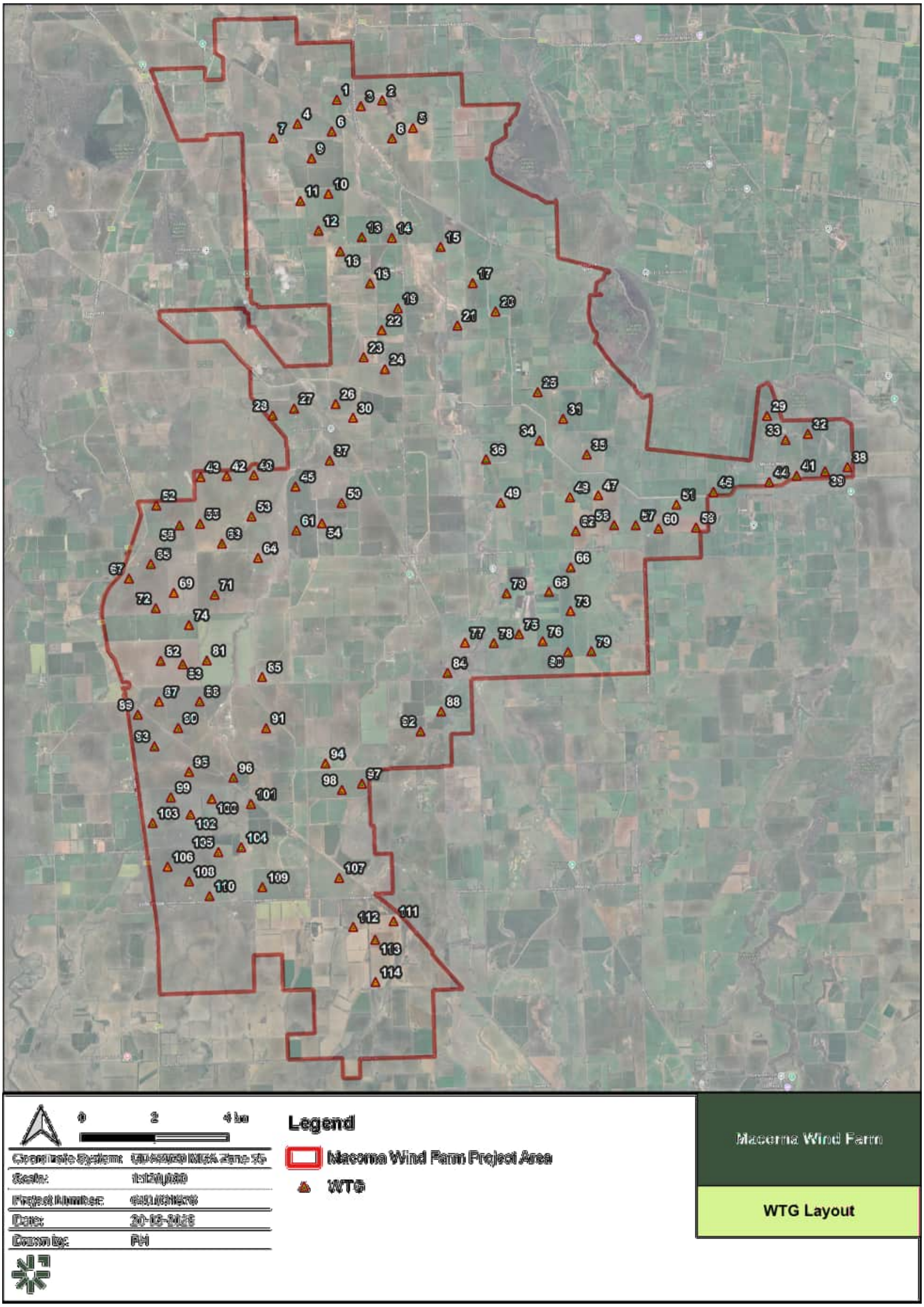
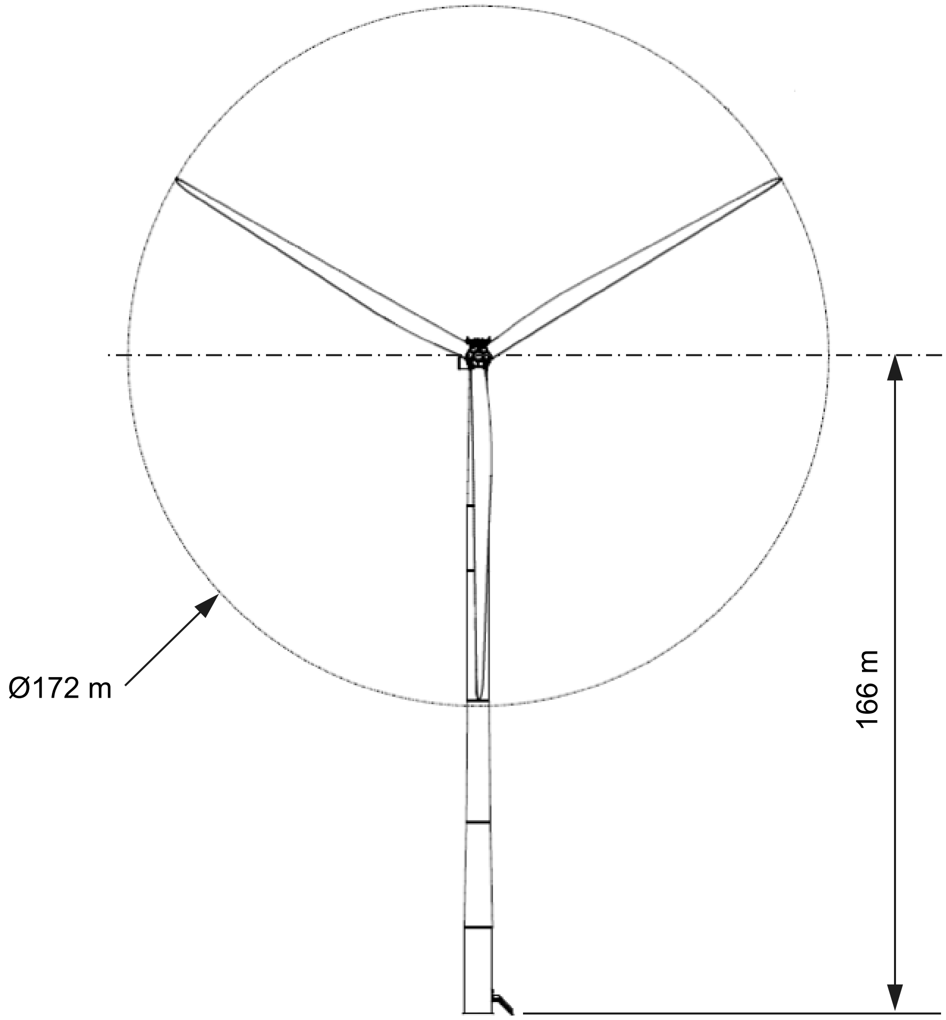


Figure 3 Turbine Dimensions – Vestas V172-7.2



4.0 Shadow Flicker

Shadow flicker is the effect experienced by an observer as sunlight passes through the swept area of an operational wind turbine. This tends to occur more often during winter when the sun's altitude is lower but can also be experienced in summer close to sunrise and sunset.

4.1 Factors Affecting Shadow Flicker

The impact of shadow flicker depends on two main factors: the distance of a viewer from the turbine in question and the duration that the flickering occurs for. Other factors affecting shadow flicker are:

- The size and height of the WTG.
- The relative ground elevation in the surrounding area.
- Intervening vegetation or other topographic features
- The wind direction which affects the direction the plane of the rotor is facing.
- Cloud cover.
- General visibility such as the presence of smoke etc.

The intensity of the shadows cast by the turbine decreases as the distance from the turbine increases and it follows that the intensity of any flickering will also decrease. This is due to a larger proportion of visible disc of the sun being blocked as the blade passes across it (BERR, 2009), when a viewer is closer to the WTG. The effect of shadow flicker tends to dissipate at distances beyond 10 rotor diameters (DECC, 2011).

4.2 Potential Impacts on Surrounding Viewers

Shadow flicker caused by wind turbines can be a source of annoyance at surrounding residential dwellings and other sensitive receiver locations such as schools or hospitals. The closer a receiver is to a wind farm, the greater the likelihood that annoyance may be experienced. This was the finding of NHMRC (2015) which cited one study (with a high risk of bias) where people who lived within 5 kilometres (km) of a wind farm were more likely to be annoyed by shadow flicker than those who lived 5-10 km away. It also found no studies that assessed the health effects of shadow flicker or other visual stimuli from wind farms.

The Draft National Wind Farm Development Guidelines (2010) note negligible risk of distraction for drivers experiencing shadow flicker, as the effect is similar to that of passing through a shadow from a tree on the side of the road.

5.0 Standard Practice and Guidelines

5.1 Australian Regulations

At a national level, the Draft National Wind Farm Development Guidelines (EHPC, 2010) provide guidance on the assessment of wind farm shadow flicker. At State/Territory level, Victoria, NSW and Queensland also have their own guidelines that generally follow the lead of the national guideline. The Policy and Planning Guidelines from the Victorian Department of Transport and Planning states:

> "*Shadow flicker can be modelled in advance, and siting and design can mitigate the problem. This is more likely to be an issue for turbines located to the east or west of a dwelling.*
>
> *The shadow flicker experienced immediately surrounding the area of a dwelling (garden-fenced area) must not exceed 30 hours per year as a result of the operation of the wind energy facility."*

The Draft National Wind Farm Development Guidelines (EHPC, 2010) provides further guidance for assessing wind farm shadow flicker. It recommends the following shadow flicker duration limits at receiver locations:

- A theoretical value of 30 hours per year and a maximum of 30 minutes per day.

