Moreton Hill Wind Farm

Shadow Flicker Assessment

MHWF Nominees Pty Ltd

10 February 2026

→ The Power of Commitment

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Acknowledgement of Country

GHD Pty Ltd respectfully acknowledges the Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. GHD is committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.

Executive summary

Project overview

The purpose of this report is to assess the potential shadow flicker impacts associated with the proposed Moreton Hill Wind Farm (the **Project**), located in the Central Highlands region of Western Victoria, approximately 35 km south-west from Ballarat. The Project will consist of 62 Wind Turbine Generators (WTGs), with a nameplate capacity of approximately 6.8 MW, delivering a total anticipated installed capacity of approximately 421 MW.

Technical assessments (including this assessment) prepared to support the Environment Report and Planning Permit Application have assessed a wind turbine layout consisting of 68 WTGs, including an additional six WTGs beyond the amount proposed for approval. This approach aims to provide future flexibility in the design evolution to respond proactively to technical assessment outcomes, consultation and design development, to maximise the application of the avoidance and minimisation hierarchy, and ultimately provide greater justification for the selection of the final 62 WTGs for approval. In doing so, the assessments will provide a worst case based on 68 WTGs, reporting on maximum probable impacts. As the Project will only seek planning approval to construct and operate up to 62 WTGs, the actual impacts from the Project will be less than reported in this assessment.

Methodology

GHD has undertaken a desktop-based shadow flicker assessment using the EMD WindPRO 4.1 software package utilising the wind turbine layout and sensitive receptor locations provided by MHWF Nominees Pty Ltd. This assessment has been undertaken in accordance with the methodology described in the Australian Draft National Wind Farm Development Guidelines. Calculations were completed for two scenarios; worst case and cloud cover-adjusted case (limit of 30 h/y and 10 h/y of annual shadow flicker as per the Draft National Guidelines, respectively).

Results

The calculation estimates that, in the worst case scenario, three sensitive receptors will experience a shadow flicker exceeding 30 hours per year within a 50 metre radius of the dwelling (an area assumed as the garden-fenced area). Under the cloud cover-adjusted scenario, all of these receptors are also anticipated to be exposed to more than 10 hours of shadow flicker annually. All of these three receptors are categorized as *Hosts*. GHD understands that these receptors have a signed option to lease agreement with the Project in place.

Mitigation measures

GHD has identified the key potential mitigation measure as possibly revising the turbine layout to minimise shadow flicker impacts on sensitive receptors.

Any changes to the layout would require an additional shadow flicker assessment.

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1. Introduction

MHWF Nominees Pty Ltd, a wholly owned subsidy of Squadron Energy and The Trustee for MHWF Trust (the Proponent), is proposing to develop Moreton Hill Wind Farm (the Project) in the Central Highlands region of Western Victoria within the Golden Plains Shire and Corangamite Shire local government areas (LGA), approximately 35 km south-west from Ballarat. The nearest townships are Skipton and Linton, approximately 5 km to the west and east of the Project site, respectively. The Project site is situated on land currently utilised for agricultural purposes, predominantly comprising dryland mixed farming activities, including sheep production, cattle grazing, and crop cultivation. The proposed Project site layout is shown in Figure 1 below.

Figure 1 Project site layout (turbines shown in red)

The Project will consist of 62 Wind Turbine Generators (WTGs), with a nameplate capacity of approximately 6.8 MW, delivering a total anticipated installed capacity of approximately 421 MW. Grid connection is proposed via a 15 km underground 220 kV transmission line connecting into Berrybank Terminal Station, integrating the Project into the National Electricity Market (NEM). A Battery Energy Storage System (BESS) is also proposed as a part of the Project.

The Proponent engaged GHD as an independent consultant to conduct a shadow flicker assessment in the vicinity of the Project site. Shadow flicker assessment was previously undertaken by DNV[1] in December 2023. In early October 2024 the Minister of Planning determined that the Project does not require an Environment Effects Statement (EES) under the *Environment Effects Act 1978* subject to conditions being met to assess and manage specific impacts. These conditions require the preparation of an Environment Report. The Project was also determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999*. The Project is being assessed via an Environment Report, which is an accredited process under the Assessment Bilateral Agreement between the Commonwealth and Victorian Governments. A Planning Permit Application has also been prepared in accordance with the *Planning and Environment Act 1987*, concurrent to the Environment Report.

[1] *MORETON HILL WIND FARM: Shadow Flicker Assessment and Blade Glint Assessment*. DNV, 21 December 2023

The Project layout has been revised since submission of referrals in April 2024 in response to biodiversity and community matters that have arisen. As a result, an updated assessment is required to reflect the revised layout, which is intended for submission as part of the Planning Permit Application.

While the Project will ultimately seek planning approval for up to 62 WTGs, this shadow flicker assessment considers the impact of all 68 WTGs present in the current layout and reports on the maximum probable impacts. This approach provides flexibility in the final layout selection. Submission of the Planning Permit Application is anticipated in Q1 2026.

1.1 Purpose of this report

The purpose of this shadow flicker impact assessment is to evaluate the potential shadow flicker effects on nearby dwellings (sensitive receptors) resulting from the operation of the Project. This report will support the Planning Permit Application.

1.2 Assessment context

Shadow flicker from wind farms is the result of turbine blade rotation casting intermittent shadows which can be observed as a flicker from the observer at a fixed ground position. The key impact associated with shadow flicker is the potential for it to cause nuisance to residents nearby to the wind farm.

Shadow flicker assessments aim to evaluate the indicative shadow flicker present from a proposed wind farm on nearby sensitive receptors. If there are exceedances in the prevalence of shadow flicker which are likely to cause a nuisance, mitigation measures can be applied to remove or reduce the amenity impacts of affected residents nearby to the wind farm.

2. Limitations

This report has been prepared by GHD for MHWF Nominees Pty Ltd and may only be used and relied on by MHWF Nominees Pty Ltd for the purpose agreed between GHD and MHWF Nominees Pty Ltd as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than MHWF Nominees Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by *MHWF Nominees Pty Ltd* and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

3. Methodology

The following methodology was used to complete the shadow flicker assessment.

1. Request for the following information from MHWF Nominees Pty Ltd:
   a. Turbine layout
   b. Turbine model technical parameters (including hub height, rotor diameter, tip height, maximum chord width)
   c. Sensitive receptors coordinates and agreement status (host, non-associated or neighbour)
   d. Height contours
2. Input of information into EMD windPRO 4.1 wind farm modelling software package
3. Selection of shadow flicker calculation parameters
4. Shadow flicker simulation
5. Reporting

3.1 Relevant documents and guidelines

GHD has conducted the shadow flicker modelling in accordance with the below guidelines:

1. *Draft National Wind Farm Development Guidelines; Part E,* 2010
2. Victorian Department of Transport and Planning – *Planning Guidelines for Development of Wind Energy Facilities, Section 5.1.2,* 2023 (Victorian guidelines).

