



Noise Impact Assessment

Macorna Wind Farm

Atmos MWV Pty Ltd

Prepared by:

SLR Consulting Australia Pty Ltd

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Basis of Report

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1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Atmos MWV Pty Ltd (Atmos) to undertake a detailed noise impact assessment for the proposed Macorna Wind Farm, located in northern Victoria. This assessment has been prepared to support the Environment Effects Statement (EES) referral and associated planning and environmental approval processes.

The purpose of this report is to assess the potential noise impacts associated with the construction and operation of the proposed wind energy facility and its ancillary infrastructure, including wind turbine generators (WTGs), electrical substations and battery energy storage systems (BESS). The assessment evaluates predicted noise levels at nearby noise-sensitive receivers and considers compliance with the relevant Victorian legislative framework, planning provisions, and technical guidance.

Operational wind turbine noise has been assessed in accordance with the *Environment Protection Act 2017*, the *Environment Protection Regulations 2021* (EPRs), and NZS 6808:2010 *Acoustics – Wind Farm Noise*, as guided by EPA Victoria Publication 3011 *Wind Energy Facility – Turbine Noise Technical Guideline* (EPA 3011) and Environment, Land, Water and Planning (DELWP) *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* (PGDWEF). Noise from ancillary infrastructure has been assessed using the *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (EPA Publication 1826.4). Construction noise has been considered with reference to EPA guidance, including EPA Publication 1834.1 – *Civil construction, building and demolition guide*, and the general environmental duty.

At this stage of project development, aspects of the wind farm design—including turbine model selection, final layout, and detailed construction methodology—remain subject to refinement. Accordingly, this assessment adopts conservative assumptions regarding turbine sound power levels, operational conditions, and construction activities to provide a robust evaluation of potential noise impacts. Where necessary, the assessment identifies matters that will require confirmation or refinement as the project design progresses.

This report should be read in conjunction with the accompanying figures, tables, and appendices, which document the assumptions, modelling inputs, predicted noise levels, and assessment outcomes. The findings of this assessment are intended to inform project design, regulatory decision-making, and the development of appropriate noise management measures for the Macorna Wind Farm.



2.0 Project Description

2.1 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.

2.2 Project 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 9km from proposed turbines.

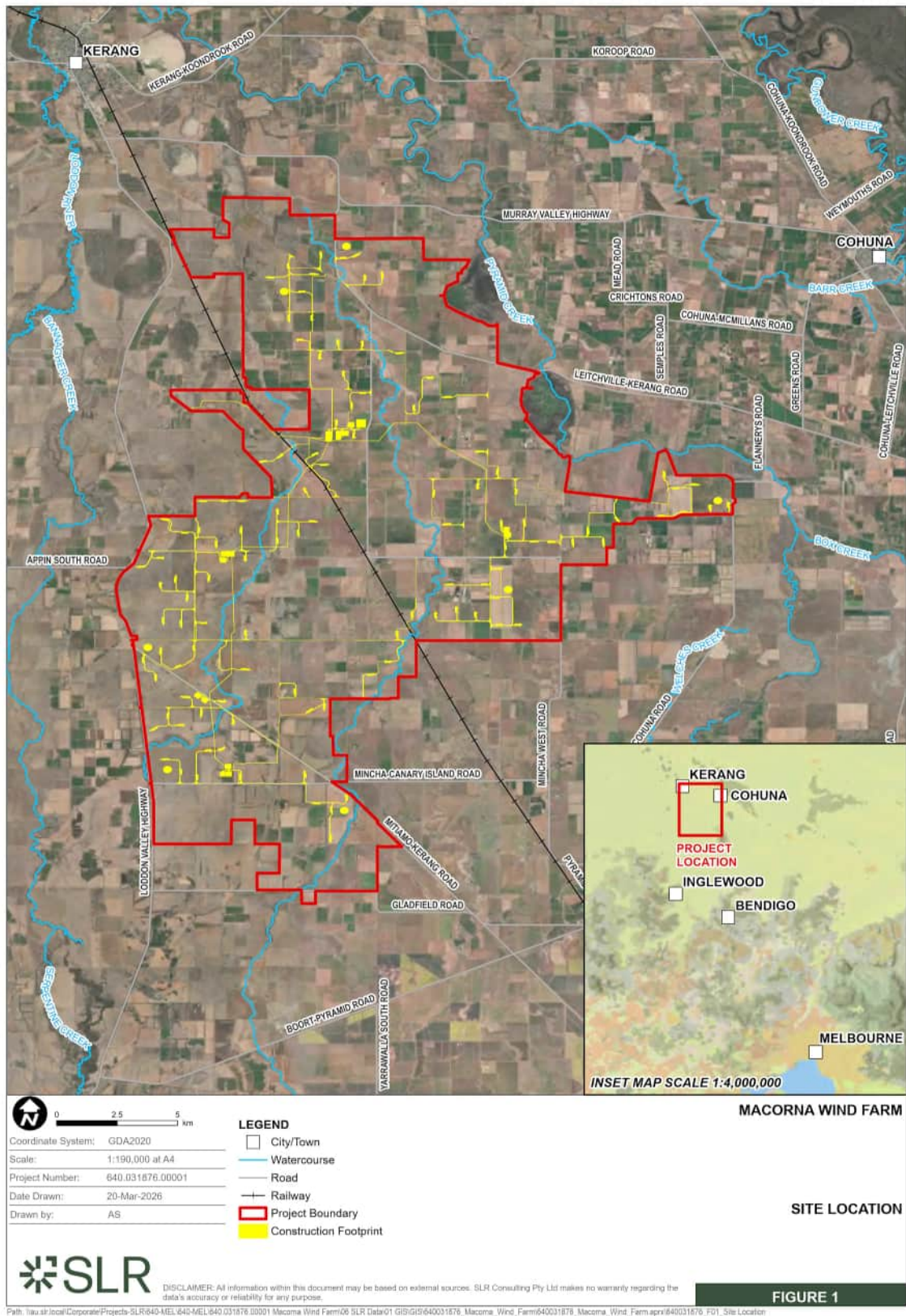
The Project Area is predominantly used for agricultural activities, including cropping, grazing and dairy farming. The landscape is generally flat and largely cleared of native vegetation, with small pockets of remnant vegetation remaining.

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 Area Overview



2.3 Project Components

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

2.3.1 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.

2.3.2 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.

2.3.3 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.

2.3.4 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.



2.3.5 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.

2.3.6 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.

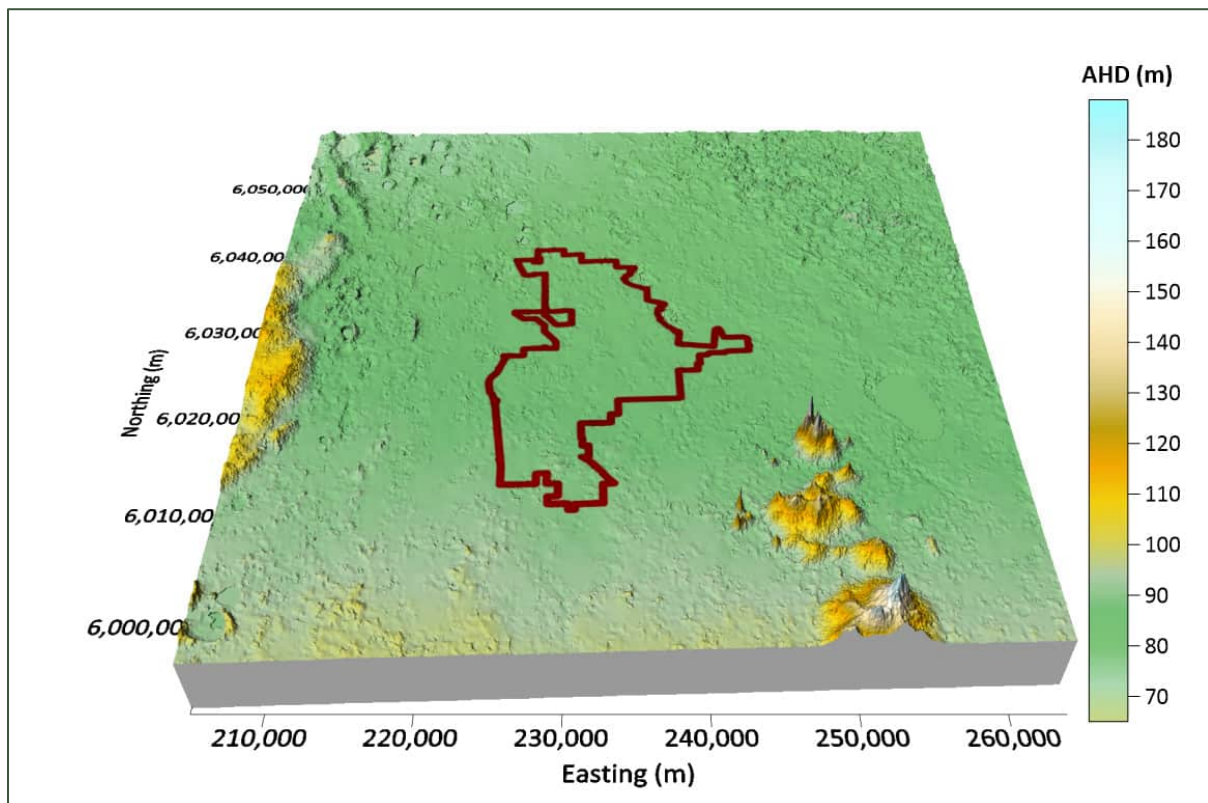


3.0 Site Conditions

3.1 Characteristics of the site

The topography of the area surrounding and including the Project is generally flat or gently undulating. **Figure 2** presents a three-dimensional representation of the topographical features in the area surrounding the Project site. Topographical features greater than 10 km to the southeast are unlikely to significantly influence winds in the vicinity of the Project.

Figure 2 Project Area Topography



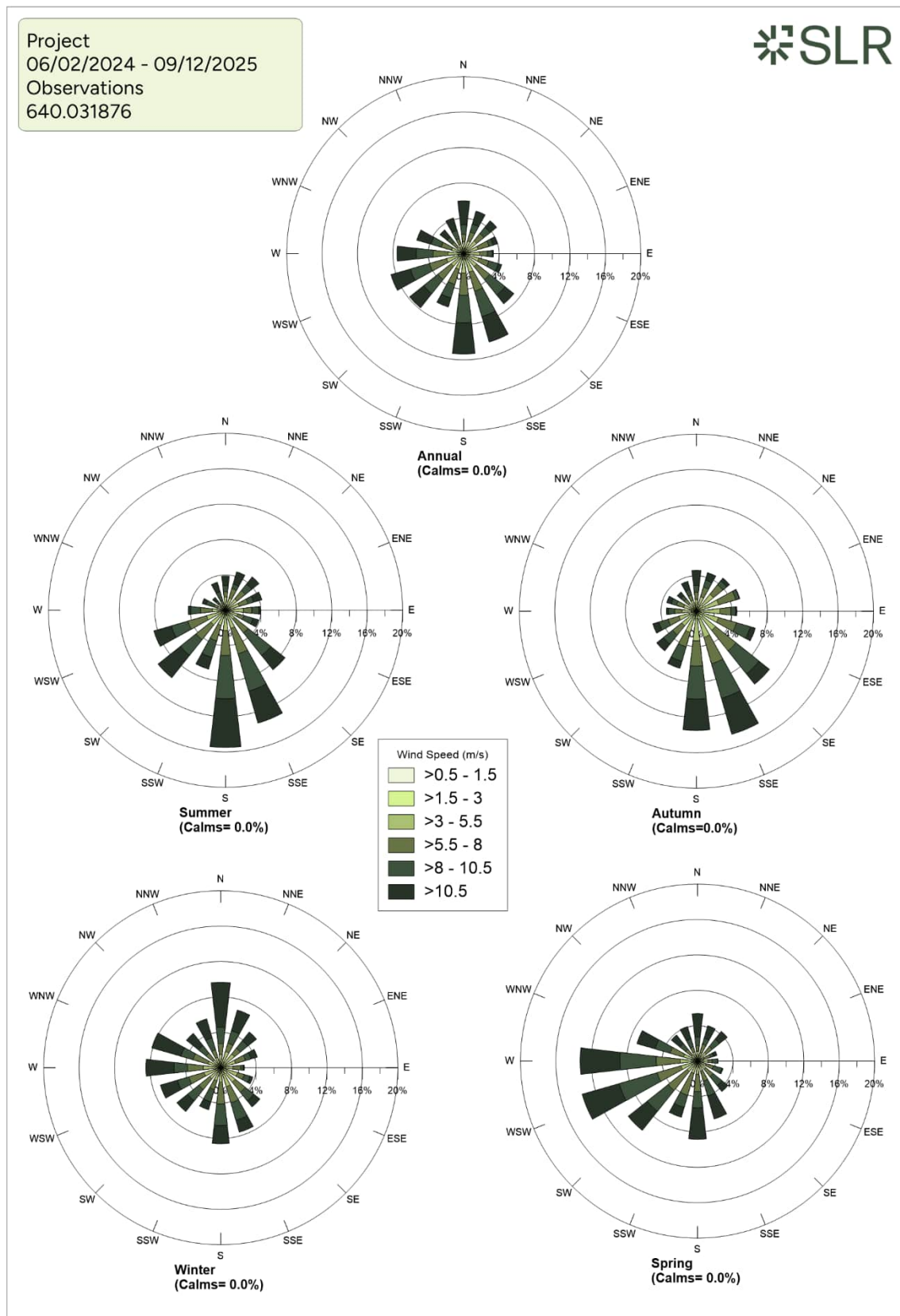
The project site has a number of natural water courses (Nine Mile Creek, Calivil Creek) and due to the relatively flat land, the region accommodates a network of irrigation channels. The west of the project site is bounded by the Loddon Valley Highway.

3.2 Wind Conditions

Annual and seasonal wind roses for the sites meteorological mast are presented in **Figure 3**. The wind roses depict winds at 150 above ground and show that annually winds from the south and southwest are relatively more prevalent. During summer and autumn winds are predominantly from the south east and south, however, in spring winds are predominantly from the west and southwest and during the winter months winds are more evenly distributed in all directions except the east.



Figure 3 Annual and Seasonal Wind Roses For Site Wind Mast (150m AGL)



3.3 Acoustic Environment

The ambient noise environment of the region is likely to be dominated by a combination of natural sources, (including: wind in foliage, insects & frogs, birds & livestock) as well as man-made sources, (including: farming plant & equipment, road traffic and domestic noise).

Baseline noise monitoring has not yet been completed for the project. It is expected that a comprehensive noise survey across the project area will be completed prior to project approval. Consequently, the noise limits used for this assessment will adopt the minimum noise limit, noting that at most sites at higher wind speeds, the noise limit is likely to be defined by the 'background + 5 dBA' provision of the policy, hence adopting the minimum noise limit at this stage of the project is considered a conservative approach.

3.4 Receiver Locations

This report applies the **Noise Sensitive Location** definition from NZS 6808:2010 *Acoustics – Wind Farm Noise for the assessment of wind turbine noise*, as required by EPA Victoria's guidance *Wind Energy Facility – Turbine Noise*, (EPA 3011). For noise associated with ancillary infrastructure (such as substations and BESS), the **Noise Sensitive Area** definition from Regulation 4 of the *Environment Protection Regulations 2021* (EPRs) has been adopted. Throughout this report, the terms receivers or noise sensitive receivers are used to describe locations assessed under these respective definitions.

The noise sensitive receivers within the project area are residential dwellings. There are more than 700 identified receivers located within 10 km of the proposed wind farm. A tabulated list of 284 receivers located within 5 km of a proposed WTG, representing those closest to the project, is provided in **Appendix A.1**.

Figure 4 presents the spatial distribution of the receivers considered in this assessment and a series of higher detail zoomed-in views with of the receiver labels are also provided in **Appendix A.2**. For the purposes of assessment and application of relevant noise criteria, receivers are classified into the following categories:

- **Host receivers:**

Residential dwellings located on land parcels that host one or more WTGs or other Project infrastructure. In accordance with EPA Publication 3011, host receivers are not defined as noise sensitive locations and are therefore not protected by the Standard. Notwithstanding this, and consistent with EPA guidance and industry good practice, noise levels at host receivers are evaluated for information purposes only, recognising their host status and the existence of commercial agreements between the Project and the landowner.

- **Involved receivers:**

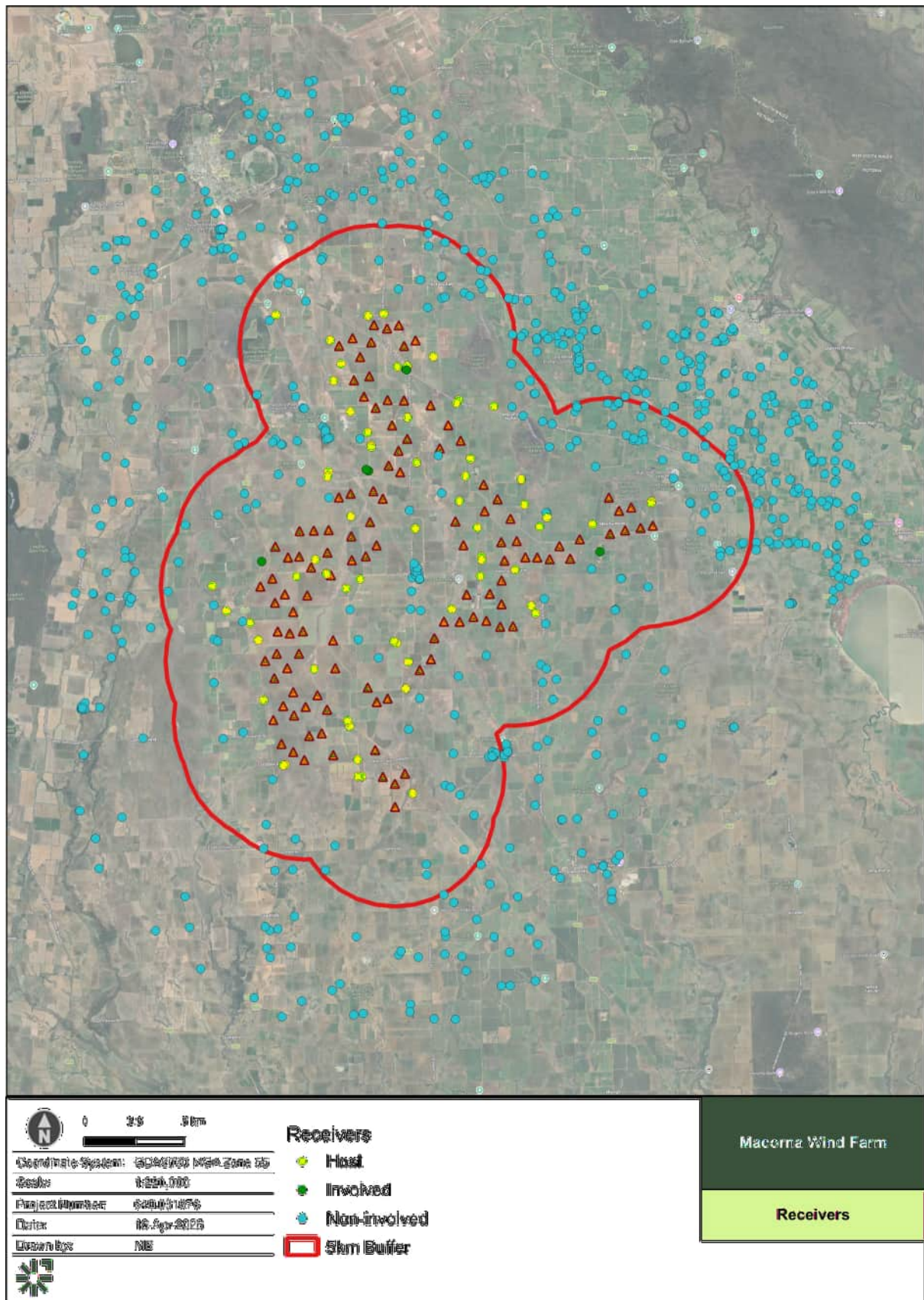
Residential dwellings located on neighbouring land parcels where a formal noise agreement is in place, or proposed to be in place, with the Project, in accordance with Regulation 131BA(2) of the *EPRs*. These agreements may specify alternative noise limits to those that would otherwise apply and are considered explicitly in the assessment of compliance.