If the theoretical value is exceeded:

- An expected or measured value of 10 hours per year day taking into account various real-world considerations.

Allowable limits for shadow flicker vary from country to country, however the generally agreed limit of 30 hours per year is widely used. The Australian Energy Infrastructure Commissioner (2022) concurs with this figure and notes that it is currently used across the country.

5.2 Theoretical Worst-Case Model Assumptions

The Theoretical Worst-Case modelling scenario is based on astronomical worst-case conditions:

- There is continual sunshine (i.e. permanently cloudless skies) from sunrise to sunset.
- There is sufficient wind for continually rotating turbine blades.
- The WTG rotor is always perpendicular to the incident direction of the sunlight.
- Solar angles less than 3° above the horizon are disregarded (due to likelihood for vegetation and building screening and atmospheric particle dispersion).
- Distances between the WTG rotor plane and the mast are negligible.
- Light refraction in the atmosphere is not considered.
- The assessment area of interest for shadow flicker extends horizontally from the WTG locations (the calculation of this distance is discussed further in **Section 5.1**).
- The modelling period covers a full non leap year.
- The height of all sensitive receivers should be 1.5 metres (m) – 2 m or at the window or balcony heights where the dwelling has more than one storey.
- The topography of the surrounding area should be included.

- The timestep used for the model should be 10 minutes or less.
- The annual duration of the shadow flicker should be reported for an area surrounding a receiver of interest (i.e. residence) comprising a circle of radius 50 m.
- The grid size used for mapping the sensitive receivers should not be more than 25 m.

5.3 Expected Real-World Model Assumptions

The Expected Real-World modelling scenario is a refinement of the Theoretical Worst-Case scenario using a more realistic interpretation of the potential occurrence of shadow flicker. The amount of predicted shadow flicker is reduced due to the following conditions.

- Cloud cover –not all days of the year will be sunny; meteorological data sourced from the closest site should be used to calculate the reduction in shadow flicker hours.
- Wind speed and wind direction frequency data (i.e. a wind rose sourced from a nearby meteorological station) can be used to determine the reduction of shadow flicker hours due to the orientation of the turbine.
- If it can be shown that the view of a turbine from a particular receiver is blocked, then the hours of shadow flicker from that turbine can be ignored.
- If the operation of a turbine has scheduled times when it is shut down, this can also be factored into the calculation.

5.4 Modelling Area of Interest

As stated above, the assessment area of interest to include in the calculation is calculated horizontally from the WTG. There are a number of different ways to calculate this distance generally involving a function of the blade chord or the rotor diameter.

SLR notes that the Draft Guideline was published 15 years ago and there has been significant development in wind turbine technology since the time of publication (2010). At the time of publication, a modern WTG had a power generation output of approx. 2 MW, whereas the WTG's for this Project are 7.2 MW and much larger in physical size.

When the Draft was written there was a wide variance in the distances used across jurisdictions. Victoria's recommendation was 265 times the maximum blade chord, while South Australia recommended 500 m.

The DECC uses a factor of 10 times the rotor diameter while the German regulations recommend 2 km around each turbine. The assessment software to be used has a slightly different method again, using a blockage of 20% this equates to a factor of approximately 683 times the mean blade chord. This approach is slightly more conservative than other reports from industry peers which use a factor of 680 times the mean blade chord.

At the distances in question this is a change of less than 0.5% and would not be expected to significantly impact the results.

6.0 Methodology

SLR has conducted the shadow flicker assessment using the WindPRO version 4.2 software package. WindPRO is a widely accepted modelling software package developed specifically for the design and evaluation of wind power projects.

WindPRO has been used to develop both Theoretical (Worst-Case) and Expected (Real-World) model predictions based on the assumptions described in **Sections 5.2 and 5.3** respectively.

6.1 Inputs

Step 1: Digital Terrain Model

Terrain elevation data was added to the model.

- The Australian Digital Elevation Model was chosen which has a resolution of 1 arc second. A 35 km by 40 km section was imported to cover the Project Area and the nearby surrounding area

Step 2: WTG Data Inputs

The 115 WTGs were added to the model.

The base case layout shown in **Figure 2** was used for the assessment.

- The following Vestas V172-7.2 specification was added manually to the WindPRO WTG input data:
  - Hub Height – 166 m
  - Rotor Diameter – 172 m
  - Maximum Blade Chord – 4.35 m
  - Mean Blade Chord – 2.81 m
  - Chord at 90% blade length – 1.26 m

Step 3: Modelling the Area of Interest

- SLR reviewed the following guidelines when determining a suitable assessment distance for the area of interest:
  - Australian Draft Guidelines (EPHC, 2010): $265 * 4.35 = 1{,}153 \text{ m}$
  - DECC 2011: $10 * 172 = 1{,}720 \text{ m}$
  - WindPRO Default: $\frac{5 * 2.81 * distance\ to\ the\ sun}{1097780} = 1919 \text{ m}$
  - “20% Blockage” method: $680 * 2.81 = 1{,}910 \text{ m}$
  - German Regulations: $= 2{,}000 \text{ m}$

The WindPRO Default distance and 20% Blockage method and the German regulations are within 10% of each other (mean average assessment distance = 1,943 m) and greater than the EPHC and DECC recommendations.

SLR has chosen the WindPRO Default distance for the assessment (1,919 m). This distance provides enough conservatism and is expected to be sufficient to capture any areas of impact regarding the criteria set out in **Section 5.0**.

Step 4: Other Modelling Inputs

- A time interval of 1 minute was used across the whole year.
- For the Expected (Real-World) scenario, actual sunshine hours were included, based on cloudiness data sourced from nearby meteorological stations.

Table 2 Average Daily Sunshine Hours

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
9.21	9.53	7.37	6.15	3.35	2.25	2.41	3.58	4.99	7.12	8.1	8.49

- Similarly, for the Expected (Real-World) scenario, rotor orientation was allowed to vary based on the supplied wind frequency data.

The following was excluded:

- Vegetation screening close to any potentially impacted receivers was not taken into account, therefore producing a more conservative result.

6.2 Sensitive Receivers

Atmos Renewables has provided SLR with a building register (MAWF_10kmDwellingRegisterExclTowns_260309.shp) . Only non-host buildings from the register have been considered for this assessment as per the Draft National Guidelines for shadow flicker. These have been refined for this study by removing any abandoned dwellings and structures identified as sheds. This left 30 locations within 2 km of the WTG's which are shown in **Figure 4** below and listed in **Table 3.** As calculated in **Section 6.1** 2 km is slightly greater than the calculation area of the model (1,919 m). The receivers were modelled with a 360° field of view, i.e. an observer being able to look in all directions equally, rather than considering the orientation of the windows of a residence. This provides a level of conservatism in the model.