The Draft National Wind Farm Development Guidelines nominate the limits for shadow flicker for both worst case scenarios and the expected case (cloud cover-adjusted) modelling scenarios. In addition, the Victorian guidelines stipulate 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 applicable limits are summarized in Table 1 below.

Table 1 Exposure limits for shadow flicker

Impact	Measure	Assessment procedure	Acceptable level	Applicable guideline
Visual Amenity[2]	Hours per year	Worst case	30 hours per year	*Draft National Wind Farm Development Guidelines; Part E*, 2010 Victorian Department of Transport and Planning – *Planning Guidelines for Development of Wind Energy Facilities, Section 5.1.2*, 2023
		"Actual" or "expected" (Cloud cover-corrected)	10 hours per year	*Draft National Wind Farm Development Guidelines; Part E*, 2010

Shadow flicker is first assessed using an ideal model (the "worst case"), which provides a conservative estimate of potential impact. If a dwelling is predicted to experience less than 30 hours of shadow flicker per year under this worst case scenario, no further assessment is typically required. However, if this threshold is exceeded, more detailed modelling must be carried out to account for factors such as cloud cover (the "cloud cover-adjusted" case). The exposure limit in the cloud cover adjusted model is 10 hours of shadow flicker per year.

This assessment therefore adopts the following approach for each sensitive receptor:

1. Model the worst case scenario and check compliance of the 30 h/y limit. If exposure is within this level, it is deemed in compliance with the guideline limits.

[2] The Draft National Guidelines refer to an annoyance criterion and the Victorian Guidelines refer to a visual amenity criterion.

2. Where exceedances of the 30 h/y limit are predicted, the impact of cloud cover will then be applied to model the “expected” case. Should the predicted level for this scenario be within the 10 h/y limit for these conditions, the receptor is deemed in compliance with the guideline limits
3. If the predicted exposure at the sensitive receptor is still above these limits, mitigation measures as outlined in Section 5 can be considered to bring exposure to within the limits stated.

3.2 Information provided

The information provided by MHWF Nominees Pty Ltd is summarised in Table 2 below:

Table 2 Provided information

Type	Filename	Date provided
Project overview	202504112 MHWF PD Overview Moreton Hill Wind Farm.docx	12 April 2025
Site layout	20250624 MHWF PPA-ER Layout rev 1 g.zip	8 January 2026
Receptor locations – unfiltered[3]	20250412 MHWF-GIS-DATAPACKAGE-Building_Register.zip	12 April 2025
Receptor locations – filtered, updated[4]	MHWF-01-GIS-Dwellings-20250529-000.zip	29 May 2025

MHWF Nominees Pty Ltd has requested a generic WTG configuration to be modelled for this assessment, with specifications as summarised in Table 3 below. The coordinates of the turbine locations are included in Appendix A.

Table 3 WTG specifications

Part	Dimension
Maximum blade chord width	4.3 m
Hub height	166 m
Rotor diameter	172 m
Tip height	252 m

3.2.1 Assessment area

The locations of dwellings in the vicinity to the project area boundary are indicated in Figure 2 below, along with the WTG locations and project boundary.

[3] Building register containing non-dwellings (sheds, ruins, sport centres, etc). This layer was not used in this assessment.
[4] Filtered building register containing dwellings only, i.e. sensitive receptors. This layer was used in this assessment.

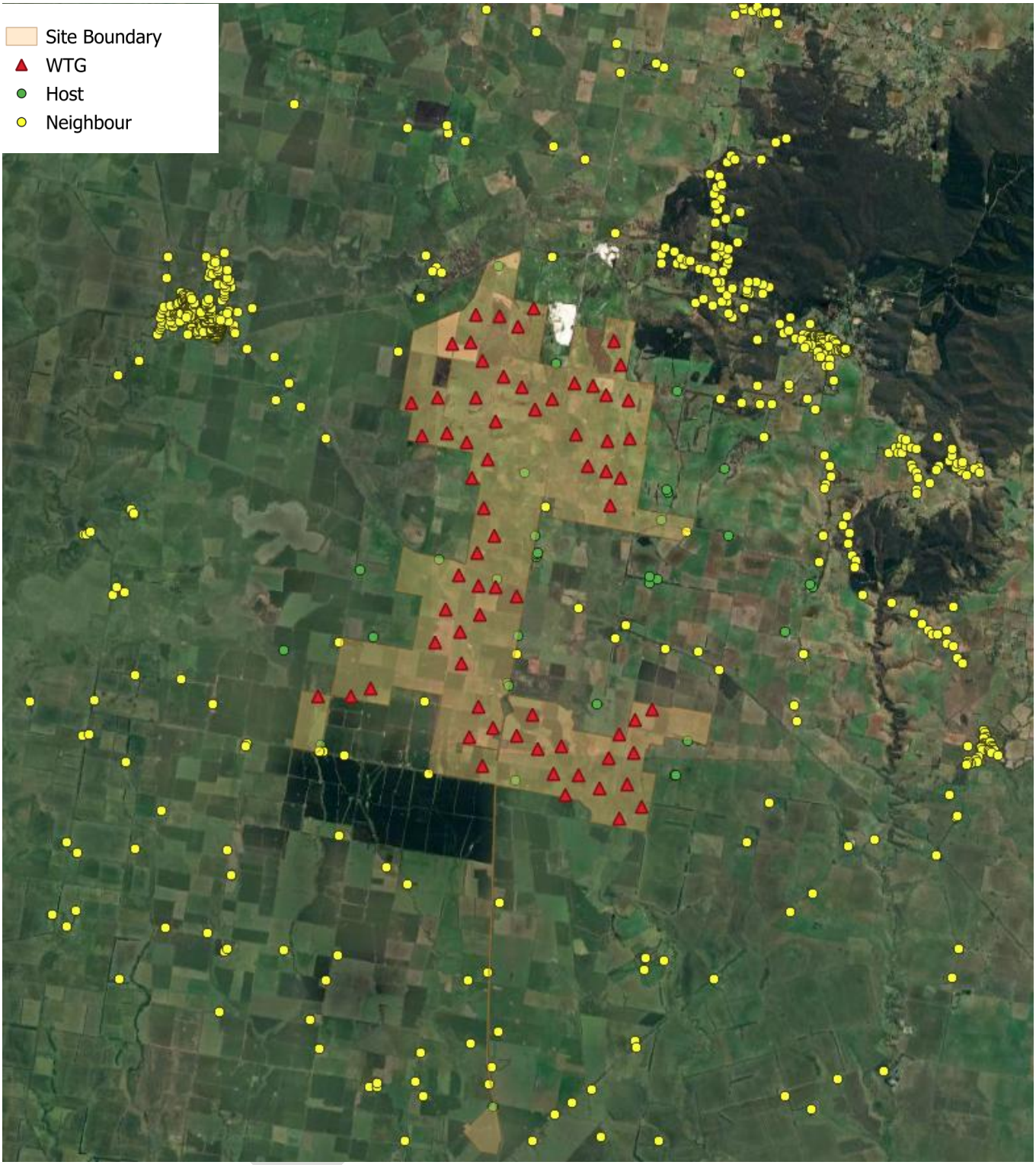

Figure 2 *Project area and sensitive receptors*

As per the Draft National Guidelines[5], the shadow flicker assessment must determine the zone of influence of shadow flicker from the turbines based on 265 m x maximum blade chord length, in this Project's case:

$$Distance = 265[m] * 4.3[m] = 1{,}139.5\ [m]$$

The Victorian guidelines[6] require consideration of shadow flicker experienced immediately surrounding the area of a dwelling (garden-fenced area). In line with the Draft National Guidelines, which require the assessment to report

[5] *National Wind Farm Development Guidelines - Draft*. EPHC, Jul 2010
[6] *Planning Guidelines for Development of Wind Energy Facilities*. Department of Transport and Planning, Sep 2023

the maximum value of shadow flicker duration within 50 m of the centre of a dwelling, a conservative buffer zone of 1,200 m was considered in this assessment to determine receptors relevant to the Project. GHD has applied the buffer zone to the Project boundary (excluding the grid connection route), rather than to the individual WTGs, to allow for maximum flexibility in the potential future changes to the layout. This buffer zone, which includes 57 sensitive receptors relevant for the Project, is shown in Figure 3 below. Coordinates of these sensitive receptor locations are included in Appendix B.

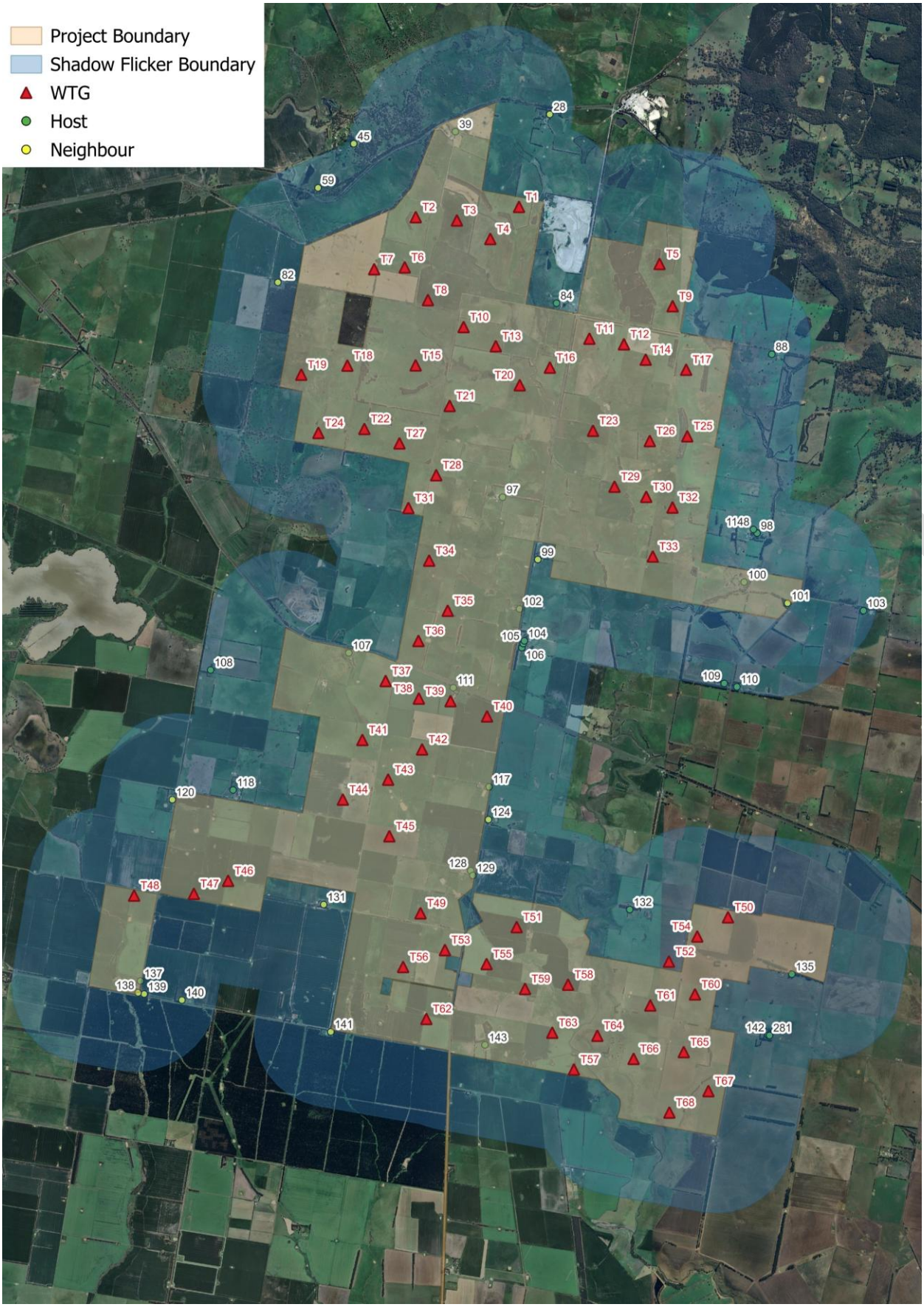

Figure 3 *Relevant sensitive receptors within the buffer zone (blue)*

The provided dwellings are sorted into the Host/Neighbour types as per the “TypeOfInvo” attribute from the provided shape file.

As per the information received from the Proponent, it is understood that the *Host* receptors have an agreement with the Project, which may allow relaxation of the allowable shadow flicker duration for these stakeholders. Accordingly, GHD understands that receptors classified as category *Neighbour,* are the primary focus of this assessment.

3.3 Modelling settings and assumptions

All modelling and calculations were completed using a single project coordinate system (GDA2020 MGA94 Zone 54). All coordinates in this report are relative to this coordinate system. Where spatial information required for the assessment (including WTG and receptor locations) was provided in other coordinate systems, it was converted into the project coordinate system.

Publicly sourced height contour information from WindPRO; Australian Digital Elevation Model - 1 arc second, (10 m resolution) was used for this study.

Assumptions and settings used in the model can be found in Table 4 below.