- **Non-involved receivers:**

Residential dwellings located on neighbouring land parcels where no commercial or noise agreement exists with the Project. These receivers are assessed against the standard regulatory noise limits prescribed under NZS 6808:2010 and the *EPRs* and represent the most stringent compliance case for the Project.



Figure 4 Sensitive receivers



3.5 Assumed WTG Model

At this early concept stage of the project the WTG manufacturer and model has not yet been selected, and accordingly it is necessary to evaluate wind farm noise based on a typical turbine model that may comprise a layout. The layout presented in this report comprises 114 WTGs and assumes that WTG noise emissions are comparable to Vestas V172, 7.2 MW turbines.

This model WTG, like most modern turbines, is able to be operated in a multiple of reduced noise modes, whereby through an adaptive management measure the turbines normal operation can be altered by increasing its pitch angle and reducing the speed of rotation of the blades. Furthermore, it is available in both standard blade configuration as well as blades with a serrated trailing edge, which provides a reduced noise emission.

Noise emission data for the assumed WTG have been supplied by the manufacturer. The standard operational mode has a maximum sound power level of 111 dBA with standard blades, or 108 dBA when fitted with serrated trailing-edge blades, with additional noise management modes presented in **Figure 5** for hub-height wind speeds between 3 m/s and 15 m/s. The manufacturer's information indicates that the sound power levels for the standard blade configuration are derived from the Vestas V172 turbine IEC 61400-11 noise test data. Accordingly, the sound power levels adopted in this assessment are indicative for the assumed WTG and should not be interpreted as manufacturer-guaranteed sound power levels.

It has been assumed that the turbine will have no penalizable tonal characteristics. Confirmation of the tested tonal audibility data ΔLA_{k} values should be provided by the manufacturer prior to layout finalisation and construction.

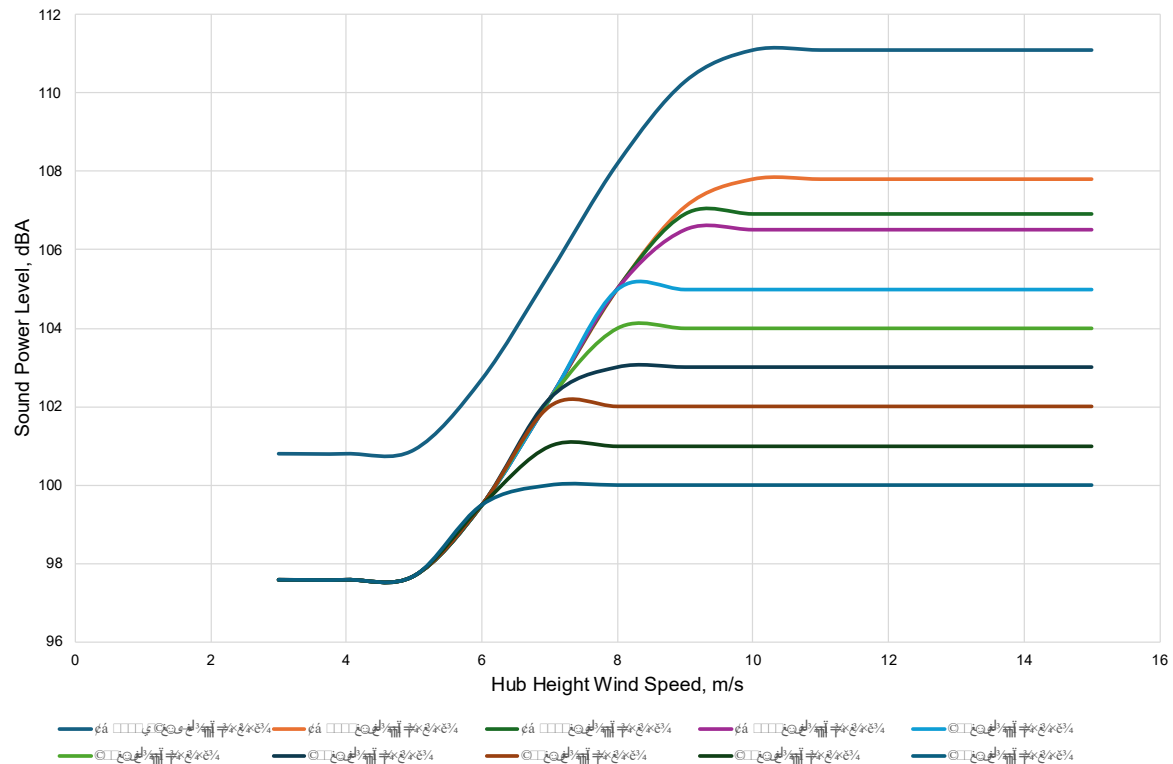
Table 1 summarises the relevant turbine input data used for noise level predictions.

Table 1 WTG Details

WTG Parameter	Detail
Make model	Vestas V172
Rated power	7.2 MW
Rotor diameter	172 m
Hub height	166 m
Cut-in wind speed	3 m/s
Standard blade: sound power level, L_{WA} vref 10 m/s HH	111.1 dBA
Serrated edge blade: sound power level, L_{WA} vref 10 m/s HH	107.8 dBA



Figure 5 WTG Sound Power Level



3.6 Proposed Substation and BESS Layout

Two 140 MVA transformers are proposed at each substation location. A single 150 MW / 600 MWh BESS is proposed at each location.

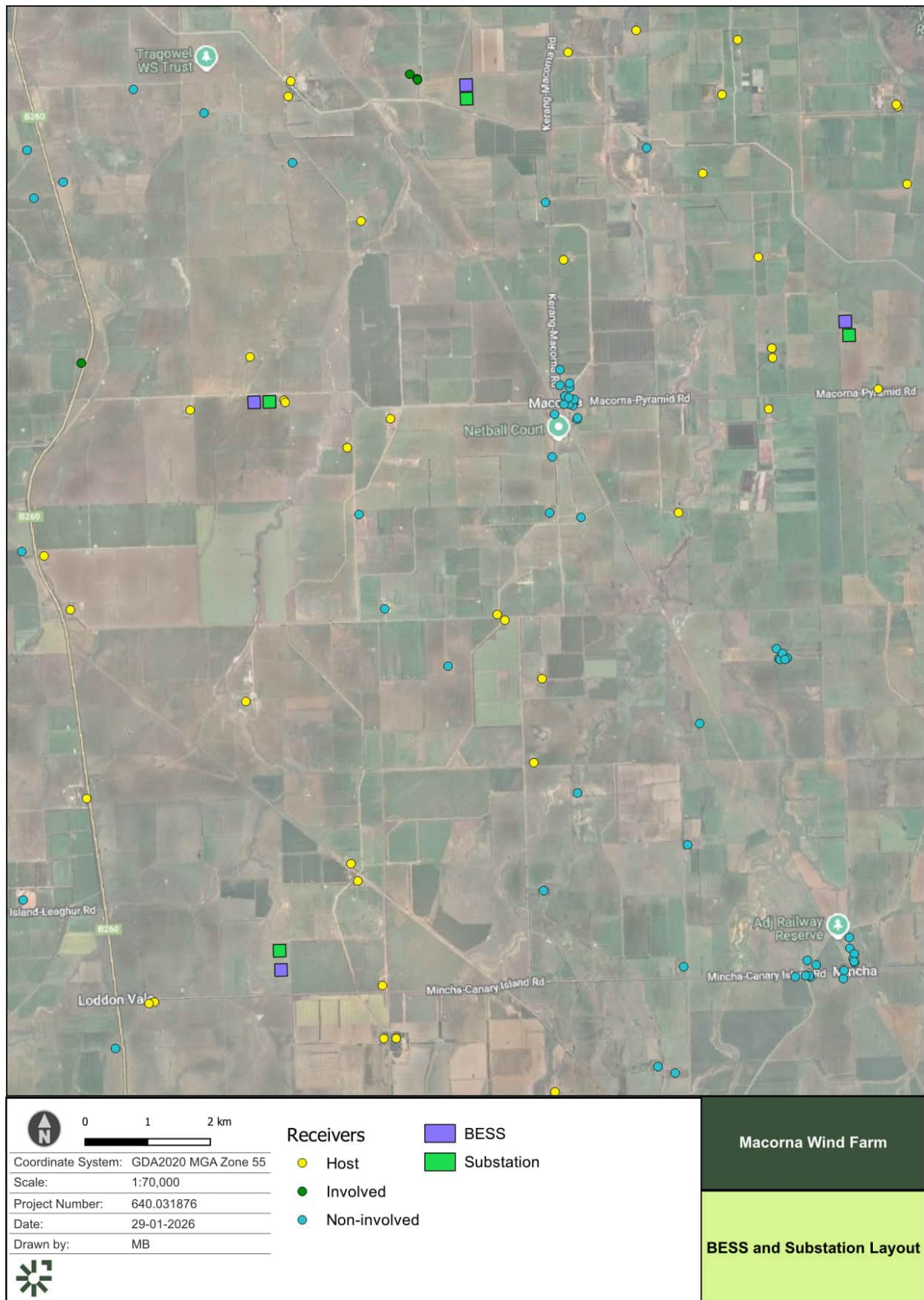
Proposed locations for the substations and BESS are tabulated in **Table 2** and shown in **Figure 6**.

Table 2 Proposed Locations

Name	Type	UTM X	UTM Y
2x Substations	140 MVA	230461	6025839
BESS	150 MW/600 MWh	230454	6026055
2x Substations	140 MVA	236568	6022062
BESS	150 MW/600 MWh	236508	6022281
2x Substations	140 MVA	227315	6020997
BESS	150 MW/600 MWh	227070	6020990
2x Substations	140 MVA	227476	6012233
BESS	150 MW/600 MWh	227500	6011924



Figure 6 BESS and Substation Layout

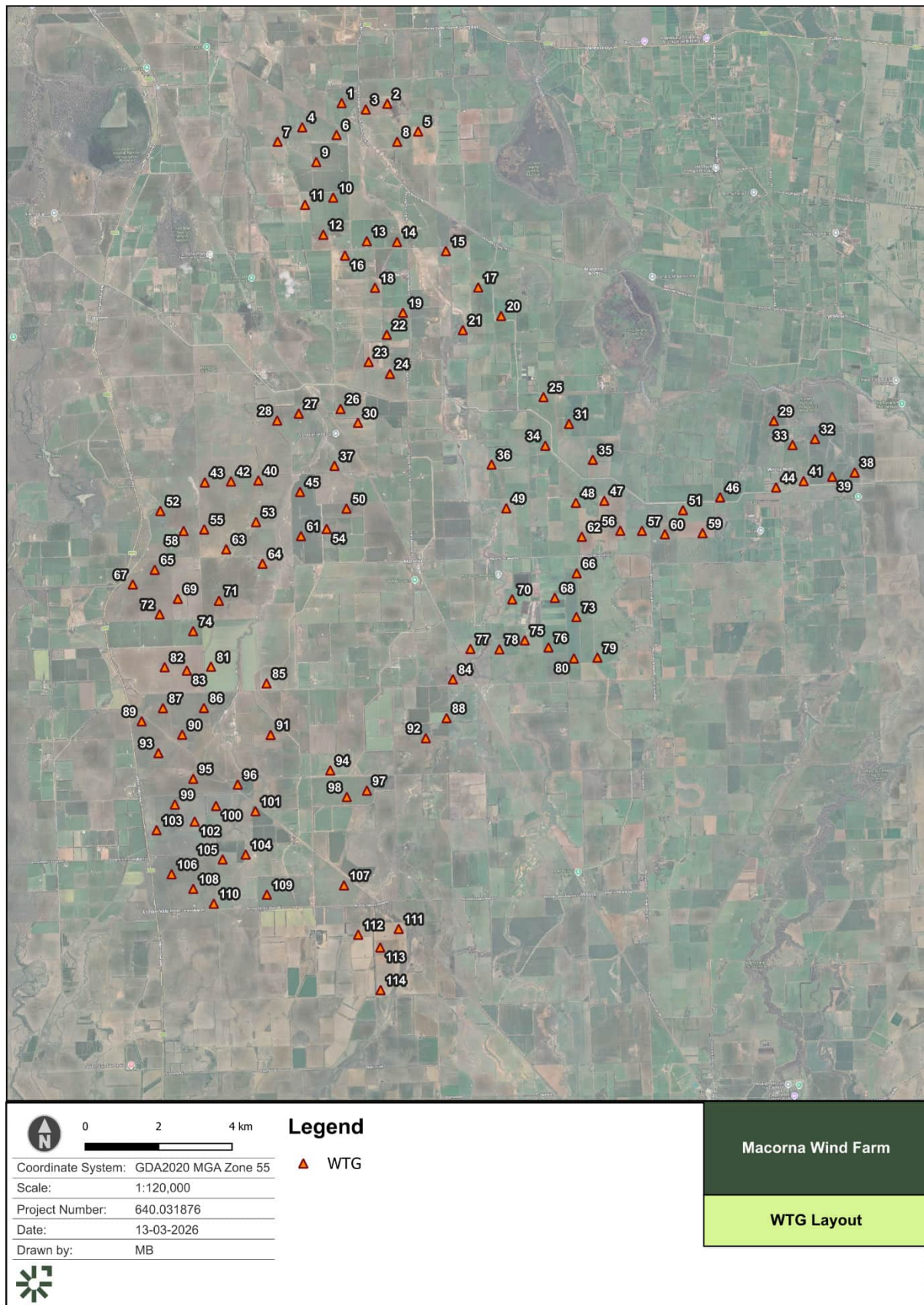


3.7 Wind Farm Layout

A tabulated list of WTG coordinates for the proposed layout is included in **Appendix B**. Should an alternative selection or turbine type or layout be finalised then a revised predictive noise assessment will be completed. The proposed layout for the WTGs are presented in **Figure 7**.



Figure 7 Proposed WTG Layout



4.0 Legislation & Guidelines

The key Victorian legislation, regulations and guidelines that apply to the noise impacts from the Project are summarised in **Table 3**.

Table 3: Legislation, Regulations and Guidelines

Name	Description	Comment
Commonwealth Government		
Nil		
Victorian Government		
<i>Environment Protection Act 2017</i> (Vic)	The <i>Environment Protection Act 2017</i> (EP Act) as amended by the <i>Environment Protection Amendment Act 2018</i> (Victoria State Government, 2018), took effect on 1 July 2021. The EP Act gives EPA enhanced powers and tools to prevent and minimise the risks of harm to human health and the environment from pollution and waste and includes the general environmental duty (GED). The GED requires everyone, including businesses and individuals, conducting activities that pose a risk to human health or the environment from pollution or waste to understand those risks and take reasonably practicable steps to eliminate or minimise them.	Noise emissions from the Project have the potential to impact human health and the environment. Noise is defined in the EP Act to include both sound and vibration. The EP Act defines <u>unreasonable noise</u> due to factors such as volume, intensity, character, time or if it is prescribed to be <u>unreasonable noise</u>. The project must ensure it does not emit <u>unreasonable noise</u>. GED is relevant to the Project requiring noise emissions that pose a risk to human health or the environment to be minimised so far as reasonably practicable.
<i>Environment Protection Regulations 2021</i> (Vic)	The <i>Environment Protection Regulations 2021</i> (EP Regs) support the implementation of the <i>Environmental Protection Act 2017</i> by imposing obligations in relation to environmental protection, including noise. The EP Regs took effect on 1 July 2021.	Regulations 131A to 131J govern wind turbine noise. See Section 4.1 for more details.
<i>Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues, EPA Publication 1826.4</i> (Noise Protocol)	This publication provides a protocol for the purpose of determining noise limits for new and existing commercial, industrial and trade premises and entertainment venues as defined by the Regulations. It sets the methodology for assessing the effective noise	The Noise Protocol sets out how to determine the following: - Noise limits - Background levels - Effective noise levels The Noise Protocol will apply to noise from ancillary equipment



Name	Description	Comment
	level to determine unreasonable noise under the Regulations.	such as electricity substations or any BESS.
Victorian Planning Provisions	The Victorian Planning Provisions (VPP), established under the Planning and Environment Act 1987, are a statewide set of standard planning provisions that form the foundation of every municipal planning scheme in Victoria. They ensure consistency across the state while allowing councils to add amendments tailored to their area. When the State amends a VPP clause, the change automatically applies in all local planning schemes.	Clause 52.32-4 (04/07/2023 VC234) of the VPP details the requirement for a pre-construction predictive noise assessment, prepared in accordance with New Zealand Standard NZS6808:2010 <i>Acoustics – Wind Farm Noise</i> and must assess whether the proposed wind farm complies with the noise limit under the EP Regs. Where landholder agreements are in place, the assessment must assess whether the proposed wind farm complies with the modified noise limit in that agreement. It further notes that the assessment must include an assessment of whether a high amenity noise limit is applicable under Section 5.3 of the standard. This clause also requires an environmental auditor to verify whether the noise assessment was conducted in accordance with <i>NZS6808:2010</i>. Clause 52.32-5 states the responsible authority must consider in their decision the effect of the proposal in terms of noise; and must consider the <i>Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria</i> (Department of Environment, Land, Water and Planning, November 2021). Neither Ganawarra or Loddon Shire Councils have specific amendments to Clause 52.32.
<i>Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria</i> (Department of Environment, Land, Water and Planning, September 2023) (PGDWEF)	The PGDWEF provides a framework for how wind energy projects should be planned, assessed, and regulated under Victoria's planning system. They cover site selection, noise and environmental impacts, community engagement, and the application of Clause 52.32	The PGDWEF, reiterates the requirements of the VPP, further requiring an assessment of construction noise emissions. Section 5.1.2 recognises wind farms create noise and affect the surrounding noise amenity. It follows by stating the