Figure 4 Sensitive Receiver Locations

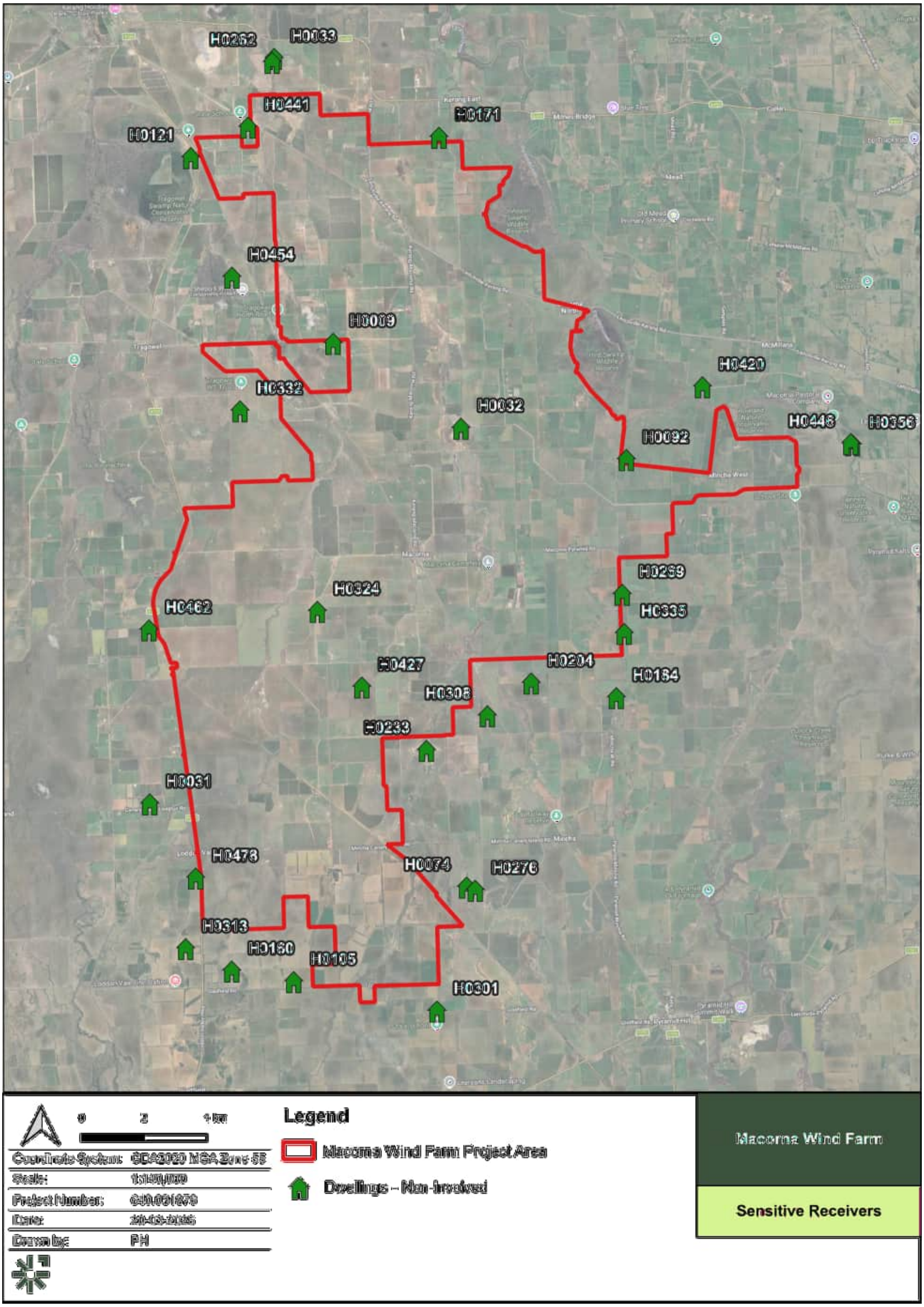


Table 3 Modelled Sensitive Receivers

ATMOS Dwelling Identifier	Nearest WTG
H0009	18
H0031	103
H0032	36
H0033, H0262	1
H0074, H0276	111
H0092	51
H0105	114
H0121	7
H0160	110
H0171	2
H0184	79
H0204	80
H0233	92
H0269	60
H0301	114
H0308	88
H0313	110
H0324	85
H0332	28
H0335	79
H0356, H0446	38
H0420	29
H0427	94
H0441	7
H0454	11
H0462	82
H0478	108

7.0 Shadow Flicker Results

The results of the shadow flicker modelling have been visualised in **Figure 5** for the Theoretical (Worst-Case) scenario and detailed in the following sections.

7.1 Theoretical (Worst Case) Results

Table 4 shows the key output results at each of the non-involved sensitive receivers in terms of:

- Theoretical (Worst-Case) Scenario:
  - Hours per year and (maximum) minutes per day.

Theoretical (Worst-Case) Scenario

- Shadow flicker in excess of 30 hours per year is not predicted for the 30 modelled sensitive receivers.
- The maximum limit of 30 minutes per day (worst-case day of the year) was also not exceeded.

Table 4 Shadow Flicker Results (Theoretical and Expected Scenarios)

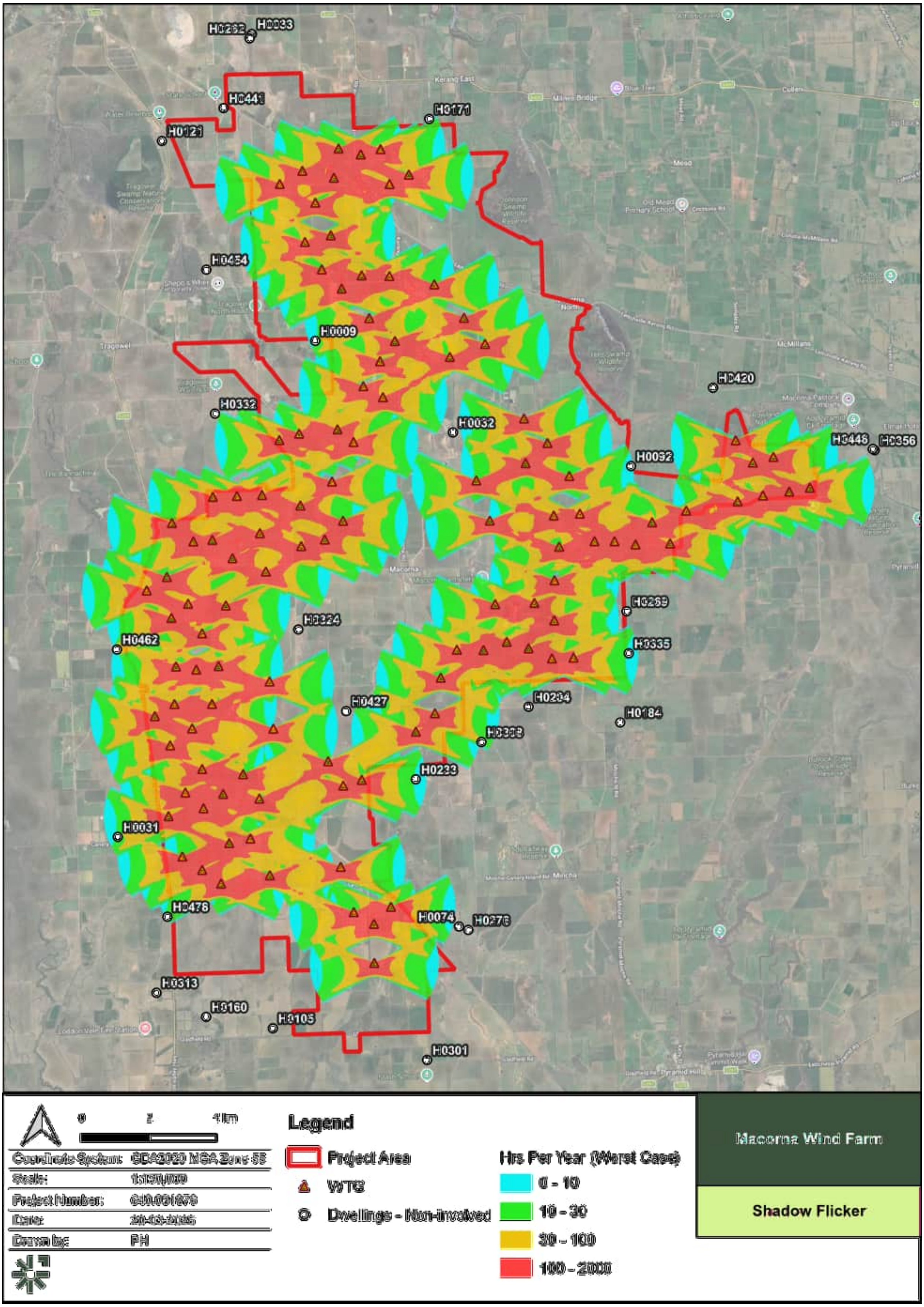
WindPRO ID	Project ID	Impacting WTG	Theoretical Shadow Flicker (hours/year)	Theoretical Shadow Flicker (max minutes/day)
A	H0009	18	10:37	24
B	H0031	103	12:01	25
C	H0032			
D	H0033			
E	H0074			
F	H0092	35	7:23	21
G	H0105			
H	H0121			
I	H0160			
J	H0171			
K	H0184			
L	H0204			
M	H0233	97	10:02	25
N	H0262			
O	H0269			
P	H0276			
Q	H0301			
R	H0308	88	26:28	27
S	H0313			

WindPRO ID	Project ID	Impacting WTG	Theoretical Shadow Flicker (hours/year)	Theoretical Shadow Flicker (max minutes/day)
T	H0324			
U	H0332			
V	H0335	79	9:39	25
W	H0356			
X	H0420			
Y	H0427			
Z	H0441			
AA	H0446			
AB	H0454			
AC	H0462	72, 82	24:41	23
AD	H0478	110	16:21	23

7.2 Theoretical (Worst Case) Map

In general, it can be seen that the majority of the WTGs are a sufficient distance from the non-involved dwellings and as a result there is no impact at many locations. Close up views of the results for the Project Area can be found in **Appendix D**.

Figure 5 Overall Modelling Results Theoretical (Worst Case) Scenario



7.3 Expected (Real-World) Results

As the Theoretical (Worst-Case) scenario did not show any exceedances the Expected (Real World) scenario does not necessarily need to be evaluated. However, it is shown here to provide an indication of what can be expected. **Table 5** shows the results at each of the non-involved sensitive receivers in terms of:

- Expected (Real-World) Scenario:
    - Hours per year.

Expected (Real-World) Scenario

The expected case taking into account weather and wind direction did not show any non-involved dwellings exceeding 10 hours per year.

Table 5 Shadow Flicker Results (Expected Scenario)

WindPRO ID	Project ID	Impacting WTG	Expected Shadow Flicker (hours/year)
A	H0009	18	2:33
B	H0031	103	2:59
F	H0092	35	2:39
M	H0233	97	3:12
R	H0308	88	4:04
V	H0335	79	3:17
AC	H0462	72, 82	6:35
AD	H0478	110	2:36

8.0 Mitigation

There are generally three options when it comes to mitigating the impacts of shadow flicker:

1. Physically moving the turbine causing the annoyance so the flickering effect no longer falls on the affected residence.
2. Implementing a screening element so there is no longer a line of sight between the viewer and the WTG.
3. Implementation of a shadow flicker control system which can shut down the offending WTG to ensure the allowable limits of duration are not exceeded. These systems work on a timer to pause turbine operation during times when the conditions enable flickering to occur. This includes sensors for light and the orientation of the rotor, which follows the wind direction, so that the WTG will continue to produce power when conditions are cloudy and/or the wind direction causes the rotor to be orientated is such a way that a shadow flicker event is not possible.

The results show that the requirements have been met, and no further mitigation will be required.

9.0 Blade Glint

Blade 'glint' involves the theoretical reflection of sunlight from a turbine blade as seen by an observer as a periodic flash of light. Blade glint is not generally caused by modern wind turbines given that non-reflective coatings are used for the surface of the blades. As stated in the EPHC Draft National Wind Farm Development Guidelines (2010), which provide guidance on blade glint:

> *"The sun's light may be reflected from the surface of wind turbine blades. Blade Glint has the potential to annoy people. All major wind turbine manufacturers currently finish their blades with a low reflectivity treatment. This prevents a potentially annoying reflective glint from the surface of the blades and the possibility of a strobing reflection when the turbine blades are spinning. Therefore, the risk of blade glint from a new development is considered to be very low."*

Assuming these treatments are used for the Project, blade glint is not expected to have an impact on any surrounding sensitive receivers.