Table 4 Assumptions and model settings

Model setting	Value	Reference
Zone of influence of shadow flicker	1,140 m	As per the draft national guidelines (265 x max blade chord width)
Minimum elevation of the sun to cause noticeable shadow flicker	3°	As per draft national guidelines
Reference year	2040	As per draft national guidelines (15 years after the DA submission, assuming the DA submission in 2025)
Time step	1 min (4 min for the map)	As per draft national guidelines (10 min or less)
Eye height	1.5 m	As per draft national guidelines
The rotor plane (yaw) is always perpendicular to the line from the WTG to the sun	Yes	As per draft national guidelines
All wind turbines blades are always rotating	Yes	As per draft national guidelines
Any vegetation blocking visibility of wind turbines has been neglected	Yes	As per draft national guidelines

3.3.1 Modelling receptors

The Draft Guidelines recommend that the shadow flicker duration be assessed by calculating and reporting the maximum value of shadow flicker duration within 50 m of the centre of a dwelling. For the 57 dwellings within the buffer zone, the assessment of shadow flicker was conducted by nominating 8 receptors (“assessment points”) surrounding the dwelling. These points are evenly spaced (every 45º) on 50 m radius circles centred on the provided dwelling locations as shown in Figure 4.

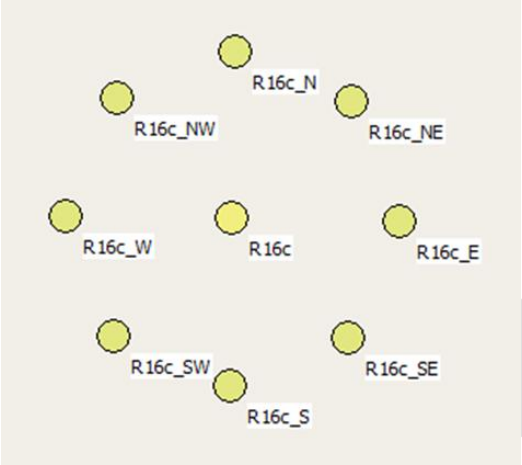

Figure 4 *Eight additional receptors located on a 50 m radius centred on provided dwelling location*

4. Calculations and results

4.1 Modelling results

The shadow flicker assessment was modelled using both a worst case and cloud cover-adjusted case. The worst case scenario obtained a shadow flicker model that was highly conservative as it assumes that the sun is always shining for the entire day (sunrise to sunset) with zero cloud cover. The cloud cover-adjusted case uses historical cloud cover statistics to account for periods where shadow flicker is unlikely due to cloud cover.

4.1.1 Worst case shadow flicker

The worst case theoretical shadow flicker calculation does not consider the following:

– Cloud cover
– Impact of wind direction on the orientation of the WTG during periods of potential shadow flicker, and whether this might reduce the shadow flicker experienced at the receptors (as opposed to the assumption that turbines will always be perpendicular to the sun)
– Any potential changes to the wind farm's operating regime to minimise operation of wind turbines contributing to shadow flicker
– Turbine down-time due to wind speeds below the cut-in wind speed
– Turbine down-time during maintenance
– Existing screening in the vicinity of affected properties (i.e. vegetation)
– Any vegetation blocking the visibility of wind turbines.

4.1.2 Cloud cover-adjusted case shadow flicker

The cloud cover-adjusted modelling differs from the worst case model in that the results are scaled according to the statistical likelihood of cloud cover[7] for different times of day and month of year. Cloud cover-adjusted case shadow calculations are based on a nearby weather stations.

Few Australian weather stations measure daily sunshine hours. In Victoria, there are 256 weather stations which record air temperature and only 20 weather stations which record sunshine duration. In the absence of long-term average cloud cover or sunshine hours statistics for the specific project location, historical cloud cover statistics from the three weather stations nearest to the Project were compared; Laverton, Hamilton and Melbourne Airport. Laverton weather station was selected for this analysis. Laverton is not only the closest station, but its values are also most closely aligned with the monthly averages of the three compared stations (see Table 5 and Figure 5).

Table 5 Considered weather stations

Station	Proximity to Project [km]	Data collection years
Laverton	109	1967-1993
Hamilton	128	1965-1987
Melbourne airport	117	1999-2024

[7] The cloud cover-adjusted case accounts for cloud cover but is otherwise identical to the worst case model.

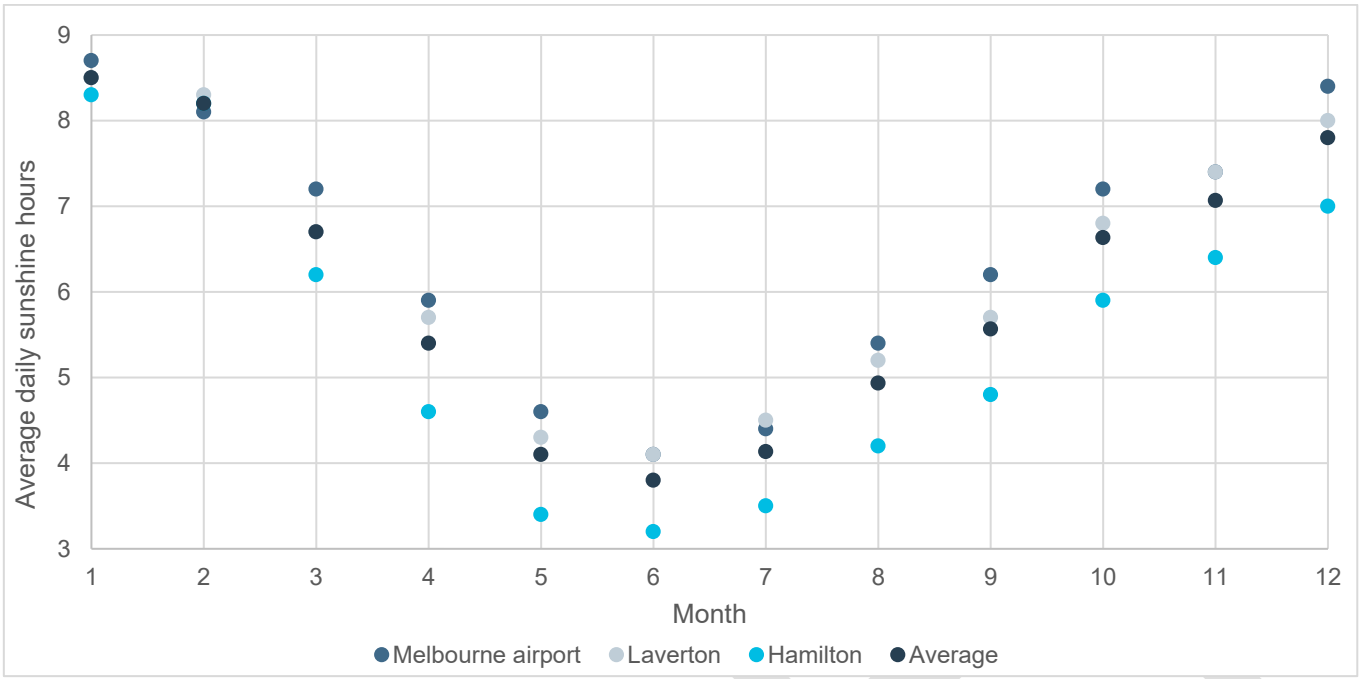

Figure 5 *Chosen weather stations – monthly values analysis*

4.1.3 Results summary

Table 6 depicts the results of the shadow flicker assessment at each sensitive receptor modelled for the following:

- Worst case annual shadow flicker at centre of a dwelling (i.e. the coordinates are as per provided shapefile);
- Worst case annual shadow flicker at the most affected assessment point of a given sensitive receptor (maximum shadow flicker within 50 m of the building), as further detailed in Section 3.3.1;
- Cloud cover-adjusted case annual shadow flicker at centre of a dwelling (i.e. the coordinates are as per provided shapefile); and
- Cloud cover-adjusted case annual shadow flicker at the most affected assessment point of a given sensitive receptor (maximum shadow flicker within 50 m of the building), as further detailed in Section 3.3.1.

In the worst case scenario, three receptors are expected to experience shadow flicker exposure of more than 30 hours per year (worst case) and 10 hours per year (cloud cover-adjusted case). All three are classified as *Hosts*. For receptors which are classified as *Hosts*, GHD understands an agreement may have been reached with the landholders, which are Project stakeholders. Shadow flicker for these receptors has been reported for completeness; however, it is not expected to present any significant issues to the Project.

Table 6 *Predicted shadow flicker duration at assessed sensitive receptor locations*

REF ID	Worst case: Shadow Flicker hours per year [HH:MM]	MAX[8] – Worst case: Shadow Flicker hours per year [HH:MM]	Cloud cover-adjusted case: Shadow Flicker hours per year [HH:MM]	MAX[8] – Cloud cover-adjusted case: Shadow Flicker hours per year [HH:MM]	"TypeOfInvo"
136	0:00	0:00	0:00	0:00	Neighbour
141	0:00	0:00	0:00	0:00	Neighbour
143	55:05	57:12	27:07	27:49	Host
137	0:00	0:00	0:00	0:00	Host
131	0:00	0:00	0:00	0:00	Neighbour
128	0:00	0:00	0:00	0:00	Host
129	0:00	0:00	0:00	0:00	Host

[8] Key values determining whether the limit is exceeded (30 h/y for the worst case, 10 h/y for the cloud cover-adjusted)

REF ID	Worst case: Shadow Flicker hours per year [HH:MM]	MAX[8] – Worst case: Shadow Flicker hours per year [HH:MM]	Cloud cover-adjusted case: Shadow Flicker hours per year [HH:MM]	MAX[8] – Cloud cover-adjusted case: Shadow Flicker hours per year [HH:MM]	"TypeOfInvo"
142	0:00	0:00	0:00	0:00	Host
135	0:00	0:00	0:00	0:00	Host
132	47:13	50:32	26:18	28:11	Host
121	0:00	0:00	0:00	0:00	Neighbour
123	0:00	0:00	0:00	0:00	Neighbour
124	0:00	0:00	0:00	0:00	Neighbour
117	0:00	0:00	0:00	0:00	Host
111[9]	113:44	144:52	62:22	79:55	Host
107	21:35	24:15	10:44	12:04	Host
118	0:00	0:00	0:00	0:00	Host
120	0:00	0:00	0:00	0:00	Neighbour
122	0:00	0:00	0:00	0:00	Host
108	0:00	0:00	0:00	0:00	Host
103	0:00	0:00	0:00	0:00	Host
125	0:00	0:00	0:00	0:00	Neighbour
139	0:00	0:00	0:00	0:00	Neighbour
138	0:00	0:00	0:00	0:00	Neighbour
140	0:00	0:00	0:00	0:00	Neighbour
39	0:00	0:00	0:00	0:00	Host
27	0:00	0:00	0:00	0:00	Neighbour
40	0:00	0:00	0:00	0:00	Neighbour
43	0:00	0:00	0:00	0:00	Neighbour
45	0:00	0:00	0:00	0:00	Neighbour
82	0:00	0:00	0:00	0:00	Neighbour
84	0:00	0:00	0:00	0:00	Host
97	23:10	25:17	11:26	12:28	Host
99	0:00	0:00	0:00	0:00	Neighbour
102	21:50	23:57	11:56	13:17	Host
106	0:00	0:00	0:00	0:00	Host
105	0:00	0:00	0:00	0:00	Host
104	0:00	0:00	0:00	0:00	Host
28	0:00	0:00	0:00	0:00	Neighbour
88	0:00	0:00	0:00	0:00	Host
35	0:00	0:00	0:00	0:00	Neighbour
36	0:00	0:00	0:00	0:00	Neighbour
59	0:00	0:00	0:00	0:00	Neighbour
113	0:00	0:00	0:00	0:00	Neighbour
112	0:00	0:00	0:00	0:00	Host
110	0:00	0:00	0:00	0:00	Host
100	0:00	0:00	0:00	0:00	Host

[9] We note that the provided shapefile includes a comment that this dwelling is to be demolished.

REF ID	Worst case: Shadow Flicker hours per year [HH:MM]	MAX[8] – Worst case: Shadow Flicker hours per year [HH:MM]	Cloud cover-adjusted case: Shadow Flicker hours per year [HH:MM]	MAX[8] – Cloud cover-adjusted case: Shadow Flicker hours per year [HH:MM]	"TypeOfInvo"
98	0:00	0:00	0:00	0:00	Host
63	0:00	0:00	0:00	0:00	Neighbour
101	0:00	0:00	0:00	0:00	Neighbour
96	0:00	0:00	0:00	0:00	Host
119	0:00	0:00	0:00	0:00	Neighbour
109	0:00	0:00	0:00	0:00	Host
175	0:00	0:00	0:00	0:00	Neighbour
171	0:00	0:00	0:00	0:00	Neighbour
281	0:00	0:00	0:00	0:00	Host
1148	0:00	0:00	0:00	0:00	Host

4.1.4 Shadow flicker maps

The following figures display the worst case and the cloud cover-adjusted shadow flicker maps with the calculated exposure in hours per year.