Name	Description	Comment
	to ensure projects meet both state policy objectives and local considerations.	requirements in NZS6808:2010 must be met and clarifies that a noise sensitive location is any habitable space or education space not on a wind farm site, inclusive of child care centres. It recommends a 45 dBA limit for project involved dwellings whom have an agreement with the wind farm. Cherry Tree Wind Farm's VCAT decision is acknowledged as the appropriate precedence for determining whether land uses shall be designated with high-amenity limits, as detailed in the NZS6808:2010. The assessment must be made without relying on noise reduction operation modes to achieve compliance.
<i>Wind Energy Facility - Turbine Noise - Technical Guideline</i> (EPA Publication 3011, December 2024)	The Wind Energy Facility - Turbine Noise technical guideline supports technical assessment and measurement of wind turbine noise under the Environment Protection Act and Regulations. It clarifies how to apply New Zealand Standards (NZS 6808:1998 and 2010), fills gaps or ambiguities in those standards, and promotes consistent noise management across the planning, construction, and operation phases of wind energy facilities in Victoria.	Pertinent clarifications to this assessment the guideline mentions are: - potential application of high amenity area (HAA) noise limit (base limit of 35 dBA) for for evenings and night-time for wind speeds up to 6 m/s at dwellings in : Low Density Residential Zone (LDRZ), Township Zone (TZ), Rural Living Zone (RLZ), and Green Wedge A Zone (GWAZ). - Modelling receiver points at 4 m above ground, and making the assumption that the L_{A90} predicted level is equivalent to the L_{Aeq} parameter - Allowance for permit application to rely on turbines operating on the basis of 'noise management modes'
<i>Environmental Reference Standard 2021</i> (Vic)	Under the <i>Environmental Protection Act 2017</i> , the Environment Reference Standard (ERS) is to be used to assess and report on environmental conditions in the whole or any part of Victoria. It sets out indicators and	The ERS sets out ambient noise indicators and objectives for land use categories. Indicators and objectives relevant to the surrounding areas of unique native habitat are qualitative and relate to a sound quality that is conducive to human tranquillity and



Name	Description	Comment
	objectives for the ambient sound environment. The ERS provides typical ambient (outdoor, free field) noise level objectives for different land use zones. It does not define noise limits nor design criteria.	enjoyment having regard to the ambient natural soundscape.
<i>Guide to the Environment Reference Standard, EPA Publication 1992 (Victorian EPA, 2021)</i>	This guide provides information about how the ERS should be applied to support decision making, and how the environmental values, indicators and objectives for each element of the environment should be interpreted.	This guide is primarily for decision makers who need to consider the ERS. Decision makers can include Environment Protection Authority Victoria (EPA) officers, officers from other government authorities and departments, environmental auditors, and representatives from local government and planning authorities. The guide will also assist applicants of proposals for new developments, infrastructure or sites that may be assessed with reference to the ERS. It will also be of assistance to site owners, environmental managers and consultants.
<i>Civil construction, building and demolition guide EPA Publication 1834.2 (Victorian EPA, 2025)</i>	This guide supports the civil construction, building and demolition industries to eliminate or reduce the risk of harm to human health and the environment through good environmental practice.	Provides guidance on identifying, assessing, and managing noise impacts from building and construction activities to minimise disturbance to nearby sensitive receptors. It outlines recommended work hours, noise management practices, and when additional controls, monitoring, or approvals are required to ensure construction noise is reasonable and consistent with the Environment Protection Act 2017.

4.1 Environment Protection Regulations 2021

A summary of the EP Regs relevant to wind energy facilities is detailed in **Table 4**.

Table 4 EP Regs Details

Regulation	Description
Reg 131A – Wind turbine noise agreement	Allows a wind energy facility operator and a landowner to enter a written agreement that sets different noise limits



Regulation	Description
	for that landowner's premises. This agreement cannot affect noise limits for any other premises.
Reg 131B – Relevant noise standard	Specifies which noise standard applies based on permit date: NZS 6808:1998 for pre-2011 facilities, and NZS 6808:2010 for those from 2011 onward. For agreements made from 1 Nov 2021, noise must not exceed 45 dB(A) or background + 5 dB, whichever is greater.
Reg 131C – Duties on operators of wind energy facilities	Requires operators to comply with the relevant noise standard and implement all actions necessary under Division 5 to manage noise in accordance with the general environmental duty.
Reg 131D – Post-construction noise assessment	Facilities starting on or after 1 Nov 2021 must complete a noise assessment within 12 months of operation, by a qualified acoustician under NZS 6808:2010. The report must be verified by an EPA-accredited environmental auditor.
Reg 131E – Noise management plan (NMP)	Requires operators (from 1 Jan 2022) to implement a noise management plan including: risk identification, noise compliance processes, remediation strategies, and a complaint response procedure.
Reg 131F – Annual statement	Operators must submit an annual report (by 30 Sep each year) covering noise complaints, compliance with operating modes, maintenance/remediation efforts, and evidence of noise compliance.
Reg 131G – Five-yearly noise monitoring	From 1 Jan 2024, operators must commission independent noise monitoring every five years, have the report audited, and submit both the report and audit to EPA.
Reg 131H – Unreasonable noise	Wind turbine noise is considered “unreasonable noise” if it exceeds the applicable standard or the alternate monitoring point criteria (if used).
Reg 131I – [Repealed]	<i>(This regulation has been repealed and is no longer in effect.)</i>
Reg 131J – Transitional provision for annual statements	Provides a transition deadline: if a facility operated during FY ending 30 June 2022, its first annual statement must be submitted by 1 March 2023, unless already submitted.



5.0 Noise Criteria

In Victoria, the EP Regs specify noise emissions from WTG's, operations (e.g. BESS and substation) and construction activities are to be assessed separately from other. The assessment approach and criteria for WTG's are detailed in **Section 5.1**, ancillary equipment to the wind farm is detailed in **Section 5.2** and construction noise detailed in **Section 5.3**.

5.1 Wind Turbine Noise

5.1.1 Non-involved receivers

Landowners without commercial agreements with the wind farm are referred to as non-involved receivers.

Section 5.2 of NZS 6808:2010 states:

As a guide to the limits of acceptability at a noise sensitive location, at any wind speed wind farm sound levels (LA90(10 min)) should not exceed the background sound level by more than 5 dB, or a level of 40 dB LA90(10 min), whichever is the greater.

Background noise monitoring is yet to be conducted at this stage. As such, the minimum noise criteria of 40 dB L_{A90 10min} has been adopted at all speeds, representing a conservative assessment.

5.1.2 Project involved receivers

Project involved receivers are residential dwellings associated with landowners who may enter into a commercial agreement with the Project, established in accordance with the EPRs (regulation 131A).

In accordance with EPA 3011, the applicable noise limit for premises subject to an agreement is *45 dB LA90(10 min) or the background sound level plus 5 dB, whichever is the greater*, pursuant to regulation 131BA.

As background noise monitoring is yet to be conducted at this stage, the minimum noise criteria of 45 dB L_{A90 10min} has been adopted, representing a conservative assessment.

5.1.3 Host receivers

Host receivers are not considered noise sensitive locations for strict assessment under the NZS6808 standard, however, consistent with EPA guidance and industry good practice, noise levels at host receivers are evaluated for information purposes only. For the purposes of this evaluation host properties shall be evaluated against a threshold of *45 dB LA90(10 min) or the background sound level plus 5 dB, whichever is the greater*.

As background noise monitoring is yet to be conducted at this stage, the minimum noise threshold of 45 dB L_{A90 10min} has been adopted for at all speeds, representing a conservative assessment.

5.1.4 High Amenity Noise Areas

The planning zones surrounding the wind farm are in general:

- Township Zone (TZ) covers most, but not all of the Marcona township; and
- Farming Zone (FZ) elsewhere.



The EPA guideline 3011 outlines that NZS 6808:2010 also allows a High Amenity Area (HAA) limit to be applied when the circumstances at a noise sensitive location justify a more stringent limit to afford a greater degree of amenity protection in the evening or at night.

The guideline states that in Victoria the HAA limit:

- should apply to a dwelling located in the following zones predominantly intended for residential development: Low Density Residential Zone (LDRZ), Township Zone (TZ), Rural Living Zone (RLZ), and Green Wedge A Zone (GWAZ).
- should not apply to dwellings in the Farming Zone (FZ)
- should not be applied in any location where background sound levels are already affected by other specific sources such as road traffic noise (based on 5.3.1 of the 2010 Standard)
- only applies for WEF wind speeds up to and including 6 m/s during evening and night-times.
- is applicable only when there is no agreement made in accordance with regulation 131A.

In the Macorna township approximately 9 dwellings are within TZ zoning. Whilst the township is located at the intersection of two roads and a train line, it is anticipated that traffic and rail movements are so infrequent so as to not affect the L90 background noise level. On this basis the EPA guideline 3011 would apply a HAA noise limit of 35 dBA or background + 5 dBA for evening and night-time periods in HH winds less than 6 m/s.

We note that NZS6808:2010 (in C5.3.1) provides guidance as to how evaluate if a HAA noise limit is justified, based on an evaluation of existing background noise and the predicted post construction noise level, whilst the EPA 3011 guideline does not outline this evaluation.

5.2 Ancillary Equipment

Noise emissions from the wind farm's substations are not permitted to be unreasonable or aggravated, and are subject to the provisions of the Regulations, and the *"Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues"*, EPA Publication 1826.4 May 2021 (the Noise Protocol).

The Noise Protocol presents the methodology for determining the noise limit (maximum allowable level of noise emitted from a premise) when measured in a noise sensitive area. Noise sensitive areas are defined in the Regulations as that part of the land within the boundary of a parcel of land that is within 10 m of the outside of the external walls of dwellings.

Table 5 presents the assessment periods prescribed by the Regulations.

Table 5 Definitions of Day, Evening and Night (Environmental Protection Regulations 2021)

Period	Day	Time
Day	Monday to Saturday (except public holidays)	7:00 am – 6:00 pm
Evening	Monday to Saturday Sunday and public holidays	6:00 pm – 10:00 pm 7:00 am – 10:00 pm
Night	Monday to Sunday	10:00 pm – 7:00 am



5.2.1 Rural Method – Noise Limits

All noise sensitive receivers are located outside of the Major Urban Area, therefore the determination of noise criteria follows the Rural Method.

The Noise Protocol noise limits for receivers in a rural environment normally takes into consideration the influence of zoning map categories (and changes in zoning categories), the distance between the zoning boundary and receiver (where different zones apply) as well as the background noise. However, there is a special consideration that applies for utilities.

5.2.2 Noise Limits in Rural Areas for BESS/Substation

Section 2.6 of the Protocol defines the method for determining noise limits in rural areas for utilities, which include electricity infrastructure, which is an appropriate classification for the substation.

Paragraph (31) states that if the utility is located in a Farming Zone (FZ) and the distance adjustment is 0 dB (receiver is also in FZ), then the distance-adjusted level for each period is:

- Day: 45 dBA
- Evening: 39 dBA
- Night: 34 dBA

Since all sensitive receivers and the proposed site are located in a Farming Zone (FZ) or the Township Zone (TZ), the above limits apply to all receivers from the BESS or substation only. This approach differs from the WTG assessment methodology, where noise limits are derived in accordance with NZS 6808:2010 and are linked to the prevailing background sound level, reflecting the specific treatment of wind turbine noise under the Victorian regulatory framework.

5.3 Construction Noise

In Victoria, the EPA does not set construction noise or vibration legislated limits. Instead, noise must be minimised so far as reasonably practicable in line with the EP Act. The contractor must first eliminate risks of harm so far as reasonably practicable, then reduce risks of harm so far as reasonably practicable. If exceedance of reference levels for evening and night periods as nominated by the EPA in the *Civil construction, building and demolition guide* (EPA Publication 1834) occurs after all reasonably practicable measures have been implemented, then further management actions must be implemented.

EPA Publication 1834 has been adopted as the appropriate guidance document for this assessment as it provides recommended working hours and guideline noise levels relating to construction impacts on residential receivers.

Section 4.1.3 of EPA Publication 1834 states:

Complaints about noise and vibration are some of the most common complaints that EPA, councils and businesses involved in civil construction, building and demolition receive.

Noise and vibration can pose a risk of harm to human health and the environment if it is too loud, continues too long, recurs frequently, suddenly increases in level, or includes disturbing sounds such as:



- *impulses (banging, hammering)*
- *tones (squealing, screeching, humming)*
- *low frequency sound. This can be more intrusive than high frequency sound as it is less attenuated during propagation and when transmitting into buildings. Noise abatement measures are less effective at low frequencies.*

For works complete within normal working hours, no reference noise levels are set, and instead noise and vibration shall be minimised as far as possible in any situation.

For works outside of normal working hours, Table 4.3 of EPA Publication 1834 states the requirements shown in **Table 6** below.

Table 6: EPA Victoria Publication 1834.1 Requirements for Weekend, Evening and Night Works

Time Period	Requirement
Weekend/evening work hours: Monday to Friday – 6:00pm to 10:00pm Saturday – 1:00pm to 10:00pm Sunday – 7:00am to 10:00pm Public holidays – 7:00am to 10:00pm	Noise from non-residential construction at any residential premises not to exceed background noise by: • 10 dB(A) or more for up to 18 months after project commencement • 5 dB(A) or more after 18 months
Night period: All days – 10:00pm to 7:00am	Noise inaudible* within a habitable room of any residential premises



6.0 Noise Assessment

6.1 Modelling Software and Algorithm

A 3D noise model was constructed within the modelling software SoundPLAN 8.2 to predict noise levels at the nearby sensitive receivers.

Noise modelling was conducted using the algorithms of ISO 9613-2¹, which predicts the A-weighted sound pressure levels under meteorological conditions favourable to propagation from sources of known sound power levels. This enhanced propagation is equivalent to downwind propagation or a moderate ground-based temperature inversion. The model also includes attenuation due to air absorption, ground attenuation and shielding.

The estimated accuracy of the prediction model is approximately ± 3 dBA.

6.2 General Modelling Assumptions

The following general assumptions are made based on best-practice modelling methods to suit the project:

- A reflection-order of three (3).
- Source height was set to WTG hub height.
- Receivers are in the acoustic free field, 4.0 m above ground level.
- Ground topography around the Marcona Wind Farm was sourced from Atmos Renewables (1 metre digital elevation data), publicly available 30 second digital elevation data was sourced from Geoscience Australia to model topography beyond the wind farm.
- Layout of wind turbines and ancillary equipment as described in **Section 3.6** and **Section 6.3.2**, and as detailed in subsequent sections.
- Ground absorption is modelled by a single number parameter between 0 (hard – reflective) and 1 (soft – absorptive). All ground surfaces were modelled with a ground absorption parameter of 0.5, as per the relevant standard and guidelines.
- The sound power level of the WTG has been modelled as per **Table 1**. We note that the Institute of Acoustics *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise* – 2013 (IOA GPG) advocates that specified manufacturer data with no uncertainty for test report is available then a +2dB should be added to the sound power level. However, the IOA GPG also includes a -2 dB adjustment from predicted L_{eq} noise levels to L_{90} noise levels, whereas the NZS6808:2010 and the EPA guideline 3011 make no such adjustment. Therefore the manufacturer sound power level has been used with no adjustment.

6.3 Wind Turbine Noise

6.3.1 Special Audible Characteristics

The New Zealand standard requires wind farms to be designed so noise at a sensitive receiver has no special audible characteristics (tonality, impulsiveness, amplitude

¹ ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*



modulation). It notes such characteristics can't always be predicted and should instead be assessed through measurement.

Based on the one-third octave data information provided by the manufacturer and the method described in the standard, no tonality penalty for tonality is justified. As the presence of any other type of special audible characteristics is unable to be predicted, no penalties have been applied to the predictions.

6.3.2 114 WTG Layout – Serrated Trailing Edge

The wind farm noise levels from the layout of 114 WTGs with serrated trailing edge (STE) blades was calculated for a hub height wind condition of 10 m/s. The receivers which do not comply are listed in **Table 7**. The predicted noise contour plot is presented in **Figure 8** as well as in a series of higher detail zoomed-in views in **Appendix C**.

Table 7: Predicted WTG Noise Level

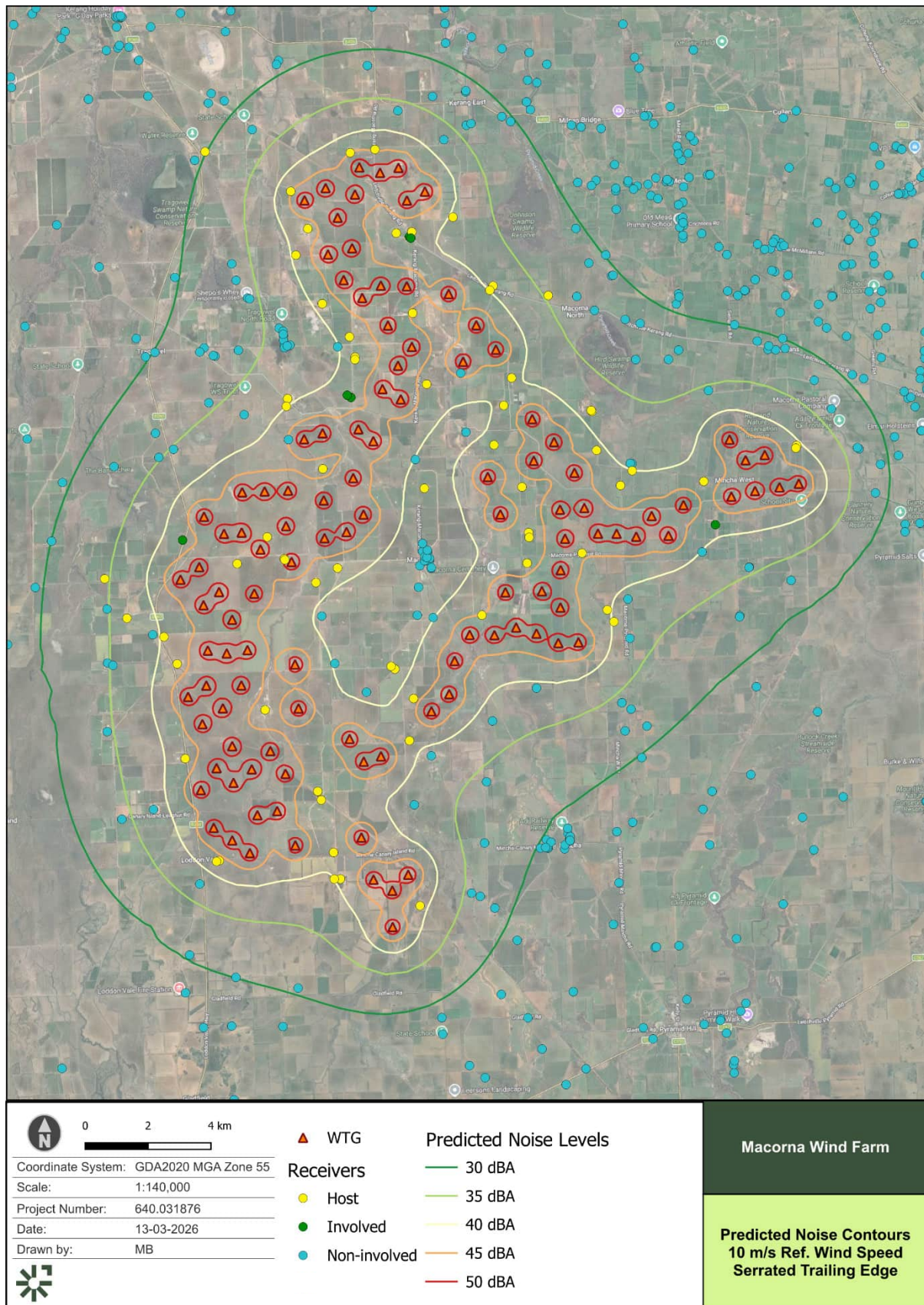
Receiver ID	WTG Noise Level, Leq dBA	Type of Dwelling
Host Receivers 45 dBA minimum noise threshold		
H0159	45.6	Dwelling
Involved Receivers 45 dBA minimum noise limit		
-	-	-
Non-involved Receivers 40 dBA minimum noise limit		
H0080	45.3	Abandoned Dwelling

Table 7 shows the following:

- Host Receiver H0159 is predicted to exceed the 45 dBA minimum noise threshold. The minor exceedance (0.4 dB) is unlikely to be perceptibly higher than the base threshold and would therefore be considered acceptable under the EPA guideline 3011 which do not require host properties to meet the minimum noise limit.
- All Involved Receivers comply with the minimum noise limit of 45 dBA.
- Non-involved Receiver H0080 is an abandoned dwelling, of which SLR has been advised that an agreement is proposed to be in place with the landholder to continue this status for the life of the project. Furthermore, the abandoned dwelling is on the Tragowel Solar Farm site and will be demolished should the solar farm proceed to construction. As such, it is concluded that all non-involved receivers comply with the minimum noise limit of 40 dBA.