10.0 Conclusion

Shadow Flicker Modelling

Shadow flicker studies normally distinguish between the predictions from two scenarios:

- An "idealised" scenario which involves calculations that do not take into account factors such as weather cloudiness, wind directionality, operational downtime, etc, which reduce the level of shadow flicker experienced by a receiver. These predictions can be considered a "theoretical worst-case" scenario.
- A "real-world" or "actual" scenario which does take into the real-world factors that influence the shadow flicker that would be experienced. These predictions can be considered an "expected" scenario.

Criteria

The widely accepted criteria for shadow flicker are:

- Theoretical Worst-case Scenario:
  - 30 hours per year and 30 minutes per day
- Expected Real-world Scenario:
  - 10 hours per year and 30 minutes per day

Baseline Study Results

The assessment evaluated the Theoretical and Expected shadow flicker from a maximum of 114 proposed WTG locations with respect to 30 sensitive receivers around and within the Project Area.

The Theoretical scenario modelling showed no exceedance of the shadow flicker criteria. The Expected scenario results (taking into account real-world factors such as cloudiness, wind directionality, etc) also showed no exceedance.

11.0 References

Business Enterprise & Regulatory Reform (BERR). 2009. Onshore Wind: Shadow Flicker [website]. Available at: http://webarchive.nationalarchives.gov.uk/20081013085503/http:/www.berr.gov.uk/whatwedo/energy/sources/renewables/planning/onshore-wind/shadow-flicker/page18736.html (Accessed May 2015). United Kingdom Department for Business Enterprise and Regulatory Reform

Department of Energy and Climate Change (DECC). 2011. Update of UK Shadow Flicker Evidence Base: Final Report. Parsons Brinckerhoff, London, UK, p. 5

Dyer A (2022) *2022 Annual Report of the Office of the Australian Energy Infrastructure Commissioner*, Australian Energy Infrastructure Commissioner, Commonwealth of Australia, accessed 15 October 2024. https://www.aeic.gov.au/sites/default/files/documents/2023-06/aeic-2022-annual-report.pdf

EPHC. 2010. *National Wind Farm Development Guidelines - Draft.* Guidelines, Adelaide: Environment Protection and Heritage Council.

Epilepsy Society. 2012. Wind Turbines and Photosensitive Epilepsy. Available at: http://www.epilepsysociety.org.uk/AboutEpilepsy/Whatisepilepsy/Triggers/Photosensitiveepilepsy/windturbines (Accessed May 2015). Last updated June 2012

National Health and Medical Research Council (NHMRC). 2015. Evidence on Wind Turbines and Human Health. Australian Government, February 2015

Appendix A WTG Location Data

Shadow Flicker Assessment

Macorna Wind Farm

Atmos MWV Pty Ltd

SLR Project No.: 640.031876.00004

16 April 2026

Revision: R02-v1.0

	Longitude	Latitude	Z [m]	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]
1	143.943817° E	-35.922239° N	85.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
2	143.945203° E	-35.955889° N	86.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
3	143.951650° E	-35.929768° N	84.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
4	143.950583° E	-35.918799° N	84.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
5	143.948677° E	-35.982735° N	88.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
6	143.949959° E	-35.963843° N	87.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
7	143.952666° E	-35.942796° N	85.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
8	143.952810° E	-35.904415° N	84.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
9	143.951763° E	-35.952823° N	85.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
10	143.952803° E	-35.993652° N	88.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
11	143.957284° E	-35.926118° N	85.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
12	143.954458° E	-35.976574° N	88.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
13	143.959311° E	-35.943795° N	85.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
14	143.959661° E	-35.909504° N	83.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
15	143.957338° E	-35.959496° N	85.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
16	143.961598° E	-35.934156° N	84.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
17	143.959201° E	-35.997422° N	88.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
18	143.960238° E	-35.970412° N	87.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
19	143.960276° E	-35.980930° N	88.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
20	143.964130° E	-35.953101° N	85.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
21	143.965904° E	-35.909274° N	84.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
22	143.966515° E	-35.897742° N	83.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
23	143.966663° E	-35.943034° N	84.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
24	143.966866° E	-35.977241° N	87.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
25	143.965273° E	-36.001225° N	88.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
26	143.969677° E	-35.926894° N	84.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
27	143.968357° E	-35.990425° N	88.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
28	143.972351° E	-35.914325° N	85.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
29	143.973636° E	-35.972149° N	87.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
30	143.974443° E	-35.897708° N	84.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
31	143.975387° E	-35.989413° N	87.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
32	143.981616° E	-35.907848° N	84.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
33	143.978722° E	-35.978821° N	87.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
34	143.981407° E	-35.999411° N	87.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0

	Longitude	Latitude	Z [m]	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]
35	143.982705° E	-35.897675° N	83.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
36	143.983181° E	-35.918140° N	84.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
37	143.983281° E	-35.947563° N	85.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
38	143.988940° E	-35.883093° N	82.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
39	143.995510° E	-35.881563° N	82.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
40	143.995064° E	-35.911635° N	83.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
41	143.999218° E	-35.811308° N	80.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
42	143.995182° E	-35.900806° N	83.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
43	143.999348° E	-35.830357° N	81.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
44	144.003149° E	-35.819932° N	80.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
45	144.001719° E	-35.969389° N	86.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
46	144.004590° E	-35.837835° N	81.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
47	144.002867° E	-35.910092° N	82.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
48	144.005820° E	-35.894647° N	83.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
49	144.007915° E	-35.828788° N	80.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
50	144.009502° E	-35.813433° N	81.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
51	144.004808° E	-35.997730° N	87.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
52	144.008165° E	-35.880719° N	82.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
53	144.006473° E	-35.976028° N	87.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
54	144.009057° E	-35.905227° N	83.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
55	144.010931° E	-35.843118° N	81.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
56	144.017628° E	-35.839754° N	81.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
57	144.008634° E	-36.009931° N	88.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
58	144.013302° E	-35.884255° N	82.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
59	144.012596° E	-35.974634° N	86.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
60	144.017089° E	-35.869408° N	82.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
61	144.018548° E	-35.807410° N	80.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
62	144.014884° E	-36.023672° N	88.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
63	144.019695° E	-35.851237° N	81.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
64	144.015164° E	-36.013248° N	88.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
65	144.022816° E	-35.862856° N	81.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
66	144.025094° E	-35.806156° N	80.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
67	144.023410° E	-35.872504° N	81.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
68	144.026749° E	-35.840170° N	80.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
69	144.020934° E	-36.008817° N	88.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
70	144.027896° E	-35.857570° N	81.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
71	144.037334° E	-35.957413° N	85.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
72	144.039605° E	-35.947963° N	85.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
73	144.041417° E	-35.842754° N	81.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
74	144.045184° E	-35.940621° N	84.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
75	144.053254° E	-35.895520° N	82.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
76	144.053926° E	-35.940926° N	84.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
77	144.058248° E	-35.928748° N	84.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
78	144.057293° E	-35.906366° N	83.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
79	144.061671° E	-35.938908° N	84.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
80	144.069539° E	-35.879318° N	81.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
81	144.068769° E	-35.940836° N	84.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
82	144.071135° E	-35.928722° N	84.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
83	144.076992° E	-35.886077° N	81.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
84	144.078369° E	-35.905515° N	83.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
85	144.077954° E	-35.922840° N	84.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
86	144.079837° E	-35.913903° N	83.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
87	144.076365° E	-35.943723° N	84.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
88	144.083852° E	-35.895075° N	82.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
89	144.086959° E	-35.905238° N	83.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
90	144.083473° E	-35.943684° N	84.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
91	144.077494° E	-35.933567° N	84.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
92	144.091513° E	-35.912716° N	83.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
93	144.098063° E	-35.912900° N	83.2	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
94	144.104951° E	-35.913895° N	83.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
95	144.110616° E	-35.908106° N	82.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
96	144.116336° E	-35.913905° N	83.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
97	144.121957° E	-35.905249° N	82.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
98	144.138866° E	-35.886858° N	82.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0

	Longitude	Latitude	Z [m]	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]
99	144.138929° E	-35.903214° N	83.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
100	144.144295° E	-35.892924° N	82.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
101	144.147321° E	-35.901832° N	83.0	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
102	144.151119° E	-35.891590° N	82.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
103	144.155984° E	-35.900966° N	82.9	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
104	144.162811° E	-35.900094° N	82.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
105	143.991670° E	-35.814658° N	79.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
106	144.011328° E	-35.805661° N	79.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
107	144.050828° E	-35.851937° N	81.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
108	143.984040° E	-35.960219° N	86.3	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
109	144.069634° E	-35.891278° N	82.6	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
110	144.030885° E	-35.962191° N	85.7	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
111	144.057489° E	-35.859095° N	81.8	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
112	144.027710° E	-35.815578° N	81.1	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
113	144.034138° E	-35.813191° N	80.5	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0
114	144.045795° E	-35.862280° N	81.4	VESTAS V172-7.2 7200...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	166.0