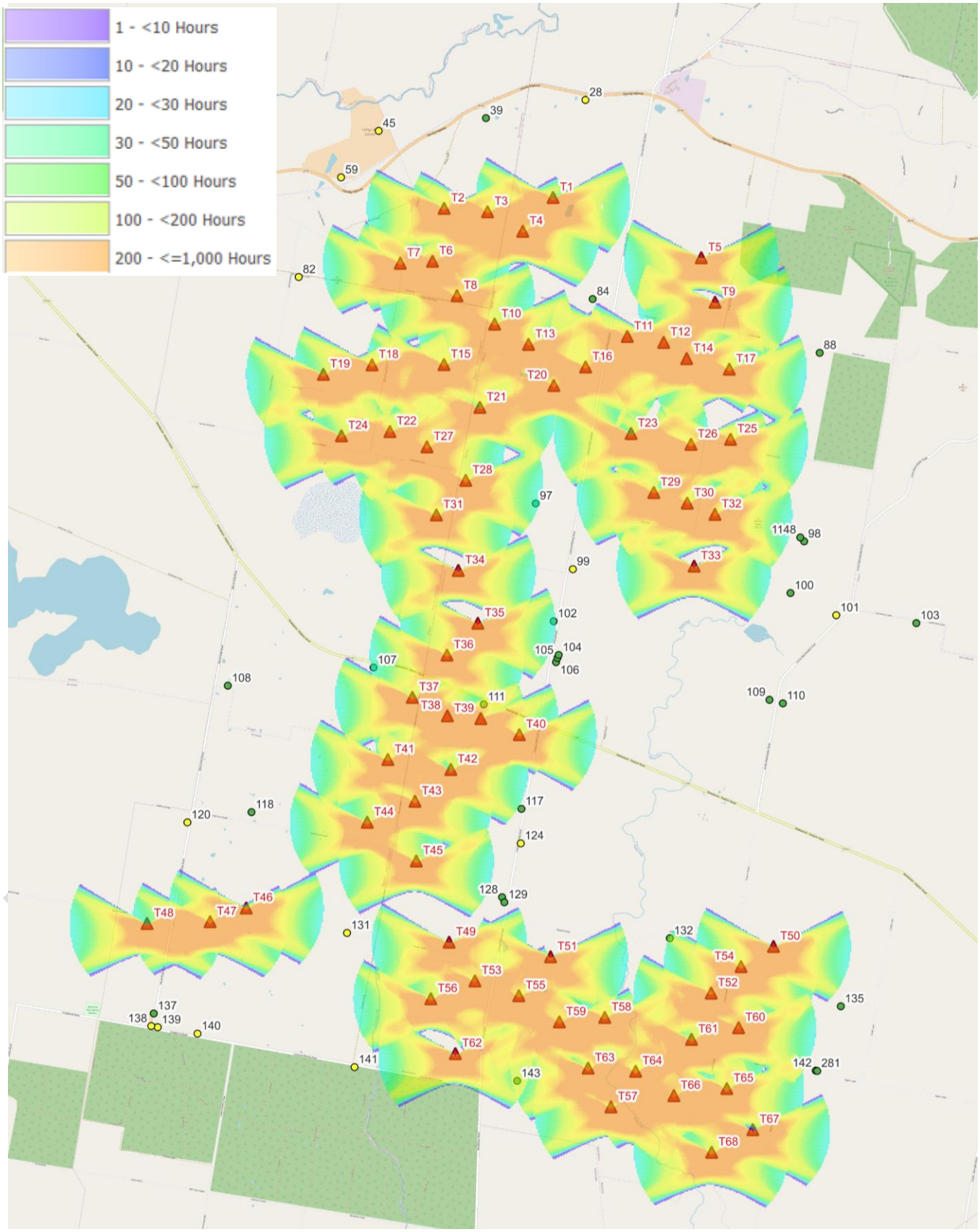

Figure 6 *Worst case shadow flicker map*

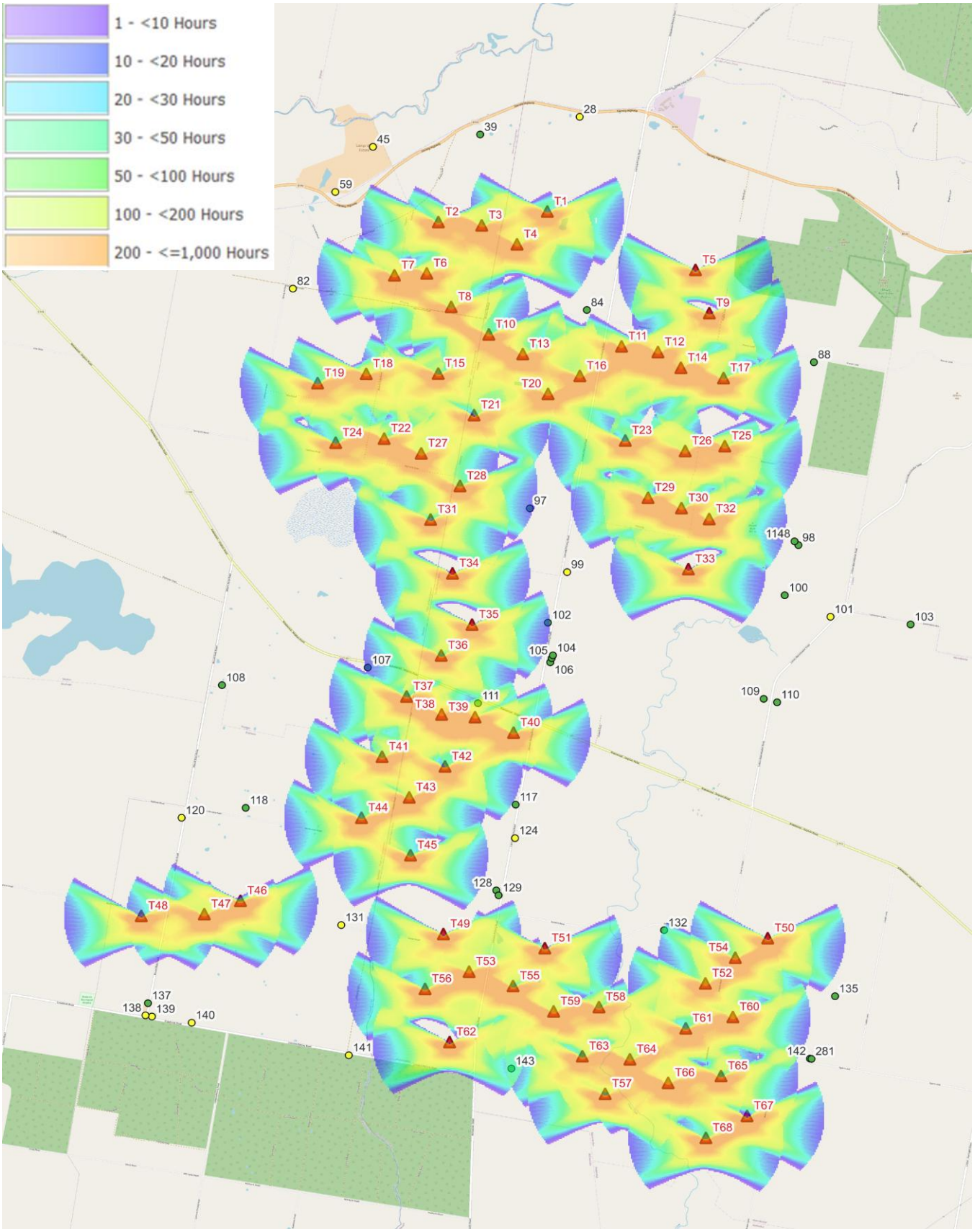

Figure 7 *Cloud cover-adjusted shadow flicker map*

5. Potential mitigations

5.1 Mitigation process

Once the potential shadow flicker impacts are identified, mitigation measures can be developed. Mitigation measures consider the 'mitigation hierarchy' to reduce or mitigate the significance of effects on the existing environment, particularly nearby sensitive receptors. As part of this process, where a mitigation measure from lower in the hierarchy is preferred, there must be justification for why controls from higher in the hierarchy cannot be applied. This mitigation hierarchy is illustrated in Figure 8.

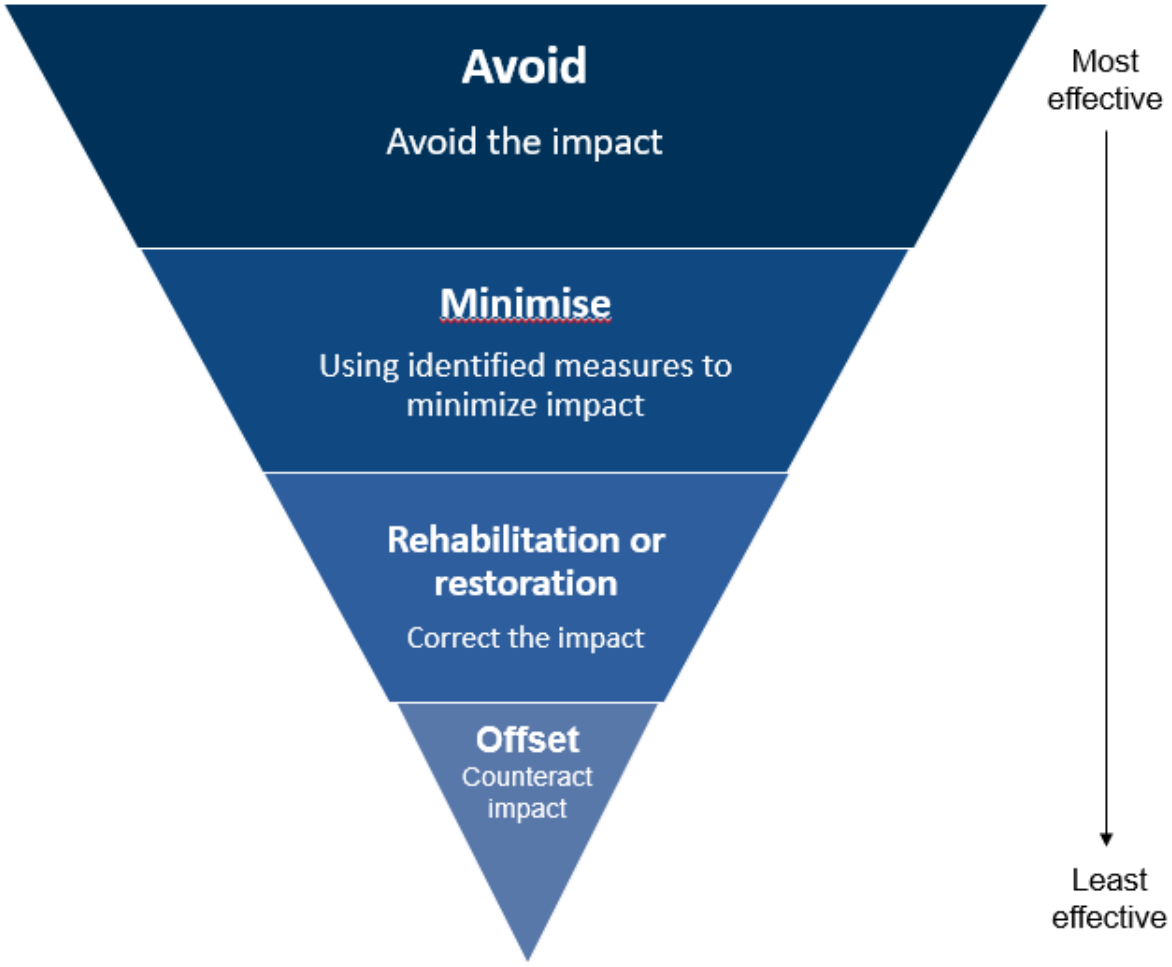

Figure 8 Mitigation hierarchy

Mitigation and contingency measures have been developed in accordance with the mitigation hierarchy with consideration of the level of potential impact. The focus of these mitigation measures is firstly avoiding impacts where possible (building upon the avoidance measures included in the design), and secondly, implementing project-specific measures to achieve acceptable outcomes.

5.2 Potential mitigation measures

This shadow flicker report evaluates the current WTG layout, consisting of 68 WTGs. As advised by the Proponent, approval will be sought for 62 WTGs, allowing the flexibility to remove 6 WTGs to avoid and minimise potential impacts (such as shadow flicker) as much as possible.

The assessment determined that, under the theoretical worst case scenario, three sensitive receptors (all stakeholders) would be exposed to shadow flicker exceeding the 30 hours-per-year threshold with the current 68 WTG layout. To address this, the WTG layout may be adjusted to reduce shadow flicker impacts, following the mitigation hierarchy outlined in Figure 8.