Figure 8 Noise Contour of Proposed WTG Layout



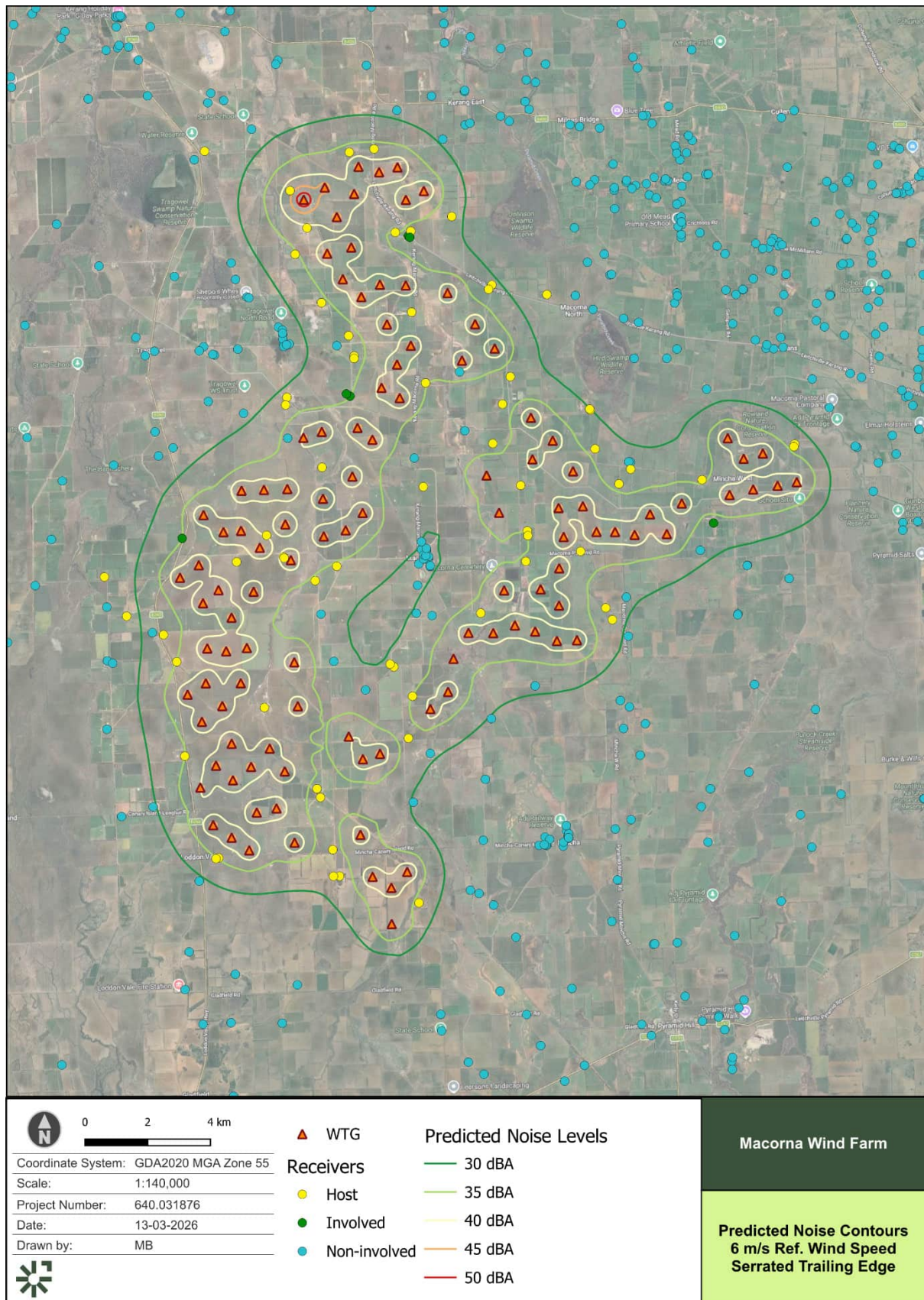
6.3.3 High Amenity Area

The applicability of the High Amenity Area (HAA) noise limit to approximately nine dwellings within the Macorna township (TZ zoning) is yet to be confirmed through background noise monitoring. However, the predicted wind farm noise levels at these township receivers are less than 38 dBA at a hub-height wind speed of 10 m/s. At a hub-height wind speed of 6 m/s, the assumed WTG sound power level is approximately 8.3 dB lower than at 10 m/s. The predicted noise contour at a 6 m/s wind speed is shown in **Figure 9**.

Based on the results shown in **Figure 9**, it is anticipated that at 6 m/s the predicted wind farm noise levels within Macorna township would be below 30 dBA, indicating compliance with the 35 dBA HAA noise limit with a substantial margin.



Figure 9 Predicted Noise Contour at 6 m/s Wind Speed



6.4 Mitigation

Wind farm noise levels at a receiver may be reduced through modification of the turbine layout (including removal or relocation of WTGs closest to the receiver), the application of operational noise controls, or a combination of both.

Modern wind farms are able to implement operational noise controls, which typically include:

- **Sector Management (SM):** Temporary curtailment of individual WTGs under specific wind speed and wind direction conditions known to result in elevated noise levels or the occurrence of Special Audible Characteristics. Sector Management is controlled by the wind farm operator via the SCADA system and is implemented dynamically as conditions arise. As SM is reactive in nature, it is generally not relied upon as the primary basis for demonstrating compliance during the planning and approval process.
- **Noise Management Mode (NMM):** A manufacturer-defined operating mode in which turbine rotor speed is reduced, resulting in lower blade-generated sound power. NMM represents a fixed reduction in sound power output and is equivalent to selecting a turbine variant with a lower noise emission profile. NMM may be adopted, where necessary, to demonstrate predictive compliance during the planning and approval process. If post-construction compliance monitoring confirms that noise limits are met without additional mitigation, NMM need not be implemented.

Determination of an optimised mitigation strategy typically involves an iterative noise optimisation process that ranks WTGs by their relative contribution at each receiver, allowing targeted application of layout changes or noise management modes for maximum effectiveness.

Notwithstanding that the proposed turbine layout has been demonstrated to comply with the applicable minimum noise criteria, these mitigation measures provide flexibility to manage noise impacts should refinements to the final WTG selection, layout, or other project assumptions occur.

6.5 Substation and BESS Noise

6.5.1 Substation Noise Source

Australian Standard AS 60076-10:2009 *Power transformers – Determination of sound levels* indicates that a transformer with a rated capacity of approximately 140 MVA may exhibit a sound power level of up to 96 dBA, depending on design and operating conditions.

Transformer noise may be tonal in nature and is typically dominated by low-frequency components associated with magnetostriction of the transformer core, with a fundamental frequency at 100 Hz (twice the 50 Hz supply frequency), and some harmonics thereof. This noise is generally continuous during normal operation and largely independent of load, although minor variations may occur with changes in electrical loading and cooling system operation.

The assumed sound power level and spectral characteristics adopted in this assessment are conservative and representative for the purposes of predicting potential operational noise impacts from the substation.



6.5.2 BESS Noise Source

The battery layout and OEM supplier has not yet been finalised. The noise assessment for the BESS will be updated once the layout and OEM supplier are finalised, to ensure that the modelled noise emissions match the final detailed design.

Sound power levels (SWL) and assumed quantities of noise producing equipment shown in **Table 8** are based on current available OEM data and assumes that the inverter and battery containers are installed with OEM developed silencing equipment.

All equipment items are assumed to be in operation for the entirety of a 30-minute assessment period. Noise emissions of the BESS equipment is typically dominated by cooling noise sources, which can be variable depending on the percentage of maximum power (charge/discharge) and the subsequent temperatures, both ambient and that being generated by the equipment.

Table 8 Equipment and Sound Power Levels

Qty	Item	Sound Power Level (SWL), per unit $L_{eq\ 30\ min, dBA}$
75	Battery Container	78
30	Inverter	83

6.5.3 Noise Protocol Assessment

6.5.3.1 Noise Character

The Noise Protocol contains provisions for adjustments for undesirable noise characteristics such as tonality, impulsiveness and intermittency. If one or more of these characteristics are present at the receiver, then an adjustment is applied to the overall level.

The following outlines the noise characteristics and discusses whether the adjustments are relevant to this assessment.

Tonality

OEM noise emission data adopted in this assessment indicate that the near-field noise from battery cooling fans contains a minor tonal component at approximately 250 Hz, while the inverter units exhibit a higher-frequency tonal component at approximately 3.15 kHz.

When account is taken of the propagation distances to the nearest noise sensitive receivers (generally in excess of 800 m), atmospheric and ground attenuation, and the presence of ambient background noise, these tonal components are expected to be substantially reduced at receiver locations. In addition, the battery and inverter cooling systems operate independently and with variable fan speeds, resulting in time-varying noise spectra that reduce the likelihood of persistent or coherent tonal audibility.

Impulsiveness

The impulsiveness characteristic refers to a dominant sudden pressure peak, or series of peaks, or a single burst with multiple pressure peaks whose amplitude decays with time or a sequence of bursts. Noise emissions of an operating BESS are not impulsive in nature.

Intermittency

Intermittency is present when the noise increases in level rapidly, and by at least 5 dB, on at least two occasions during a 30-minute period and maintains the higher level for at least one-minute.



The cooling fans are expected to cycle up and down as required to cool the batteries and power electronics. However, the duty cycle period typically exceeds 30 minutes and is not therefore considered intermittent. Therefore, no characteristic adjustments have been applied to the following results.

6.5.3.2 Low Frequency Noise

Low frequency noise contains significant acoustic energy in one-third octave bands ranging from 10 Hz to 160 Hz. The OEM provided noise spectra for their units between 25 Hz to 10 kHz. Depending on the duty cycle, the cooling fans of the battery units contain significant acoustic energy in the mid-frequencies; 250 Hz to 400 Hz.

The EPA Noise Guideline: *Assessing Low Frequency Noise* (Publication 1996) adopts a low frequency threshold level as a screening tool to identify the potential risk of problematic low frequency noise. Notwithstanding the limited low frequency data provided by the OEM and technical limitations of modelling low frequency noise, exceedances of the 25 Hz to 160 Hz frequency bands were not identified at any receivers in the modelling and since the acoustic energy of the sources are most dominant around the mid-frequencies, low frequency noise is not expected to be problematic for this project.

The low frequency noise assessment should be revisited if the OEM is changed.

6.5.3.3 Assessment Results

The results of the cumulative substation and BESS noise predictions are listed in **Table 9** for the nearest three receiver locations, with all substations and BESS operating simultaneously. These results are compared with the most stringent Noise Protocol night limits described in **Section 5.2**. The noise contour plot is shown in **Figure 10**.

Table 9: Predicted BESS and Substation Noise

Receiver ID	Cumulative BESS and substation noise level, dBA	Complies with minimum night criteria, 34 dBA ²
H0370	30	Yes
H0339	30	Yes
H0038	30	Yes

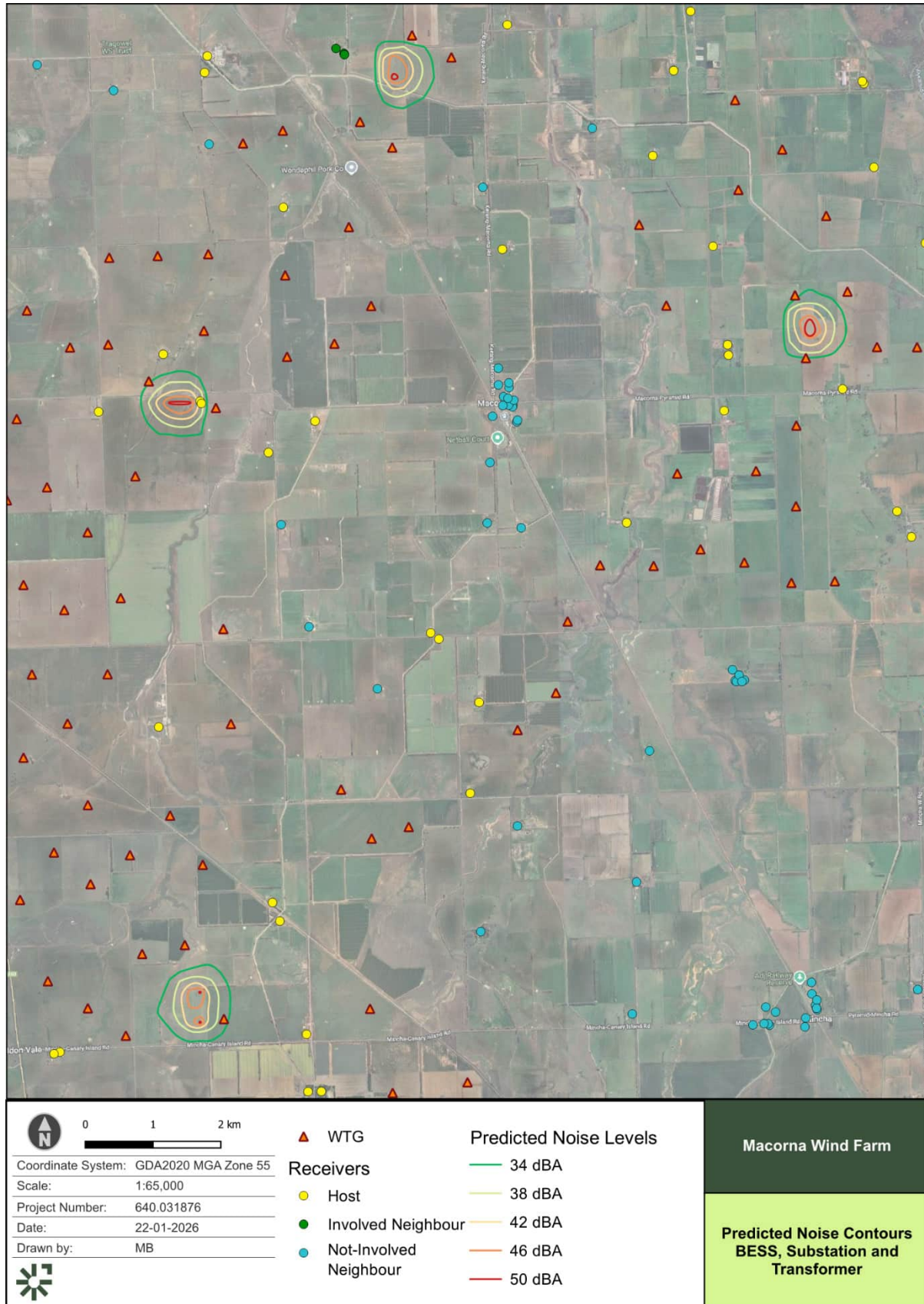
Predicted results indicate compliance at all locations during all times.

WTG noise has been excluded from this assessment, as wind farm noise is subject to separate assessment requirements under the EPA framework and is addressed separately in **Section 6.3**.

² Compliance with the night noise criteria implies compliance with the daytime and evening criteria, which are less stringent, and assumes that the BESS and substation produce consistent noise throughout the standard 24 hour period.



Figure 10 Noise Contour of Proposed Layout – BESS & Substation



6.6 Construction Noise

Detailed construction methods, sequencing and schedules are yet to be finalised. Accordingly, a Construction Noise and Vibration Management Plan (CNVMP) will be prepared prior to the commencement of works. The CNVMP will outline appropriate noise management and mitigation measures, monitoring requirements, and communication and stakeholder engagement procedures, consistent with relevant EPA guidance.

Construction activities will generally be undertaken during standard daytime working hours. However, limited works outside these hours may be required for specific activities, such as wind turbine blade erection during periods of low wind speed, or continuous concrete pours where operationally necessary.

To provide an initial indication of the potential risk of construction noise impacts at nearby receivers, a screening-level assessment has been undertaken. This assessment comprises the following steps:

1. Identification of likely construction activities and their anticipated locations;
2. Assignment of representative source noise levels for each activity;
3. Identification of appropriate construction noise criteria;
4. Estimation of distances between likely construction areas and the nearest sensitive receivers; and
5. Qualitative assessment of the potential noise impact.

This screening assessment is intended to inform the level of construction noise risk and the likely need for mitigation, with detailed management measures to be refined and confirmed through the CNVMP.

6.6.1 Construction Activities and Locations

During the construction phase, noise emissions from the Site will vary depending on the type, location, and duration of activities being undertaken. The construction activities with the greatest potential to generate noise are expected to include:

- Earthworks associated with the construction of access roads, laydown areas, and WTG foundations;
- Trenching and earthworks for underground electrical cabling;
- Concrete batching (where applicable) and the placement of concrete for WTG foundations;
- Lifting, handling, and installation of WTG components during tower, nacelle, and blade erection; and
- Construction-related traffic movements on public and project roads, particularly where occurring outside standard working hours.

Earthworks, concreting, and WTG erection activities are generally expected to be confined to the WTG locations and the internal access road network. Construction traffic movements are anticipated to occur along local public roads and the internal Project road network.



6.6.2 Activity Noise Levels

The assumed construction equipment and their respective assumed sound power levels are presented in **Table 10**.