Appendix B Receptor Location Data

Shadow Flicker Assessment

Macorna Wind Farm

Atmos MWV Pty Ltd

SLR Project No.: 640.031876.00004

16 April 2026

Revision: R02-v1.0

No.	Longitude	Latitude	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	
A	144.001737° E	-35.856917° N	82.4	2.0	1.5	1.0	90.0	"Green house mode"
B	143.931768° E	-35.987873° N	89.2	2.0	1.5	1.0	90.0	"Green house mode"
C	144.046065° E	-35.882500° N	82.0	2.0	1.5	1.0	90.0	"Green house mode"
D	143.984020° E	-35.774355° N	79.6	2.0	1.5	1.0	90.0	"Green house mode"
E	144.043120° E	-36.014655° N	91.0	2.0	1.5	1.0	90.0	"Green house mode"
F	144.104252° E	-35.892928° N	85.1	2.0	1.5	1.0	90.0	"Green house mode"
G	143.980832° E	-36.040342° N	91.8	2.0	1.5	1.0	90.0	"Green house mode"
H	143.953461° E	-35.802189° N	82.0	2.0	1.5	1.0	90.0	"Green house mode"
I	143.958979° E	-36.036734° N	90.3	2.0	1.5	1.0	90.0	"Green house mode"
J	144.041378° E	-35.798493° N	81.0	2.0	1.5	1.0	90.0	"Green house mode"
K	144.098199° E	-35.961396° N	86.6	2.0	1.5	1.0	90.0	"Green house mode"
L	144.068202° E	-35.956472° N	85.9	2.0	1.5	1.0	90.0	"Green house mode"
M	144.030379° E	-35.974954° N	86.1	2.0	1.5	1.0	90.0	"Green house mode"
N	143.983249° E	-35.775486° N	79.5	2.0	1.5	1.0	90.0	"Green house mode"
O	144.101365° E	-35.931707° N	85.3	2.0	1.5	1.0	90.0	"Green house mode"
P	144.046147° E	-36.015653° N	89.7	2.0	1.5	1.0	90.0	"Green house mode"
Q	144.031290° E	-36.050078° N	90.2	2.0	1.5	1.0	90.0	"Green house mode"
R	144.052341° E	-35.965503° N	85.8	2.0	1.5	1.0	90.0	"Green house mode"
S	143.942893° E	-36.029870° N	90.4	2.0	1.5	1.0	90.0	"Green house mode"
T	143.993254° E	-35.933939° N	84.6	2.0	1.5	1.0	90.0	"Green house mode"
U	143.968080° E	-35.875532° N	83.1	2.0	1.5	1.0	90.0	"Green house mode"
V	144.101673° E	-35.942978° N	85.2	2.0	1.5	1.0	90.0	"Green house mode"
W	144.184434° E	-35.890579° N	82.6	2.0	1.5	1.0	90.0	"Green house mode"
X	144.131945° E	-35.872626° N	82.8	2.0	1.5	1.0	90.0	"Green house mode"
Y	144.008174° E	-35.956142° N	85.7	2.0	1.5	1.0	90.0	"Green house mode"
Z	143.973999° E	-35.793911° N	80.0	2.0	1.5	1.0	90.0	"Green house mode"
AA	144.183850° E	-35.890235° N	82.5	2.0	1.5	1.0	90.0	"Green house mode"
AB	143.966688° E	-35.836959° N	82.0	2.0	1.5	1.0	90.0	"Green house mode"
AC	143.933447° E	-35.937773° N	86.1	2.0	1.5	1.0	90.0	"Green house mode"
AD	143.947254° E	-36.009638° N	88.8	2.0	1.5	1.0	90.0	"Green house mode"