Potential mitigation measures to avoid, minimise, and manage potential adverse effects caused by shadow flicker are listed in Table 7.

Table 7 Potential shadow flicker mitigation measures

MM ID	Mitigation measure	Project component	Project phase
MM-SF01	The WTG layout may be revised to reduce shadow flicker impacts on sensitive receptors with modelled exceedances. If any changes to the WTG layout occur, a pre-construction shadow flicker assessment should be undertaken on the final WTG layout to determine potential effects of shadow flicker and ensure the layout is compliant. The assessment should be undertaken in accordance with the DTP Planning Guidelines for the Development of Wind Energy Facilities in Victoria (September 2023), and to the satisfaction of the responsible authority.	WTG	Development

6. Conclusion

This shadow flicker assessment has been completed in accordance with the Draft National Wind Farm Development Guidelines (2010) and Victorian Planning Guidelines (2023). Based on these reference documents, the calculated shadow flicker for three sensitive receptors identified by the Proponent exceeds the allowable limits. All three receptors are classified as *Hosts*. GHD understands that *Hosts* have signed option to lease agreements in place which allow for shadow flicker exposure exceeding the limits referenced in the guidelines. Furthermore, GHD understands that the receptor predicted to experience the most significant amount of shadow flicker hours (REF ID 111) is planned to be demolished.