Table 10: Construction Activity Sound Power Levels

Activity	Equipment	Sound Power Level
Earthworks	1x 30t Excavator	105
	1x Vibratory roller	108
	1x Haul truck	105
	Total Sound Power Level	111
Concrete batching	1x Concrete batch plant	107
	1x Front end loader	105
	1x Slumping / washout	110
	1x Agitator truck	108
	1x Cement silo (blower)	110
	Total Sound Power Level	115
Concrete pouring	1x Concrete agitator truck	107
	1x Concrete pump truck	107
	Total Sound Power Level	110
WTG erection	1x Mobile crane	98
	1x 30t Excavator	105
	Total Sound Power Level	106
Off-site traffic	1x Haul truck	103

6.6.3 Noise Screening Threshold

EPA Victoria Publication 1834 does not prescribe numerical noise limits for construction activities undertaken during Normal Working Hours. Accordingly, a daytime screening threshold of 75 dBA has been adopted for the purposes of this assessment, consistent with the aggravated noise criteria under the Environment Protection Regulations 2021.

For works undertaken during the night-time period, EPA Publication 1834 advises that construction noise should be inaudible within habitable rooms. As inaudibility is dependent on internal background noise levels and building construction, and is therefore difficult to assess at the planning stage, EPA guidance recommends setting a reference level that is representative of the background noise level at the anticipated time of impact. the use of an external background noise level as a proxy target for assessment purposes. In the absence site-specific background noise measurements, a typical rural external background noise level of 25 dBA has been assumed for this screening-level assessment.



6.6.4 Predicted Impacts

The predicted worst-case noise impacts from each broad construction stage are shown in **Table 11**.

Table 11: Predicted Construction Impacts

Activity	Nearest Sensitive Receiver	Predicted Noise Level, dBA Leq	Likely Impact	Recommended Controls	Residual Impact
Earthworks	Host 525m	49	Significantly lower than the screening threshold with peak noise periods likely contained to a short period of a few weeks only. Likely to have negligible impact to the surrounding community.	Best practice noise management controls as per CNVMP.	Low
	Non-involved 1160m	42			
Concrete batch plant	Host 1100m	46	Significantly lower than the screening threshold with peak noise periods likely contained to a short period of a few weeks only. Likely to have negligible impact to the surrounding community.	Best practice noise management controls as per CNVMP.	Low
	Non-involved 800m	49			
Concrete pouring	Host 525m	48	Significantly lower than the screening threshold with peak noise periods likely contained to a short period of a few weeks only. Likely to have negligible impact to the surrounding community.	Best practice noise management controls as per CNVMP.	Low
	Non-involved 1160m	41			
WTG Erection	Host 525m	44	Significantly lower than the screening threshold with peak noise periods likely contained to a short period of a few weeks only. Likely to have negligible impact to	Best practice noise management controls as per CNVMP.	Low
	Non-involved 1160m	37			



Activity	Nearest Sensitive Receiver	Predicted Noise Level, dBA Leq	Likely Impact	Recommended Controls	Residual Impact
			the surrounding community.		
Off-site traffic	50 m (from internal road)	43	Will likely be noticeable above the background noise, but given it will likely be infrequent and only occur for a minute or two as the truck passes, community annoyance or sleep disturbance impacts will likely be limited.	Best practice noise management controls as per CNVMP, including community and stakeholder engagement.	Low

Overall, given the relatively large separation distances between construction activities and the nearest receivers, and that the majority of works are expected to occur within normal working hours, construction noise impacts are anticipated to be low and manageable. Any residual noise impacts can be effectively addressed through the implementation of best-practice noise management measures, together with proactive community and stakeholder engagement, as set out in a Construction Noise Management Plan.

The predicted noise impacts are based on conservative, worst-case assumptions, including flat, hard-ground propagation, continuous operation of equipment with no downtime, and assessment at the closest sensitive receiver. Receivers located at greater distances would be expected to experience lower noise levels. Accordingly, the results of this screening-level assessment are considered conservative and appropriate for informing construction noise risk at this stage of the Project.



7.0 Summary

7.1 Wind Farm Noise

Noise emissions from the proposed Marcona Wind Farm, based on a preliminary layout of 114 WTGs (assumed representative WTG equivalent to Vestas V172, 7.2 MW), have been predicted and assessed against the minimum criteria set out in NZS 6808:2010 – *Acoustics: Wind Farm Noise*, as guided by EPA Victoria Publication 3011 – *Wind Energy Facility Turbine Noise Technical Guideline*, and the *Policy and Planning Guidelines for the Development of Wind Energy Facilities in Victoria* (DELWP, November 2021).

Predicted operational noise levels for the base proposed layout, with all WTGs fitted with serrated trailing-edge blades and operating at their maximum sound power level (108 dBA), indicate the following:

- All non-involved receivers comply with the minimum 40 dBA noise criterion;
- All project involved receivers comply with the applicable 45 dBA noise criterion; and
- One host receiver (H0159) is predicted to marginally exceed the 45 dBA screening target by approximately 0.4 dB. This exceedance is minor and is unlikely to be perceptible. Consistent with EPA Publication 3011, host receivers are not noise sensitive locations and are not required to comply with the minimum noise limits.

The applicability of the High Amenity Area (HAA) noise limit to approximately nine dwellings within the Macorna township (TZ zoning) is yet to be confirmed through background noise monitoring. However, the predicted wind farm noise levels at these township receivers are less than 38 dBA at a hub-height wind speed of 10 m/s. At a hub-height wind speed of 6 m/s, the assumed WTG sound power level is approximately 8.3 dB lower than at 10 m/s, and it is therefore anticipated that at 6 m/s the predicted wind farm noise levels within Macorna township would be below 30 dBA, comfortably complying with the 35 dBA HAA noise limit.

7.2 Substation and BESS Noise

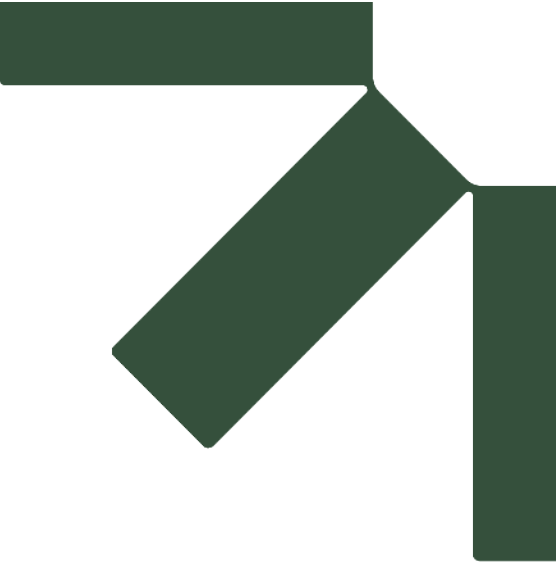
Cumulative noise predictions for all ancillary equipment including the substation transformers and all BESS equipment, indicate the applicable night time Noise Protocol noise criteria will be met at all assessed receivers under all operating conditions.

7.3 Construction Noise

Construction noise will be minimised so far as reasonably practicable in accordance with EPA Publication 1834. Where practicable, construction activities will be scheduled within standard working hours. Noise management measures, including mitigation, monitoring, and communication protocols, will be detailed in a Construction Noise and Vibration Management Plan (CNVMP) to be prepared prior to the commencement of works.

Screening-level modelling of representative construction scenarios indicates that construction activities undertaken during standard working hours are likely to result in negligible noise impacts at nearby receivers. While limited night-time activities, such as deliveries, may occur and could result in occasional disturbance, the application of management measures consistent with EPA Publication 1834, together with standard industry best-practice controls as outlined in the CNVMP, is expected to result in negligible residual noise impacts.





Appendix A Receivers

Noise Impact Assessment

Macorna Wind Farm

Atmos MWV Pty Ltd

SLR Project No.: 640.031876.00001

17 April 2026



A.1 Receivers

The list of identified receivers that are within 5km of the nearest WTG are listed in **Table A1**.

Table A-1: Receiver List

Receiver ID	Host Status	East	South	Distance to nearest WTG km	Predicted Noise Level dBA	Receiver ID	Host Status	East	South	Distance to nearest WTG km	Predicted Noise Level dBA
H0004	Not-Involved	241993	6029403	4.6	28.2	H0073	Host	226938	6016212	1.1	43.9
H0006	Not-Involved	233348	6034821	2.5	33.6	H0074	Not-Involved	233516	6010381	2.1	34
H0009	Not-Involved	229247	6027769	1.7	39.9	H0076	Not-Involved	233170	6026930	0.4	47.1
H0010	Not-Involved	233992	6013924	2.9	34.1	H0077	Not-Involved	240036	6029131	4.6	29.6
H0012	Not-Involved	241671	6029546	4.7	28.2	H0078	Not-Involved	245456	6028107	4.6	27.5
H0013	Host	234231	6024646	1.0	41.4	H0079	Not-Involved	222126	6023956	3.3	32.1
H0014	Not-Involved	231866	6020800	2.4	37.7	H0080	Not-Involved	227681	6024817	0.5	45.3
H0015	Host	237837	6019398	1.4	40.4	H0082	Not-Involved	232167	6020965	2.6	37.8
H0016	Not-Involved	232108	6021223	2.4	37.8	H0084	Not-Involved	244821	6028372	4.5	27.8
H0017	Host	228777	6023884	1.0	44.4	H0088	Not-Involved	235953	6011810	4.5	29.5
H0019	Host	242360	6020759	2.3	35.7	H0092	Not-Involved	238626	6024053	1.8	39.4
H0020	Host	224396	6014663	1.0	43	H0093	Not-Involved	239786	6027370	3.2	32.5
H0022	Host	228759	6029140	1.0	41.5	H0094	Not-Involved	227693	6027803	2.7	36.5
H0023	Not-Involved	225345	6027473	3.9	32.8	H0098	Host	235957	6029404	1.4	34.5
H0025	Host	234198	6029707	1.1	39	H0101	Not-Involved	224020	6024506	2.4	35.3
H0026	Not-Involved	231691	6013192	1.9	37.8	H0102	Not-Involved	227383	6028363	2.6	36
H0030	Host	222538	6019130	2.1	36.7	H0105	Not-Involved	227989	6007358	3.6	30.5
H0031	Not-Involved	223384	6013042	1.6	37.7	H0106	Not-Involved	225287	6027490	3.9	32.7
H0032	Not-Involved	233337	6025053	1.6	39.3	H0107	Not-Involved	234460	6007157	4.1	27.4
H0033	Not-Involved	227365	6036881	4.3	29	H0108	Not-Involved	226379	6029322	2.9	34.1
H0035	Host	231667	6016575	0.7	42.9	H0109	Not-Involved	246004	6026758	3.9	28.9
H0037	Not-Involved	240106	6029455	4.9	29.1	H0110	Not-Involved	238885	6028515	4.2	31.2
H0038	Host	229673	6026157	1.0	42.9	H0112	Not-Involved	235934	6011833	4.5	29.5
H0044	Not-Involved	247418	6026135	4.4	26.9	H0113	Not-Involved	244558	6028567	4.6	27.8
H0047	Not-Involved	235899	6012078	4.5	29.8	H0114	Host	231636	6028841	0.9	44.6
H0049	Not-Involved	244976	6025793	2.6	33.1	H0116	Host	232919	6031897	1.2	39.4
H0053	Not-Involved	234479	6035097	3.4	30.6	H0117	Host	229803	6027439	1.3	41.5
H0055	Not-Involved	247834	6025097	4.2	26.9	H0118	Host	234789	6026780	1.2	40.7
H0057	Not-Involved	224065	6029979	4.8	29.8	H0121	Not-Involved	224697	6033707	3.7	29.4
H0058	Not-Involved	231952	6021262	2.2	37.9	H0122	Not-Involved	248346	6022486	4.5	25.8
H0062	Host	240858	6021241	1.2	39.8	H0125	Not-Involved	236043	6012005	4.7	29.5
H0066	Not-Involved	233323	6035883	3.2	31.1	H0126	Host	227918	6030687	1.0	40.8
H0069	Not-Involved	246987	6024903	3.4	29	H0128	Host	232224	6020718	2.4	37.8
H0070	Not-Involved	227518	6028117	2.6	36.2	H0129	Not-Involved	223553	6024250	2.4	34.8
H0071	Not-Involved	236894	6033004	4.8	28.9	H0130	Host	237347	6025712	1.5	38.1
H0072	Not-Involved	230194	6036722	3.2	31.4	H0132	Host	225026	6033979	3.5	29.9



Receiver ID	Host Status	East	South	Distance to nearest WTG km	Predicted Noise Level dBA	Receiver ID	Host Status	East	South	Distance to nearest WTG km	Predicted Noise Level dBA
H0133	Not-Involved	232159	6020939	2.6	37.8	H0217	Host	229156	6017691	1.3	39.7
H0142	Host	231073	6017511	1.8	38.7	H0219	Host	231873	6009978	1.0	41.6
H0143	Not-Involved	235388	6035315	4.3	28.7	H0223	Host	223716	6018537	1.2	40.5
H0146	Not-Involved	234969	6008881	4.0	28.8	H0224	Not-Involved	242955	6027686	3.1	31.2
H0151	Not-Involved	224404	6007206	4.9	27.9	H0226	Not-Involved	238570	6024062	1.8	39.4
H0152	Not-Involved	241891	6028471	3.7	29.9	H0229	Not-Involved	234756	6034937	3.5	30.3
H0155	Not-Involved	231533	6031274	1.2	41.7	H0231	Not-Involved	243198	6027672	3.2	31
H0156	Not-Involved	243423	6028033	3.6	30	H0232	Host	237033	6021203	0.7	45.8
H0158	Not-Involved	246380	6023120	2.5	31.4	H0233	Not-Involved	232233	6014751	1.4	38.8
H0159	Host	226050	6020865	0.9	45.6	H0234	Not-Involved	235595	6036179	5.0	27.2
H0160	Not-Involved	226007	6007697	4.0	30	H0236	Host	241281	6022108	1.0	41.7
H0162	Not-Involved	224995	6027737	4.3	32.1	H0238	Not-Involved	232179	6021038	2.5	37.8
H0164	Not-Involved	239100	6015698	3.4	31.2	H0243	Not-Involved	237788	6030691	3.6	29.9
H0165	Not-Involved	232103	6020965	2.5	37.7	H0245	Not-Involved	246540	6024029	2.7	30.8
H0166	Not-Involved	237975	6030032	3.5	30.4	H0246	Host	221829	6020385	2.4	34.5
H0167	Host	225478	6011413	0.8	43.4	H0248	Not-Involved	242614	6027951	3.3	30.8
H0170	Host	229649	6033946	0.5	44.9	H0250	Not-Involved	248463	6022546	4.6	25.6
H0171	Not-Involved	232632	6034361	1.7	37	H0251	Not-Involved	238593	6016236	2.7	33
H0172	Host	231536	6015234	1.0	41.3	H0253	Host	228726	6013346	1.4	41.4
H0175	Host	232082	6026580	1.0	43.2	H0254	Host	229798	6027362	1.3	41.5
H0176	Not-Involved	232686	6037438	4.2	28.4	H0256	Not-Involved	225129	6035526	4.4	28.1
H0177	Host	231610	6031429	1.0	42	H0258	Not-Involved	227505	6006136	4.7	27.8
H0179	Not-Involved	243498	6027718	3.4	30.6	H0259	Host	234095	6029571	1.0	39.8
H0180	Host	233846	6019229	0.7	45.1	H0260	Not-Involved	220484	6023452	4.6	29.5
H0181	Host	229338	6010832	1.1	40.7	H0262	Not-Involved	227299	6036754	4.2	29.2
H0184	Not-Involved	238305	6016440	2.4	33.9	H0263	Not-Involved	242227	6029552	4.8	27.8
H0188	Not-Involved	232666	6038059	4.8	27.2	H0264	Not-Involved	235710	6011815	4.3	29.8
H0189	Not-Involved	246565	6027424	4.8	26.9	H0265	Host	237496	6024476	1.0	41.2
H0191	Not-Involved	234256	6009907	3.0	31.4	H0267	Not-Involved	245643	6026882	3.8	29.3
H0192	Host	238257	6023357	1.4	41.9	H0269	Not-Involved	238493	6019743	2.0	39
H0197	Not-Involved	227510	6028266	2.5	36.2	H0271	Not-Involved	231828	6020118	2.2	37.7
H0198	Not-Involved	221908	6015523	2.8	34.4	H0273	Not-Involved	238937	6014694	4.2	29.8
H0199	Not-Involved	233928	6011976	2.6	33	H0274	Host	243870	6024628	1.1	40.9
H0200	Not-Involved	227550	6027810	2.8	36.2	H0276	Not-Involved	233792	6010278	2.4	33
H0204	Not-Involved	235583	6016905	1.6	39.1	H0278	Host	229554	6026230	1.1	42.3
H0205	Not-Involved	221921	6017704	2.8	34.8	H0281	Not-Involved	232017	6020959	2.4	37.7
H0207	Not-Involved	247849	6025099	4.3	26.8	H0282	Not-Involved	238742	6027364	3.7	32.9
H0208	Host	242351	6020750	2.3	35.7	H0283	Not-Involved	243523	6029397	4.9	27.2
H0209	Not-Involved	244428	6026705	2.9	32	H0284	Host	243692	6020335	3.0	32.7
H0211	Host	229120	6011676	1.0	41.5	H0286	Not-Involved	238020	6030047	3.6	30.3
H0213	Host	227655	6026119	1.4	39.1	H0288	Host	227756	6032718	0.5	44.6