Appendix C Shadow Flicker Results

Shadow Flicker Assessment

Macorna Wind Farm

Atmos MWV Pty Ltd

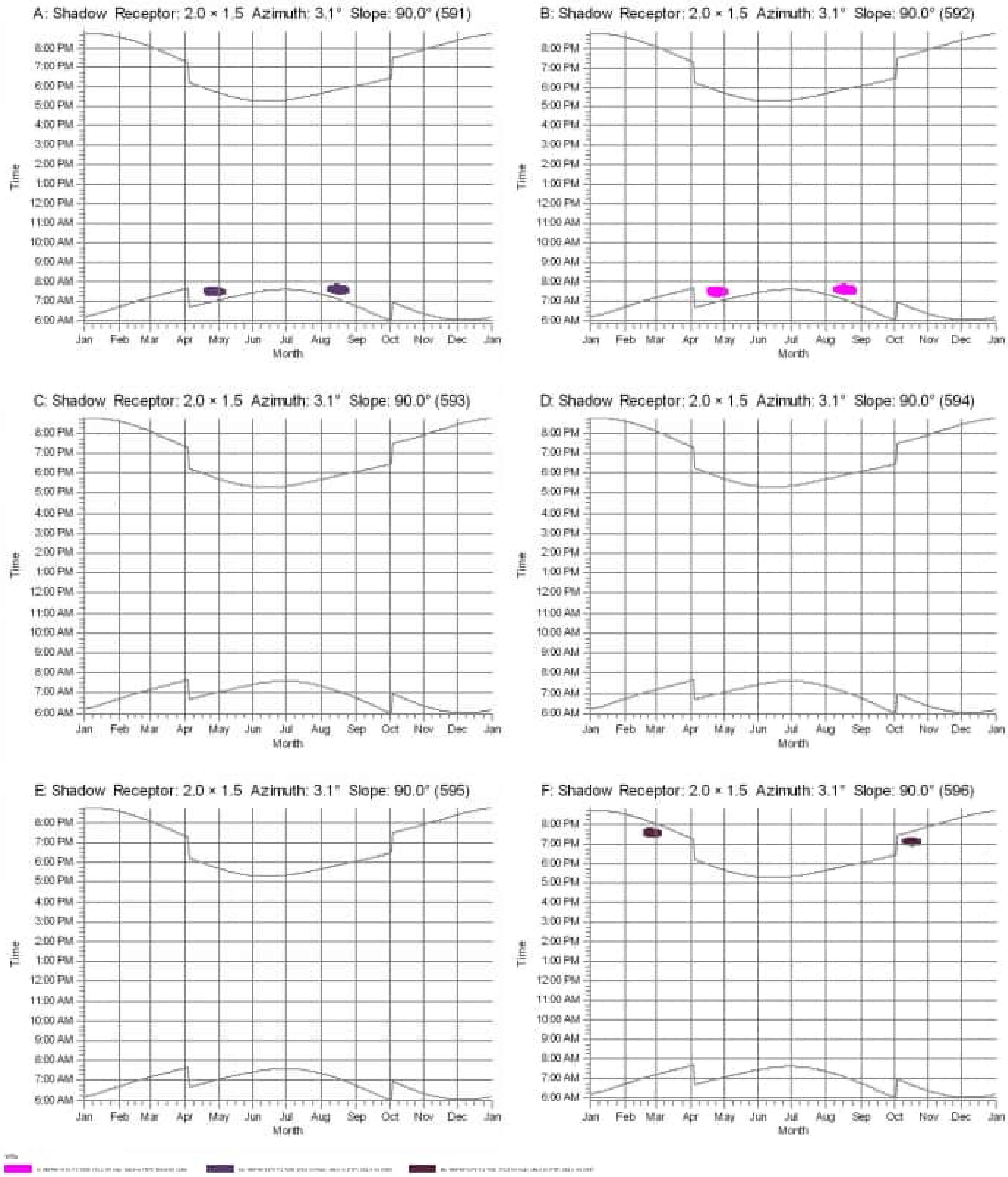
SLR Project No.: 640.031876.00004

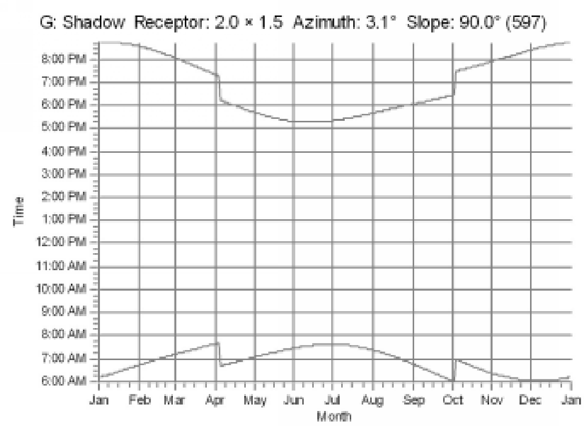
16 April 2026

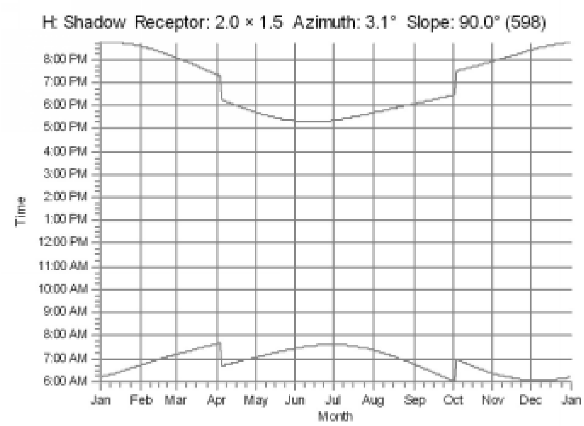
Revision: R02-v1.0

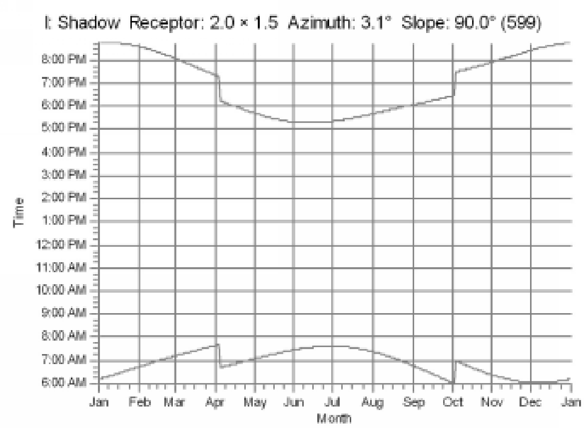
SHADOW - Calendar, graphical

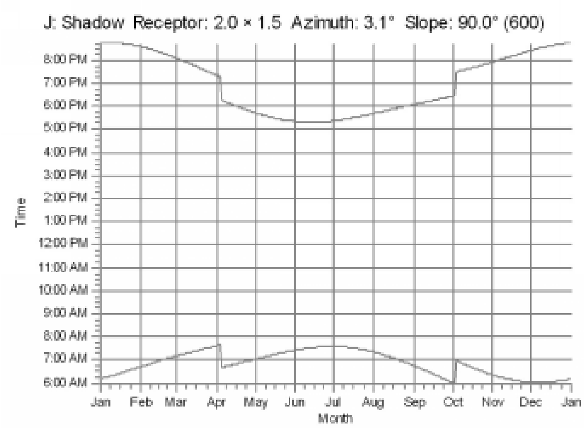
Calculation: V007A Assessment

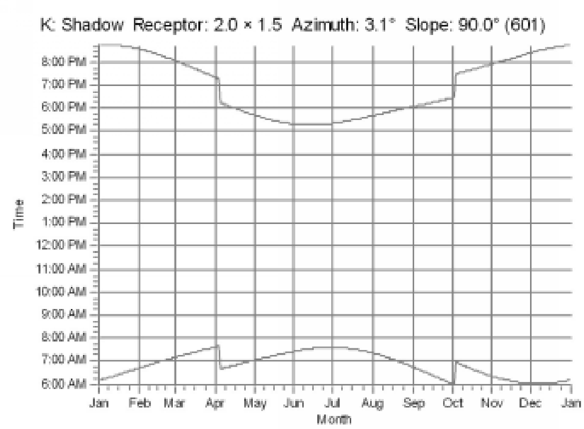


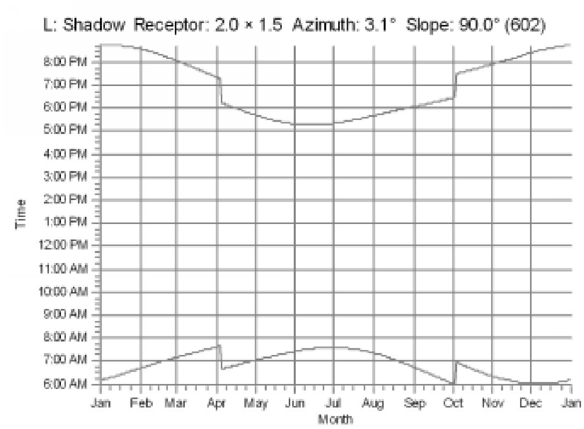

G: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (597)
Time
Month


H: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (598)
Time
Month


I: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (599)
Time
Month

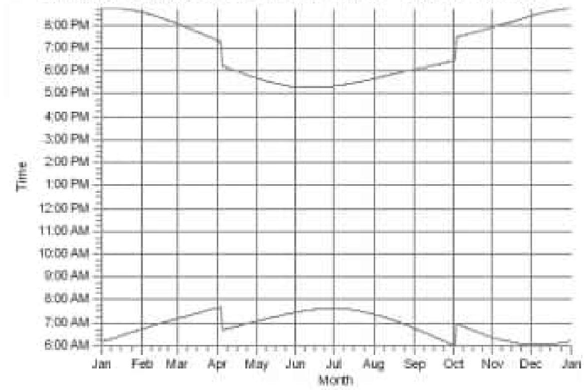

J: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (600)
Time
Month


K: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (601)
Time
Month

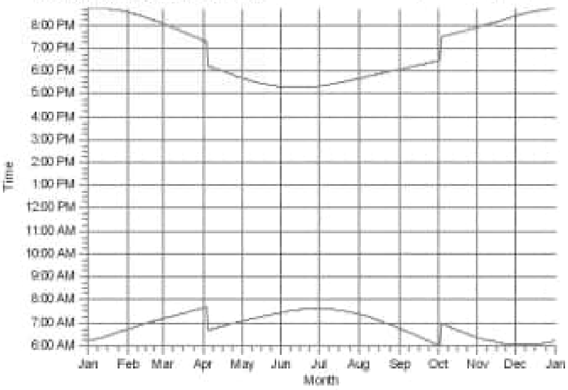

L: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (602)
Time
Month


M: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (603)
N: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (604)
O: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (605)
P: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (606)
Q: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (607)
R: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (608)
Time
Month
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan

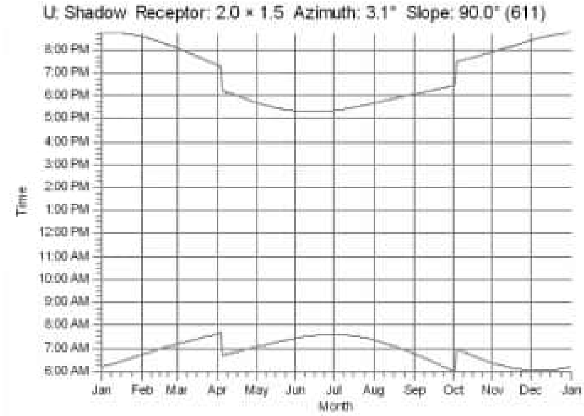
S: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (609)



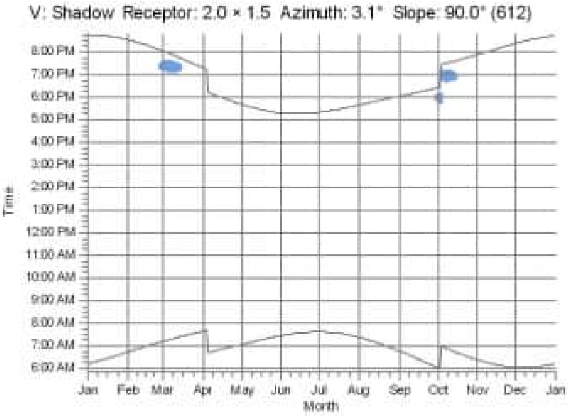
T: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (610)



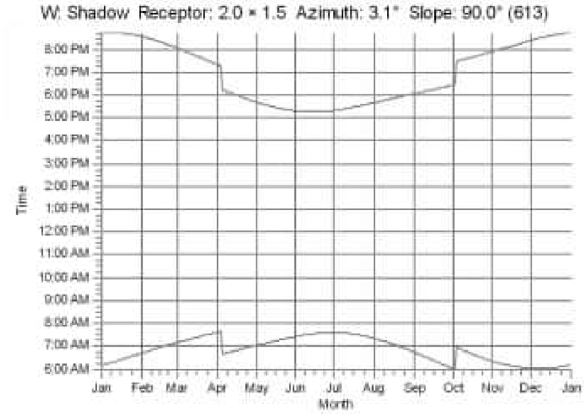
U: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (611)



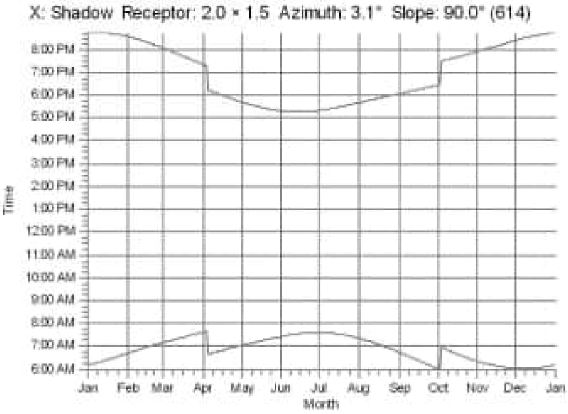
V: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (612)