These results have been derived based on the information provided by the Proponent, including the WTG layout, specifications and nearby sensitive receptors for the Project.

This assessment is based on the current WTG layout which consists of 68 WTGs however, the Project will ultimately seek planning approval for up to 62 WTGs. This approach aims to provide future flexibility in the wind farm design evolution to respond proactively to technical assessment outcomes, consultation and layout development and, ultimately, provide greater justification for the selection of the final 62 WTG layout for Project planning approval.

If any changes to the turbine layout occurs prior to construction, a pre-construction shadow flicker assessment should be undertaken to determine the potential effects of shadow flicker and ensure there are no exceedances.

Appendices

Appendix A

Wind turbine locations

Table A 1 The Project WTG Layout (Coordinate system: MGA94 GDA2020 EPSG 7854)

Turbine ID	Easting [m]	Southing [m]
T1	717599	5826548
T2	715995	5826389
T3	716634	5826338
T4	717153	5826051
T5	719781	5825662
T6	715824	5825609
T7	715349	5825580
T8	716184	5825101
T9	719984	5825006
T10	716738	5824683
T11	718692	5824502
T12	719228	5824415
T13	717238	5824385
T14	719566	5824176
T15	715993	5824088
T16	718078	5824053
T17	720194	5824020
T18	714933	5824084
T19	714217	5823944
T20	717610	5823780
T21	716521	5823458
T22	715197	5823101
T23	718747	5823072
T24	714483	5823039
T25	720212	5822987
T26	719629	5822913
T27	715742	5822877
T28	716313	5822383
T29	719082	5822204
T30	719574	5822047
T31	715881	5821873
T32	719982	5821882
T33	719676	5821120
T34	716203	5821056
T35	716491	5820278
T36	716037	5819810
T37	715527	5819187
T38	716043	5818915
T39	716535	5818874
T40	717102	5818638

Turbine ID	Easting [m]	Southing [m]
T41	715166	5818272
T42	716093	5818125
T43	715566	5817656
T44	714863	5817347
T45	715585	5816777
T46	713081	5816085
T47	712549	5815883
T48	711621	5815856
T49	716069	5815581
T50	720844	5815519
T51	717562	5815367
T52	719927	5814832
T53	716448	5815010
T54	720367	5815222
T55	717095	5814793
T56	715799	5814748
T57	718451	5813155
T58	718360	5814473
T59	717692	5814407
T60	720331	5814322
T61	719638	5814150
T62	716160	5813941
T63	718115	5813727
T64	718815	5813680
T65	720157	5813426
T66	719378	5813322
T67	720540	5812821
T68	719934	5812487

Appendix B

Sensitive receptor locations

Table B 1 Sensitive receptors within the buffer zone (with classifications as per provided shapefile)

REF ID	Easting [m]	Southing [m]	"Associated"	"TypeOfInvo"	"Occupancy"
136	709668	5814572	Non Associated	Neighbour	Main residence
141	714676	5813739	Non Associated	Neighbour	Main residence
143	717070	5813538	Associated	Host	Main residence
137	711720	5814529	Associated	Host	Main residence
131	714565	5815715	Non Associated	Neighbour	Main residence
128	716848	5816242	Associated	Host	Main residence
129	716882	5816167	Associated	Host	Main residence
142	721466	5813689	Associated	Host	Main residence
135	721836	5814636	Associated	Host	Derelict
132	719318	5815638	Associated	Host	Rental
121	721196	5817167	Non Associated	Neighbour	Main residence
123	722110	5817090	Non Associated	Neighbour	Main residence
124	717124	5817035	Non Associated	Neighbour	Main residence
117	717133	5817543	Associated	Host	Main residence
111	716578	5819082	Associated	Host	Farm manager/staff house
107	714955	5819624	Associated	Host	Main residence
118	713158	5817494	Associated	Host	Main residence
120	712214	5817344	Non Associated	Neighbour	Farm manager/staff house
122	710701	5817142	Associated	Host	Main residence
108	712809	5819357	Associated	Host	Derelict
103	722948	5820278	Associated	Host	Main residence
125	722687	5816586	Non Associated	Neighbour	Derelict
139	711778	5814327	Non Associated	Neighbour	Holiday house
138	711683	5814345	Non Associated	Neighbour	Holiday house
140	712363	5814232	Non Associated	Neighbour	Derelict
39	716611	5827715	Associated	Host	Main residence
27	714610	5827991	Non Associated	Neighbour	Farm manager/staff house
40	714900	5827690	Non Associated	Neighbour	Farm manager/staff house
43	714773	5827576	Non Associated	Neighbour	Farm manager/staff house
45	715032	5827527	Non Associated	Neighbour	Farm manager/staff house
82	713854	5825375	Non Associated	Neighbour	Main residence
84	718182	5825051	Associated	Host	Main residence
97	717343	5822040	Associated	Host	Main residence
99	717891	5821072	Non Associated	Neighbour	Main residence
102	717608	5820305	Associated	Host	Main residence
106	717643	5819703	Associated	Host	Main residence
105	717665	5819766	Associated	Host	Main residence
104	717682	5819809	Associated	Host	Main residence
28	718076	5827983	Non Associated	Neighbour	Main residence
88	721525	5824258	Associated	Host	Main residence
35	721114	5827783	Non Associated	Neighbour	Main residence
36	721549	5827775	Non Associated	Neighbour	Holiday house
59	714478	5826842	Non Associated	Neighbour	Farm manager/staff house

REF ID	Easting [m]	Southing [m]	"Associated"	"TypeOfInvo"	"Occupancy"
113	718827	5818286	Non Associated	Neighbour	Main residence
112	720780	5818984	Associated	Host	Main residence
110	720983	5819096	Associated	Host	Main residence
100	721095	5820721	Associated	Host	Main residence
98	721296	5821482	Associated	Host	Main residence
63	722057	5826715	Non Associated	Neighbour	Main residence
101	721769	5820394	Non Associated	Neighbour	Main residence
96	722848	5822136	Associated	Host	Main residence
119	719831	5817458	Non Associated	Neighbour	Main residence
109	720785	5819149	Associated	Host	Main residence
175	709631	5814475	Non Associated	Neighbour	Main residence
171	722725	5824039	Non Associated	Neighbour	Main residence
281	721489	5813684	Associated	Host	Main residence
1148	721239	5821540	Associated	Host	Main residence

We note that the coordinates listed in this table correspond to the centre of the dwelling, i.e. as per provided shapefile.

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