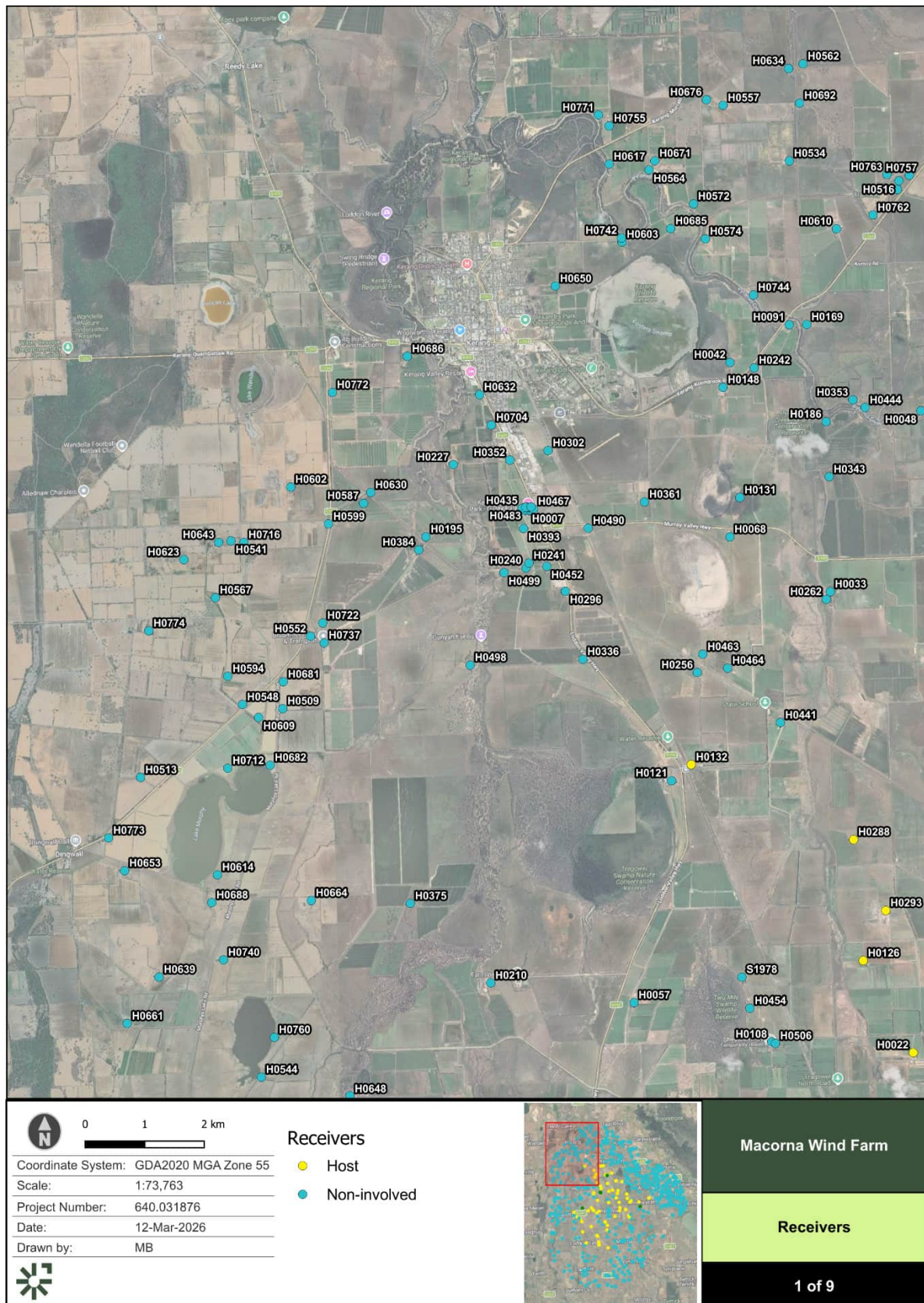
Receiver ID	Host Status	East	South	Distance to nearest WTG km	Predicted Noise Level dBA	Receiver ID	Host Status	East	South	Distance to nearest WTG km	Predicted Noise Level dBA
H0289	Not-Involved	247326	6022123	3.6	27.9	H0365	Host	235348	6021702	1.1	42.9
H0290	Not-Involved	232271	6035740	2.5	33.2	H0366	Not-Involved	232093	6021066	2.4	37.8
H0293	Host	228296	6031527	0.9	43.5	H0368	Not-Involved	242980	6027799	3.2	30.9
H0294	Not-Involved	236835	6031534	3.5	30.4	H0373	Not-Involved	235297	6036254	4.8	27.5
H0298	Not-Involved	247293	6026346	4.5	26.9	H0374	Not-Involved	237251	6030438	3.1	30.9
H0299	Host	231116	6031388	1.1	42.3	H0382	Host	230436	6034051	0.8	44.6
H0301	Not-Involved	232569	6006418	3.3	28.5	H0385	Not-Involved	238409	6028640	3.7	31.5
H0303	Not-Involved	247794	6022157	4.1	26.9	H0386	Not-Involved	242061	6019206	3.4	32.5
H0304	Not-Involved	240123	6029358	4.8	29.2	H0387	Not-Involved	232234	6020743	2.5	37.8
H0306	Not-Involved	238404	6015545	3.2	31.9	H0389	Not-Involved	235263	6035567	4.3	28.6
H0307	Host	229142	6010829	1.2	40	H0395	Not-Involved	221903	6019423	2.5	34.8
H0308	Not-Involved	234182	6015860	1.6	37.7	H0396	Not-Involved	223444	6025018	3.1	33.2
H0309	Host	224137	6017676	1.0	42.9	H0398	Host	228616	6013621	1.2	41.9
H0310	Not-Involved	247324	6021880	3.7	27.4	H0408	Not-Involved	238121	6032146	4.8	28.1
H0313	Not-Involved	224534	6008413	3.8	30.4	H0409	Not-Involved	236868	6029373	2.3	32.7
H0314	Host	235336	6021855	1.1	43	H0410	Host	235284	6020883	1.0	43.5
H0315	Host	230952	6017601	1.9	38.4	H0413	Not-Involved	247643	6025862	4.4	26.7
H0317	Host	237324	6025746	1.6	38.1	H0414	Not-Involved	231580	6031230	1.2	41.6
H0320	Host	227614	6025875	1.2	39.9	H0416	Not-Involved	232595	6005892	3.8	27.3
H0322	Not-Involved	222377	6012732	2.7	34	H0419	Host	225392	6011388	0.8	42.8
H0323	Not-Involved	233334	6035922	3.3	31	H0420	Not-Involved	241060	6026379	1.7	35.6
H0324	Not-Involved	228744	6019200	1.8	39.4	H0423	Not-Involved	243346	6028864	4.4	28.3
H0326	Host	231721	6024182	1.5	39.9	H0424	Host	234539	6025903	1.0	40.8
H0327	Not-Involved	219617	6020107	4.6	29.5	H0425	Not-Involved	237331	6032904	4.9	28.4
H0329	Host	238629	6023827	1.6	40	H0427	Not-Involved	230166	6016777	1.6	39.2
H0331	Not-Involved	225142	6025988	3.0	34.4	H0429	Not-Involved	227554	6027743	2.9	36.2
H0332	Not-Involved	226271	6025610	2.1	37	H0433	Not-Involved	224856	6027605	4.3	32
H0335	Not-Involved	238558	6018493	1.6	37.4	H0437	Host	229626	6028087	1.3	41.4
H0339	Host	227004	6021715	0.5	48	H0441	Not-Involved	226525	6034683	2.8	32.3
H0340	Host	235120	6023309	0.9	43.5	H0442	Not-Involved	233498	6034874	2.6	33.1
H0341	Not-Involved	227733	6027826	2.7	36.6	H0446	Not-Involved	245804	6024562	2.2	33
H0342	Not-Involved	235873	6011833	4.5	29.6	H0448	Host	232289	6019153	1.3	39.8
H0349	Not-Involved	232030	6021090	2.4	37.8	H0451	Host	224310	6021616	1.0	43
H0351	Not-Involved	233512	6037632	4.8	27.3	H0454	Not-Involved	226013	6029886	3.0	33.5
H0354	Not-Involved	227523	6027983	2.7	36.2	H0456	Host	231787	6019224	1.8	38.3
H0355	Host	240913	6023488	1.0	42.7	H0462	Not-Involved	223360	6018606	1.6	39.2
H0356	Not-Involved	245857	6024525	2.2	32.9	H0463	Not-Involved	225220	6035833	4.5	27.8
H0357	Host	228557	6020265	1.0	41.9	H0464	Not-Involved	225638	6035599	4.1	28.9
H0359	Not-Involved	227513	6028169	2.6	36.2	H0469	Host	238050	6019020	1.3	39.6
H0363	Not-Involved	226086	6027661	3.5	33.8	H0470	Host	232011	6023265	2.1	38.8
H0364	Not-Involved	222089	6017629	2.6	35.2	H0472	Not-Involved	232106	6021294	2.3	37.8

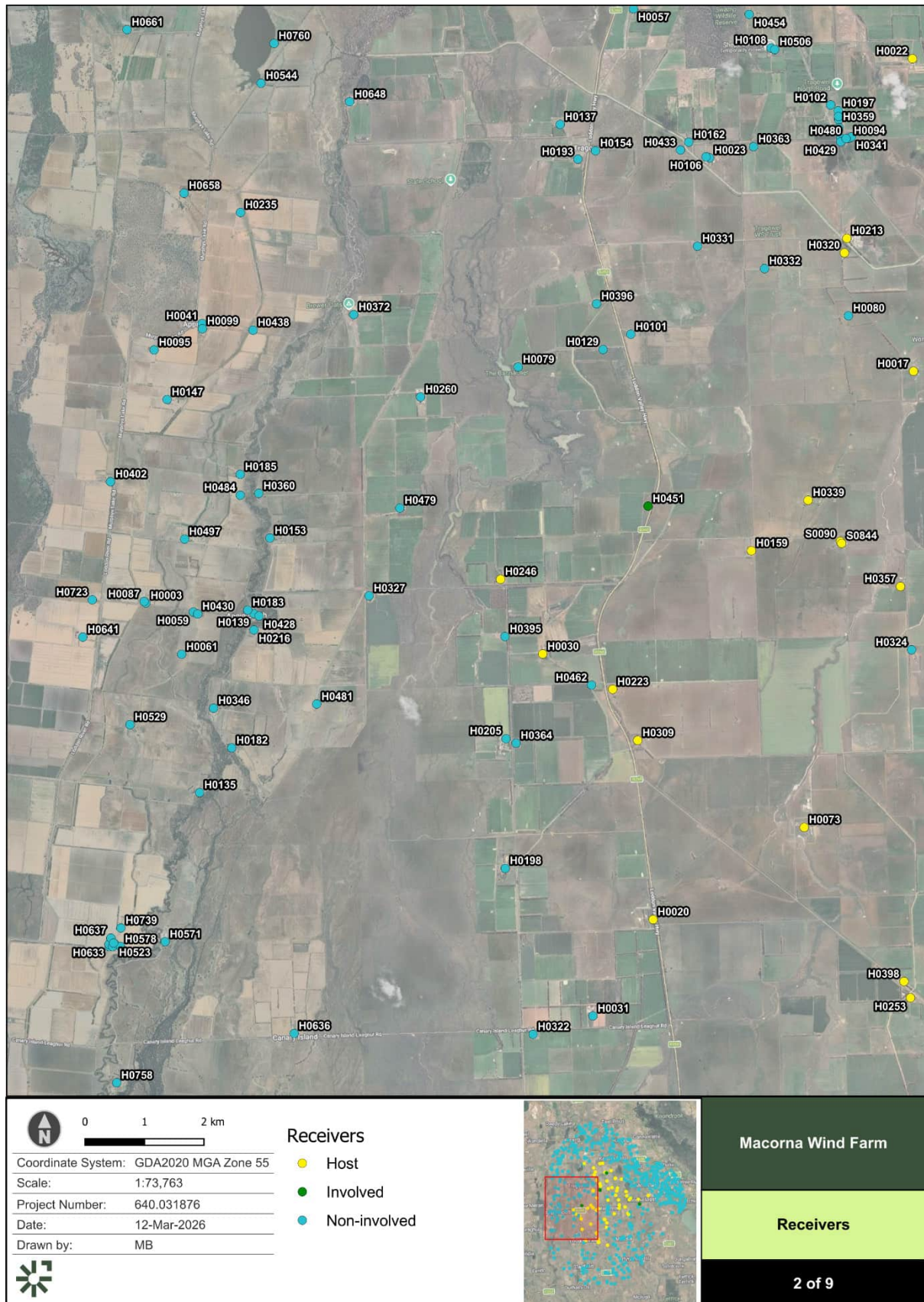


Receiver ID	Host Status	East	South	Distance to nearest WTG km	Predicted Noise Level dBA	Receiver ID	Host Status	East	South	Distance to nearest WTG km	Predicted Noise Level dBA
H0473	Not-Involved	242049	6019175	3.4	32.5	H0491	Not-Involved	242214	6029569	4.8	27.8
H0474	Host	229246	6020729	1.0	42.1	H0493	Not-Involved	247109	6024310	3.3	29
H0478	Not-Involved	224856	6010671	1.7	37.4	H0500	Not-Involved	247510	6026166	4.5	26.7
H0479	Not-Involved	220135	6021583	4.3	30	H0505	Not-Involved	237430	6028929	2.7	32.3
H0480	Not-Involved	227642	6027799	2.8	36.4	H0506	Not-Involved	226442	6029296	2.9	34.3
H0485	Not-Involved	231164	6035283	1.8	36.3	H0507	Not-Involved	231951	6021510	2.1	38

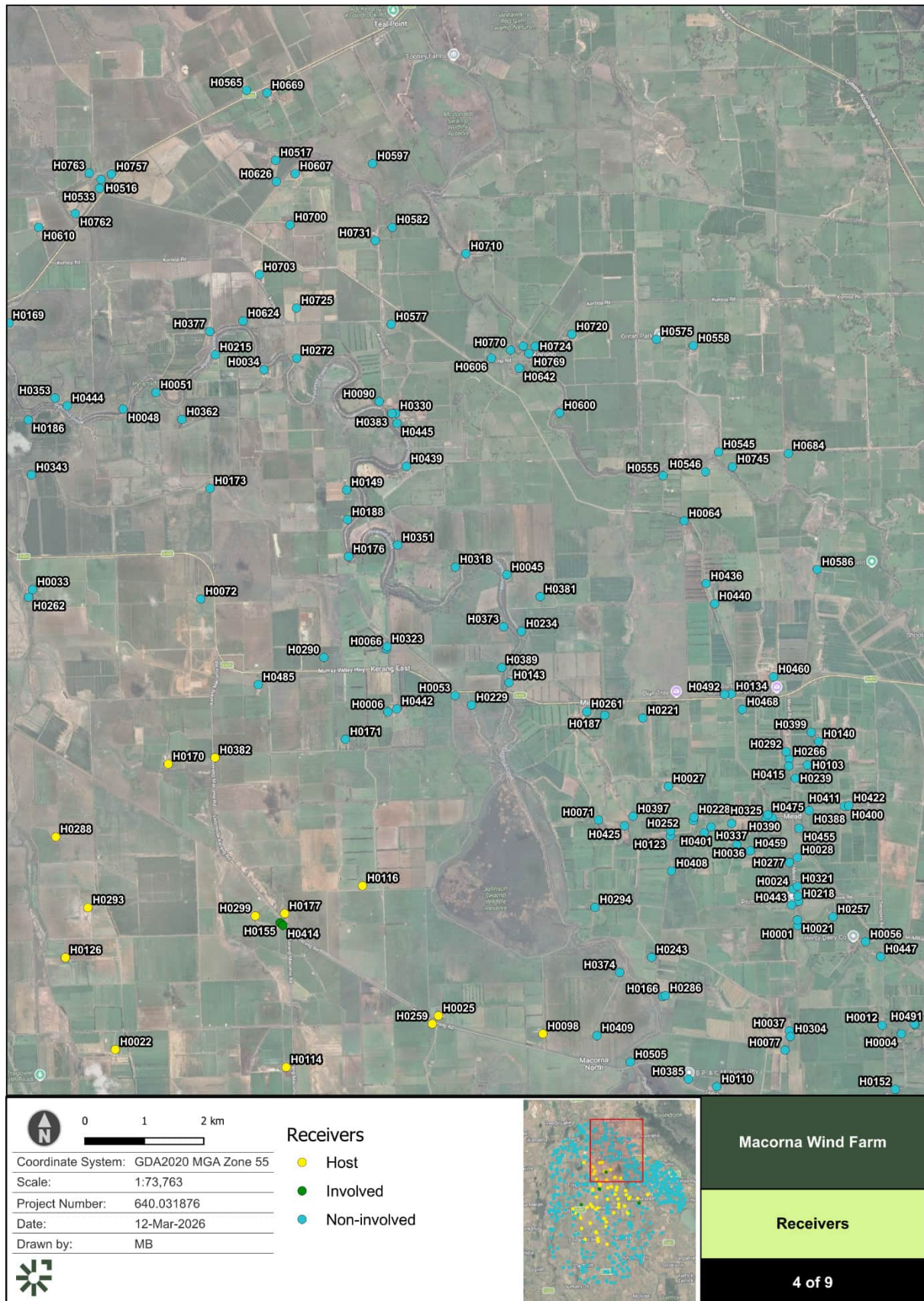


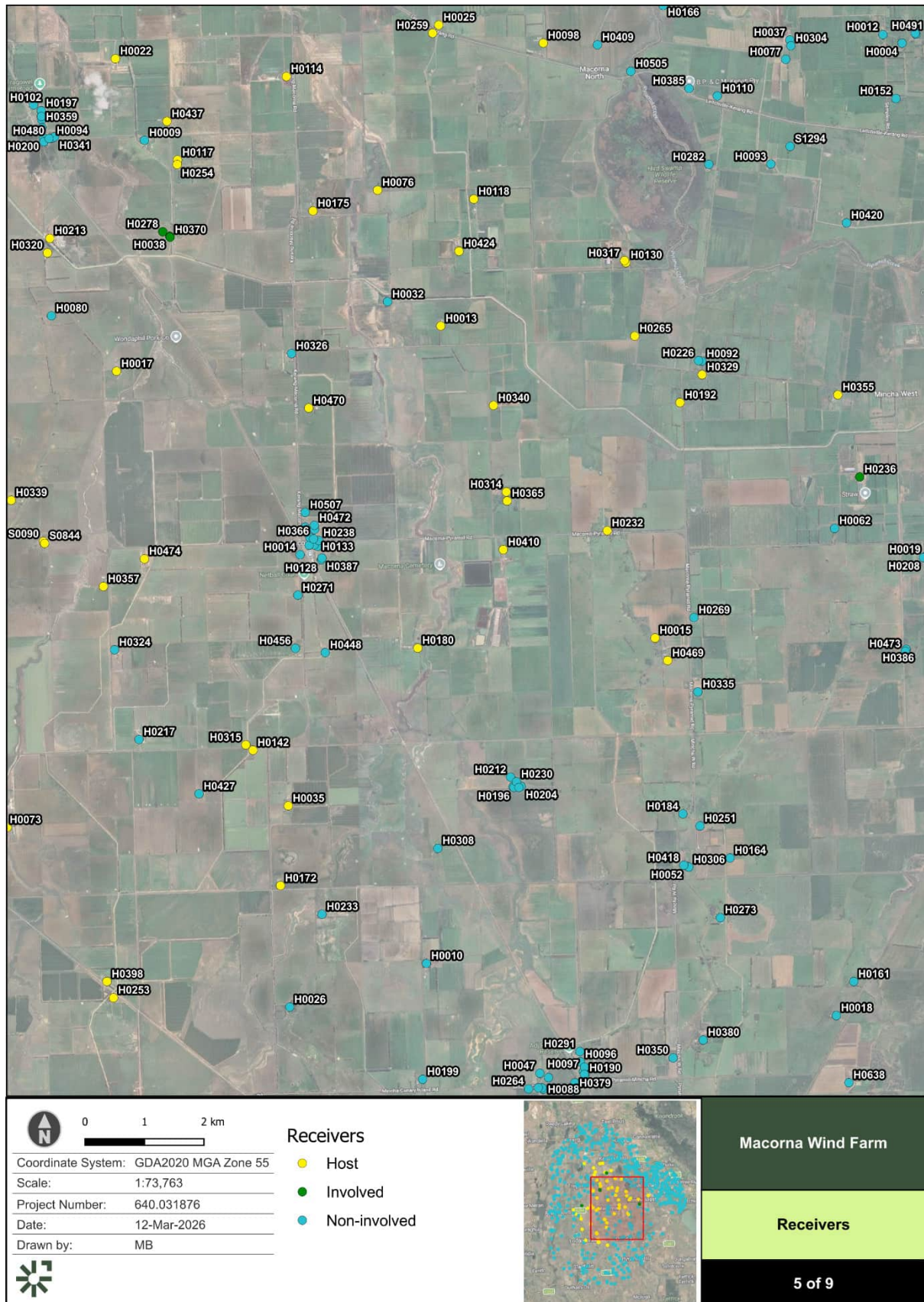
A.2 Detailed View of Sensitive Receivers