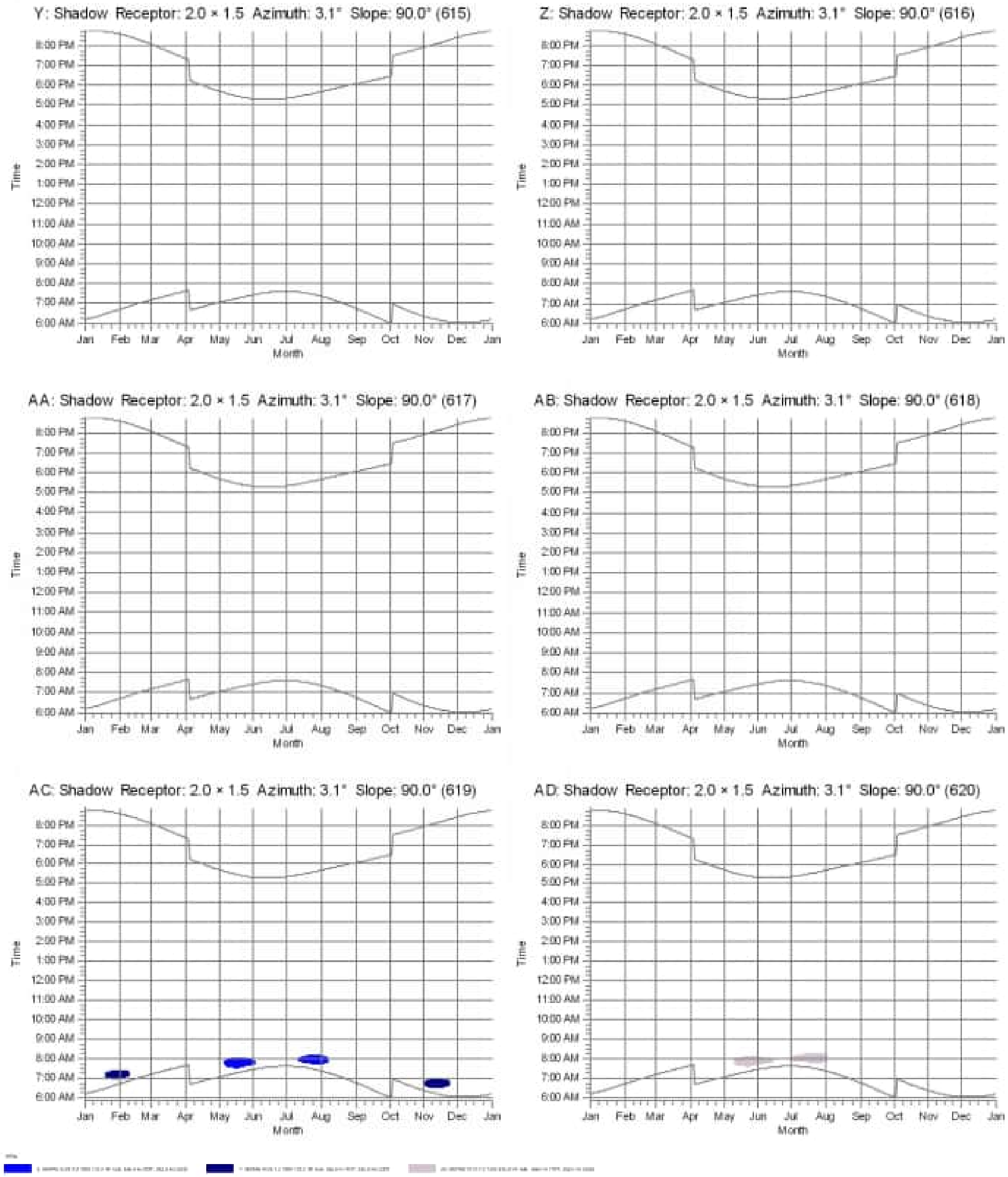


W: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (613)



X: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (614)




Y: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (615)
Z: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (616)
AA: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (617)
AB: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (618)
AC: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (619)
AD: Shadow Receptor: 2.0 × 1.5 Azimuth: 3.1° Slope: 90.0° (620)
Time
Month
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
6:00 AM 7:00 AM 8:00 AM 9:00 AM 10:00 AM 11:00 AM 12:00 PM 1:00 PM 2:00 PM 3:00 PM 4:00 PM 5:00 PM 6:00 PM 7:00 PM 8:00 PM

Appendix D Close up of Figure 5

Shadow Flicker Assessment

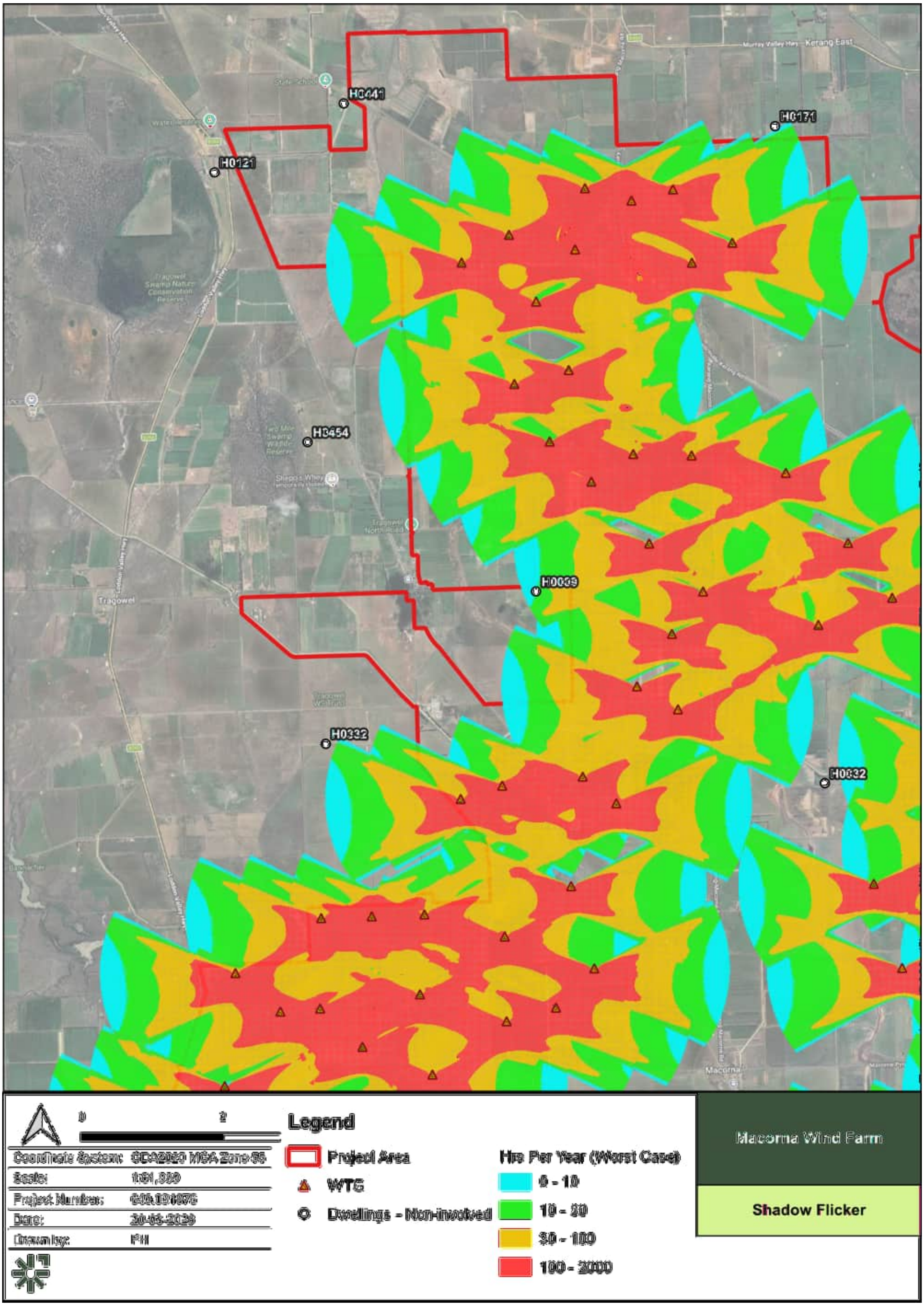
Macorna Wind Farm

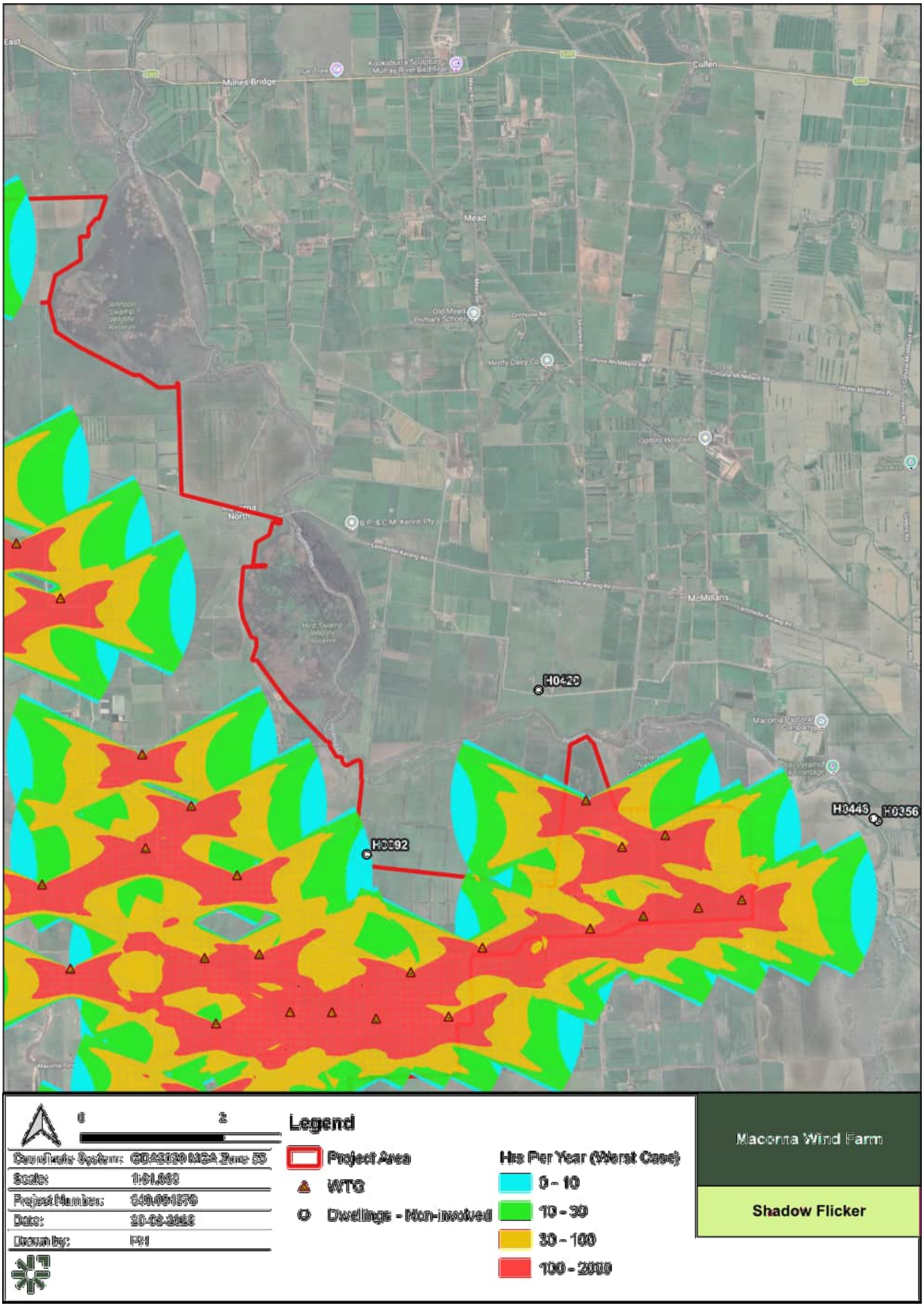
Atmos MWV Pty Ltd

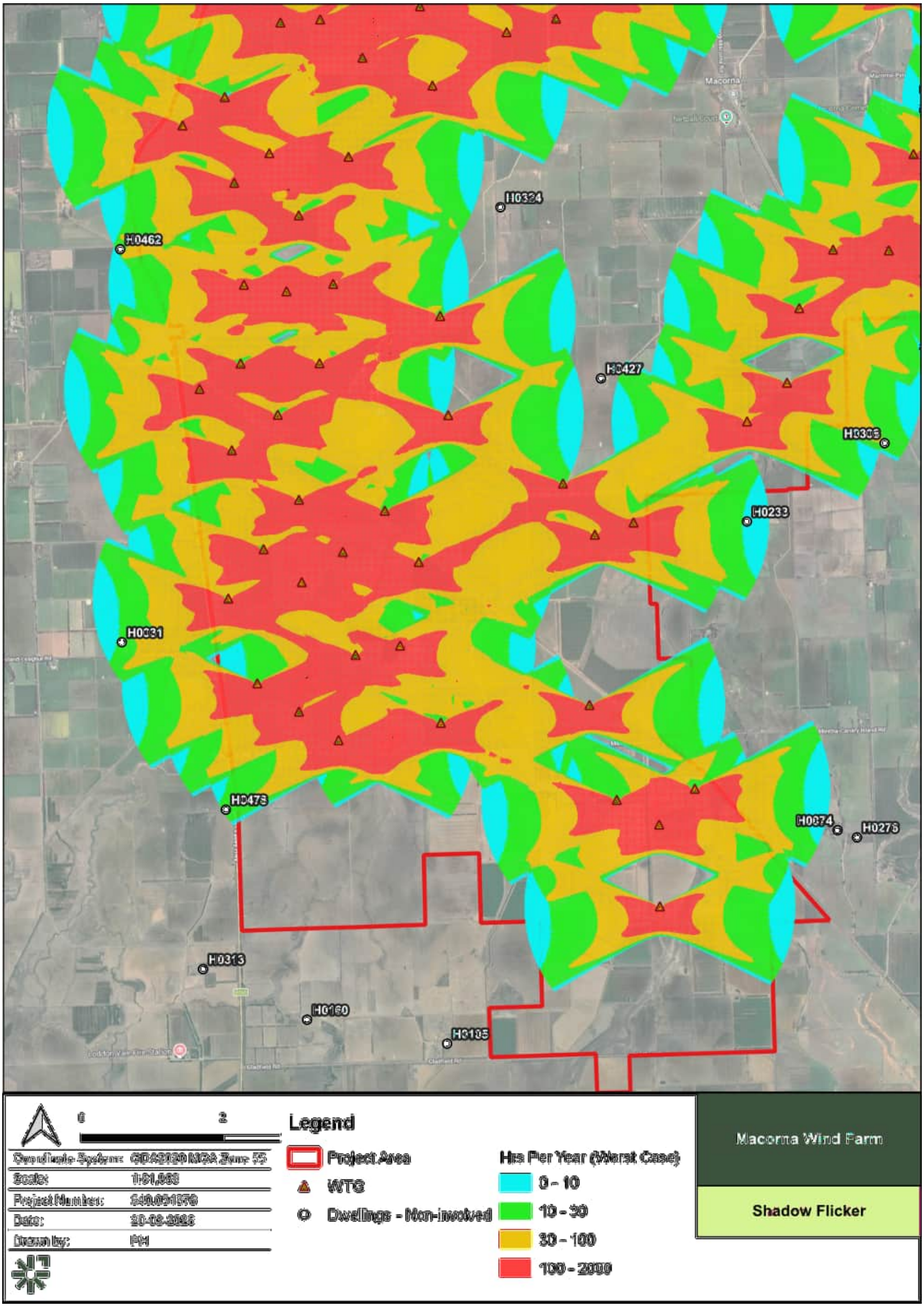
SLR Project No.: 640.031876.00004

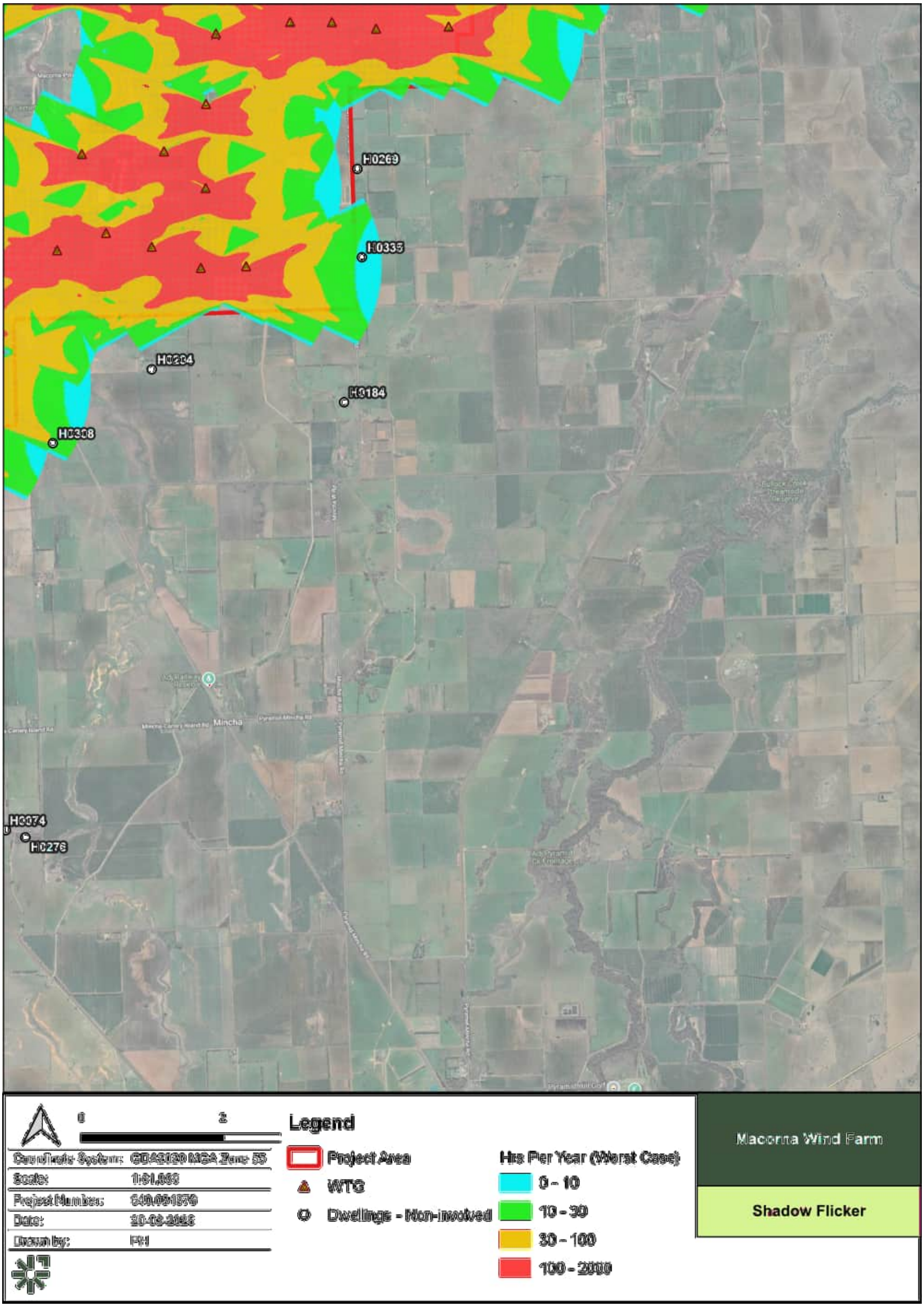
16 April 2026

Revision: R02-v1.0


H0441
H0171
H0121
H0454
H0009
H0332
Tragowel
Legend
Project Area
WTG
Dwellings - Non-involved
Hrs Per Year (Worst Case)
0 - 10
30 - 100
100 - 2000
Macorna Wind Farm
Shadow Flicker


H0420
H0092
H0445
H0356
Legend
Project Area
WTG
Dwellings - Non-involved
Hrs Per Year (Worst Case)
0 - 10
10 - 30
30 - 100
100 - 2000
Macorna Wind Farm
Shadow Flicker


H0324
H0462
H0427
H0233
H0478
H0313
H0160
H0105
Macorna
0
2
Legend
Project Area
WTG
Dwellings - Non-involved
Hrs Per Year (Worst Case)
0 - 10
10 - 30
30 - 100
100 - 2000
Macorna Wind Farm
Shadow Flicker


H0269
H0335
H0204
H0184
H0308
H0074
H0276
Mincha
0
2
Coordinate System: GDA2020 MGA Zone 55
Scale:
Project Number:
Date:
Drawn by:
Legend
Project Area
WTG
Dwellings - Non-involved
Hrs Per Year (Worst Case)
0 - 10
10 - 30
30 - 100
100 - 2000
Macorna Wind Farm
Shadow Flicker

Making Sustainability Happen