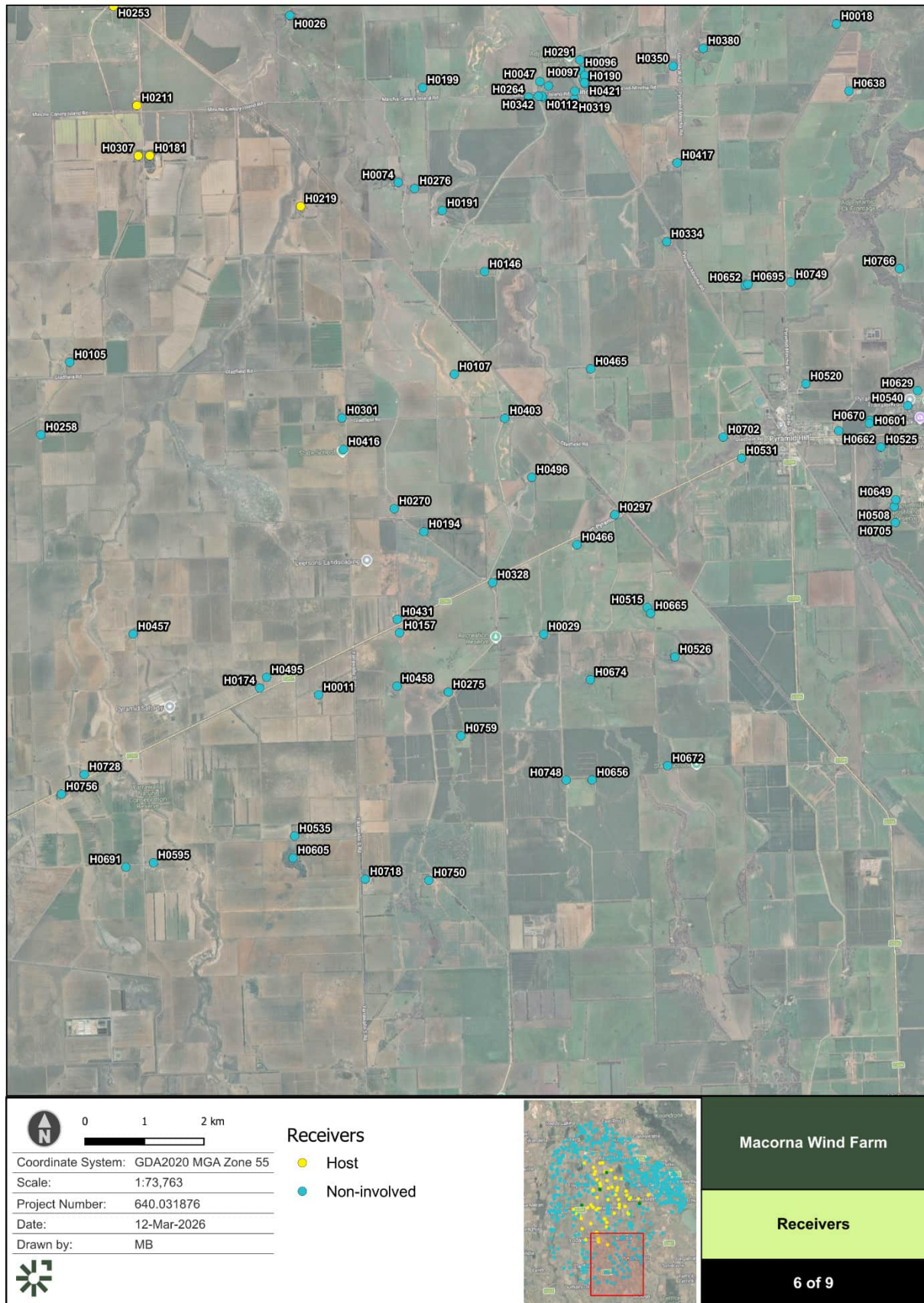


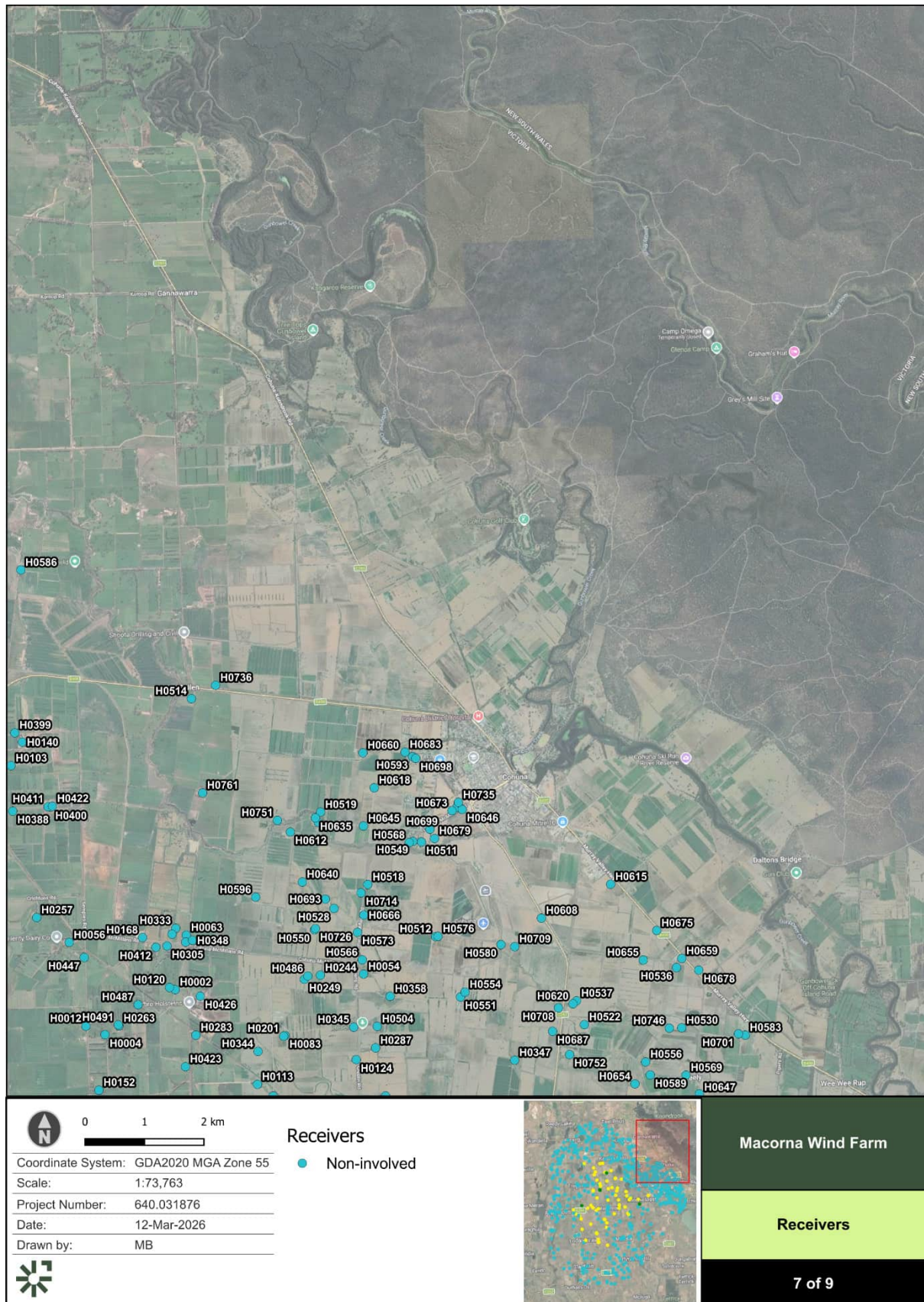


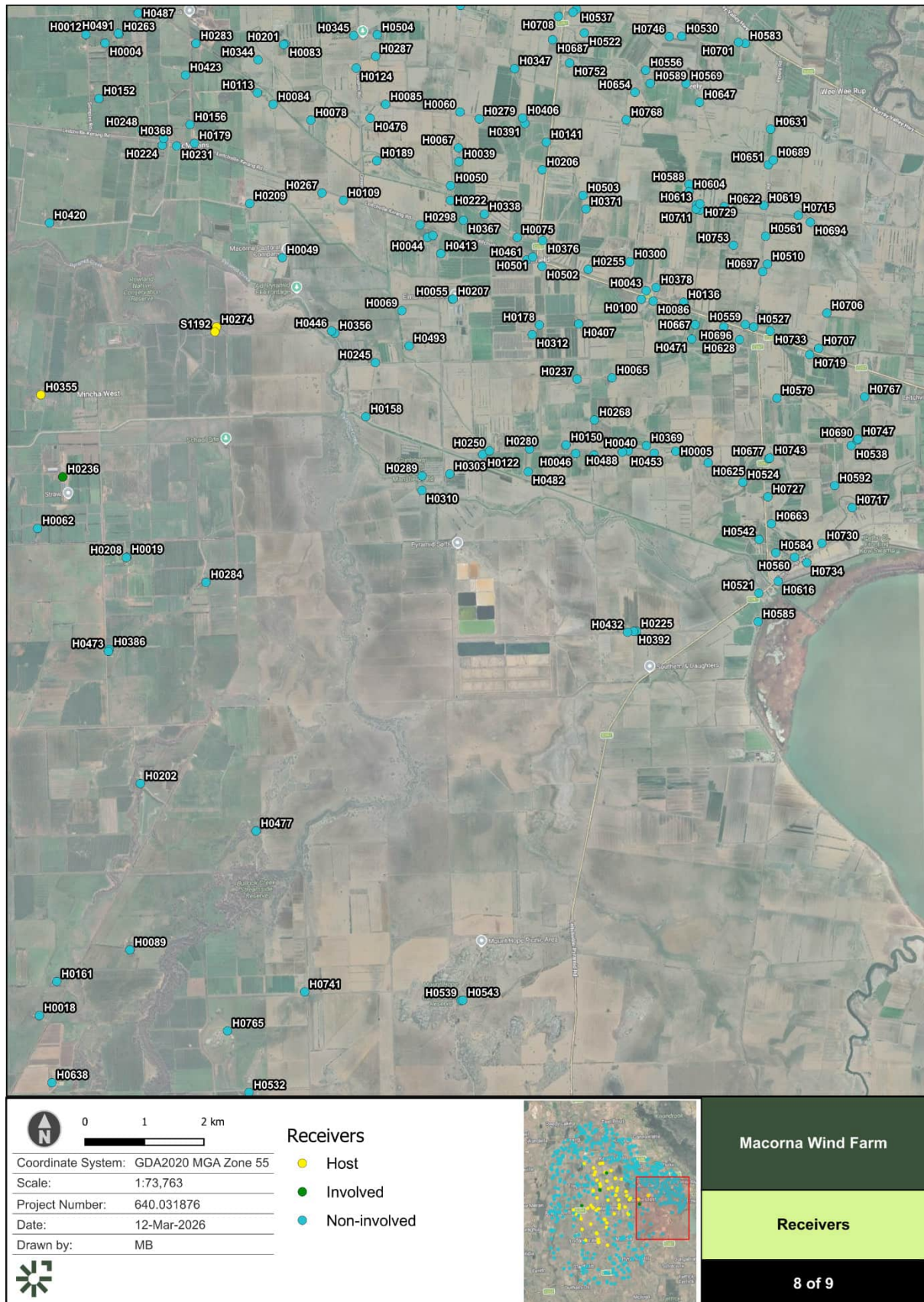




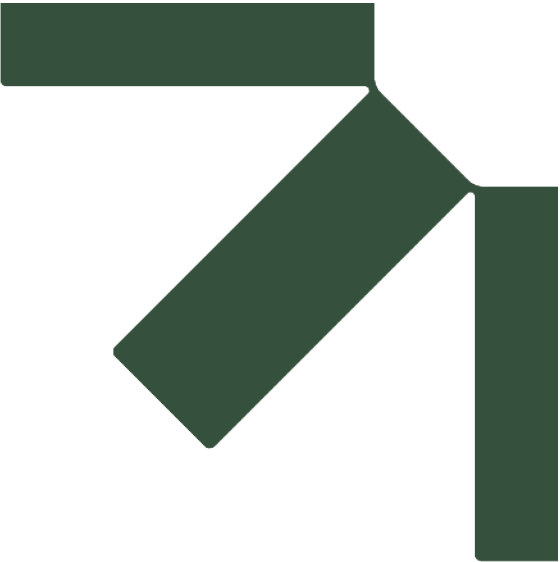












Appendix B WTG List

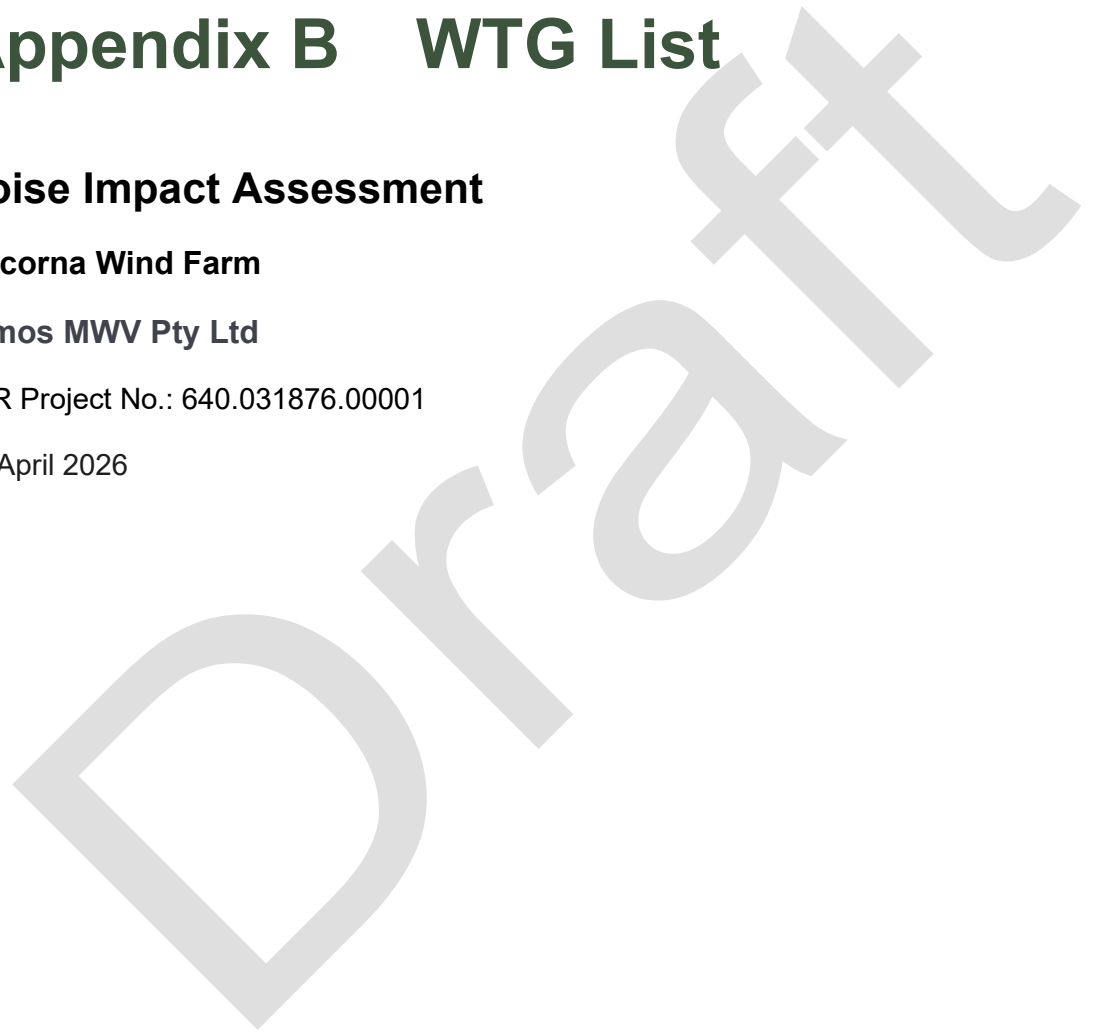
Noise Impact Assessment

Macorna Wind Farm

Atmos MWV Pty Ltd

SLR Project No.: 640.031876.00001

17 April 2026



B.1 Proposed WTG layout

Turbine Number	Easting UTM-X	Northing UTM-Y
1	229940	6033483
2	231186	6033466
3	230598	6033309
4	228864	6032823
5	232027	6032711
6	229801	6032616
7	228194	6032431
8	231454	6032428
9	229249	6031877
10	229710	6030908
11	228941	6030710
12	229440	6029895
13	230625	6029718
14	231450	6029697
15	232784	6029450
16	230031	6029326
17	233665	6028457
18	230850	6028449
19	231612	6027769
20	234291	6027681
21	233245	6027296
22	231171	6027169
23	230676	6026426
24	231258	6026100
25	235446	6025470
26	229909	6025146
27	228769	6025018
28	228181	6024829
29	241731	6024819
30	230385	6024768
31	236142	6024740
32	242853	6024326
33	242241	6024160
34	235495	6024143
35	236791	6023760
36	234030	6023628
37	229744	6023594

Turbine Number	Easting UTM-X	Northing UTM-Y
38	243936	6023413
39	243322	6023298
40	227668	6023194
41	242543	6023180
42	226922	6023167
43	226206	6023141
44	241790	6023004
45	228805	6022881
46	240264	6022733
47	237105	6022641
48	236331	6022587
49	234431	6022435
50	230073	6022429
51	239250	6022386
52	224992	6022362
53	227604	6022062
54	229530	6021872
55	226191	6021860
56	237541	6021823
57	238133	6021820
58	225628	6021817
59	239786	6021758
60	238758	6021728
61	228831	6021679
62	236491	6021660
63	226790	6021318
64	227781	6020925
65	224841	6020760
66	236351	6020663
67	224242	6020359
68	235755	6019992
69	225471	6019967
70	234592	6019954
71	226592	6019915
72	224975	6019546
73	236345	6019472
74	225888	6019087
75	234935	6018836
76	235582	6018642



Turbine Number	Easting UTM-X	Northing UTM-Y
77	233453	6018601
78	234243	6018591
79	236918	6018365
80	236277	6018342
81	226376	6018116
82	225112	6018103
83	225715	6018011
84	232974	6017771
85	227891	6017660
86	226182	6016992
87	225065	6016988
88	232801	6016717
89	224484	6016629
90	225592	6016263
91	228003	6016258
92	232236	6016169
93	224941	6015760
94	229629	6015289
95	225891	6015060
96	227105	6014905
97	230628	6014738
98	230081	6014566
99	225391	6014360
100	226512	6014321
101	227587	6014179
102	225931	6013893
103	224891	6013660
104	227323	6012994
105	226692	6012862
106	225301	6012460
107	230004	6012153
108	225891	6012060
109	227900	6011902
110	226452	6011655
111	231496	6010968
112	230391	6010810
113	230991	6010460
114	231001	6009303



Appendix C Detailed View of Predicted Noise Contours at 10 m/s

Noise Impact Assessment

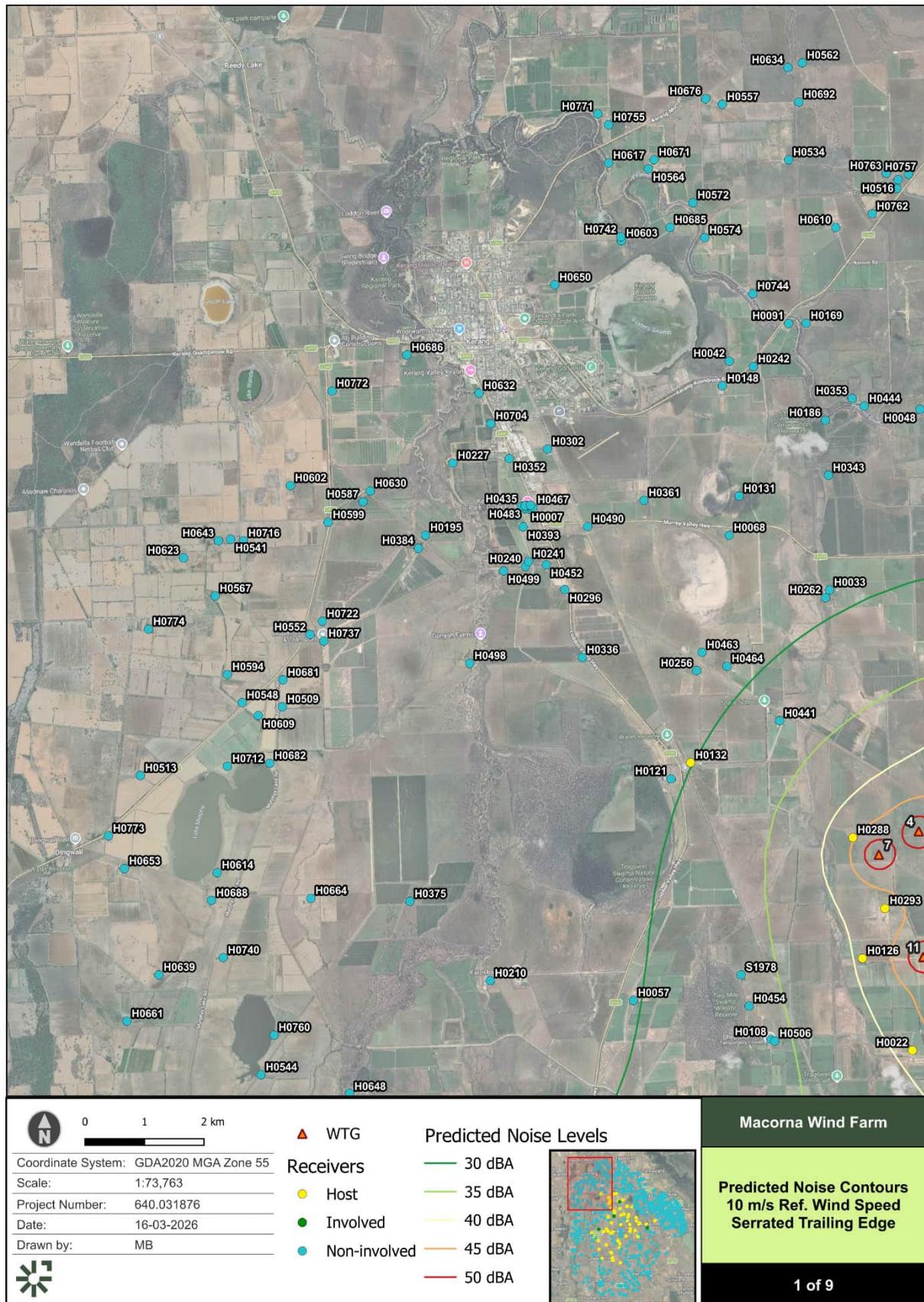
Macorna Wind Farm

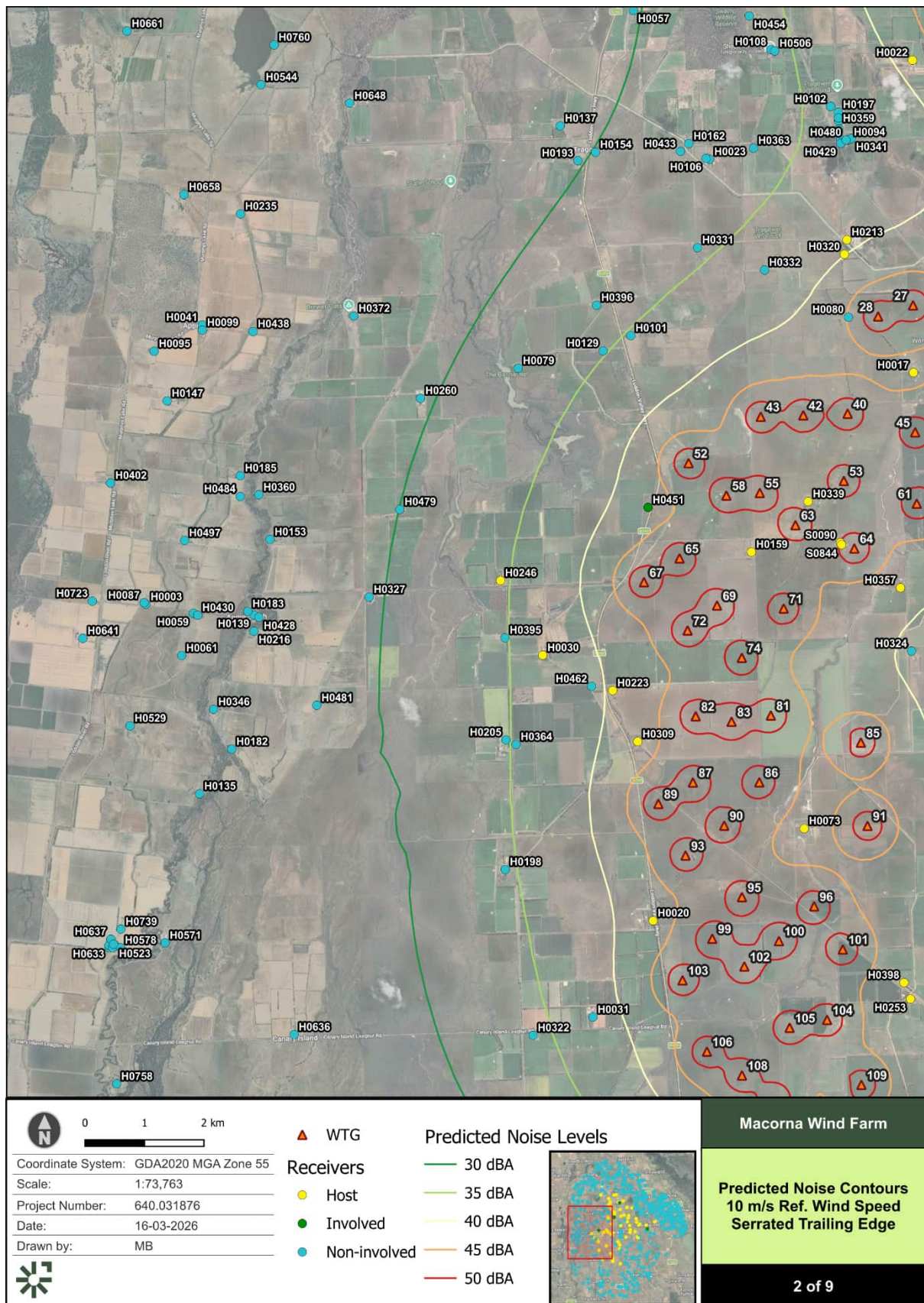
Atmos MWV Pty Ltd

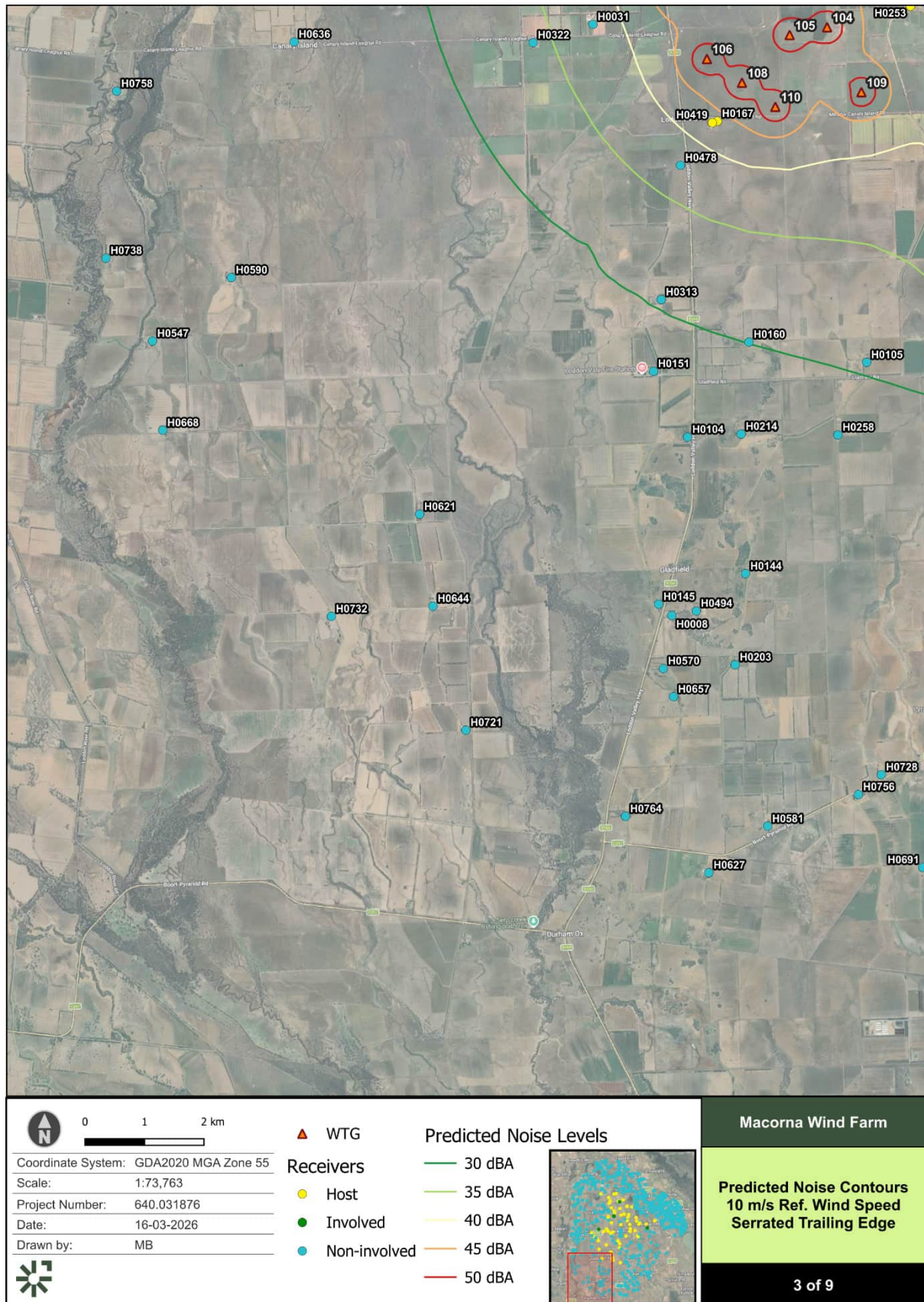
SLR Project No.: 640.031876.00001

17 April 2026

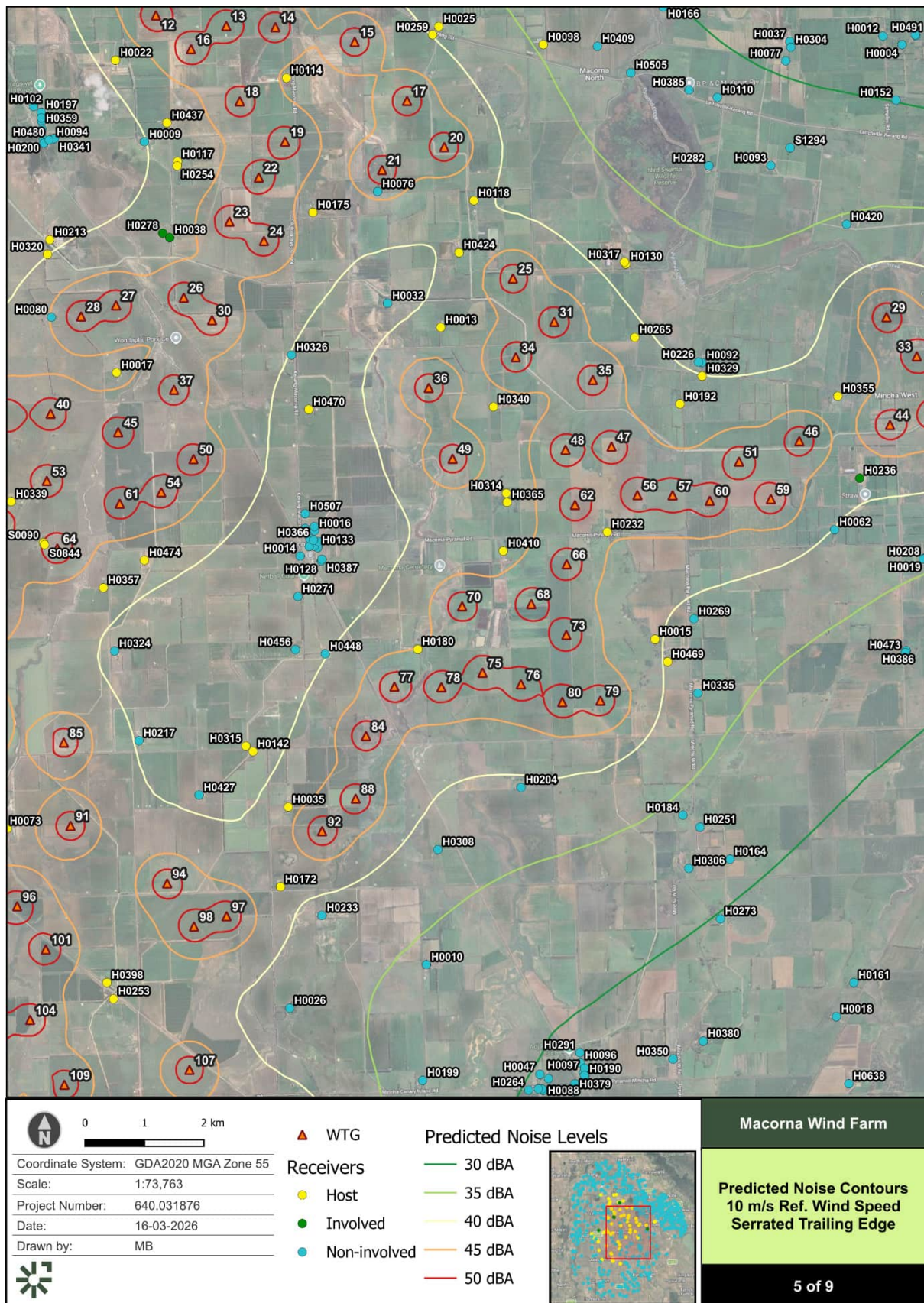


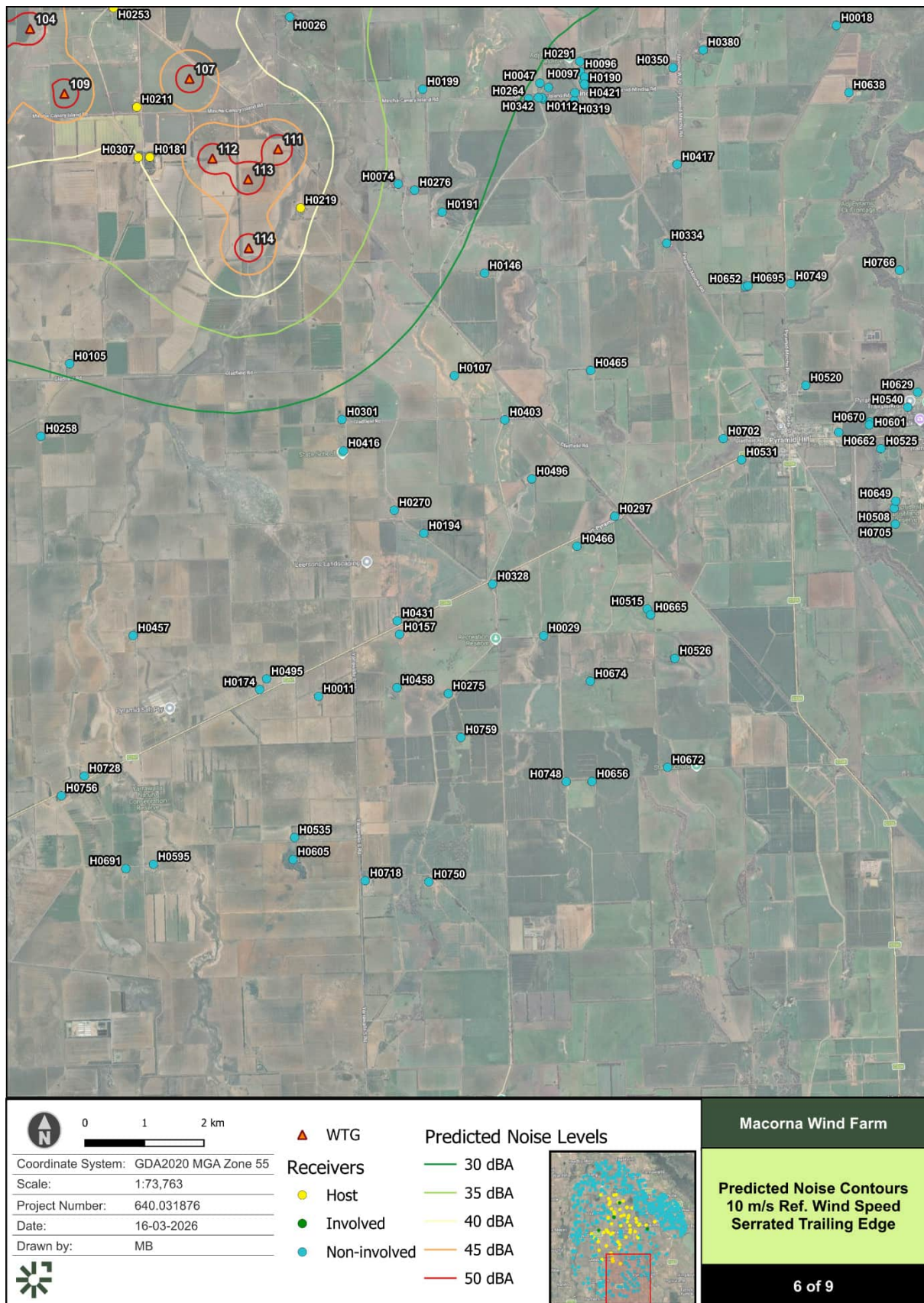


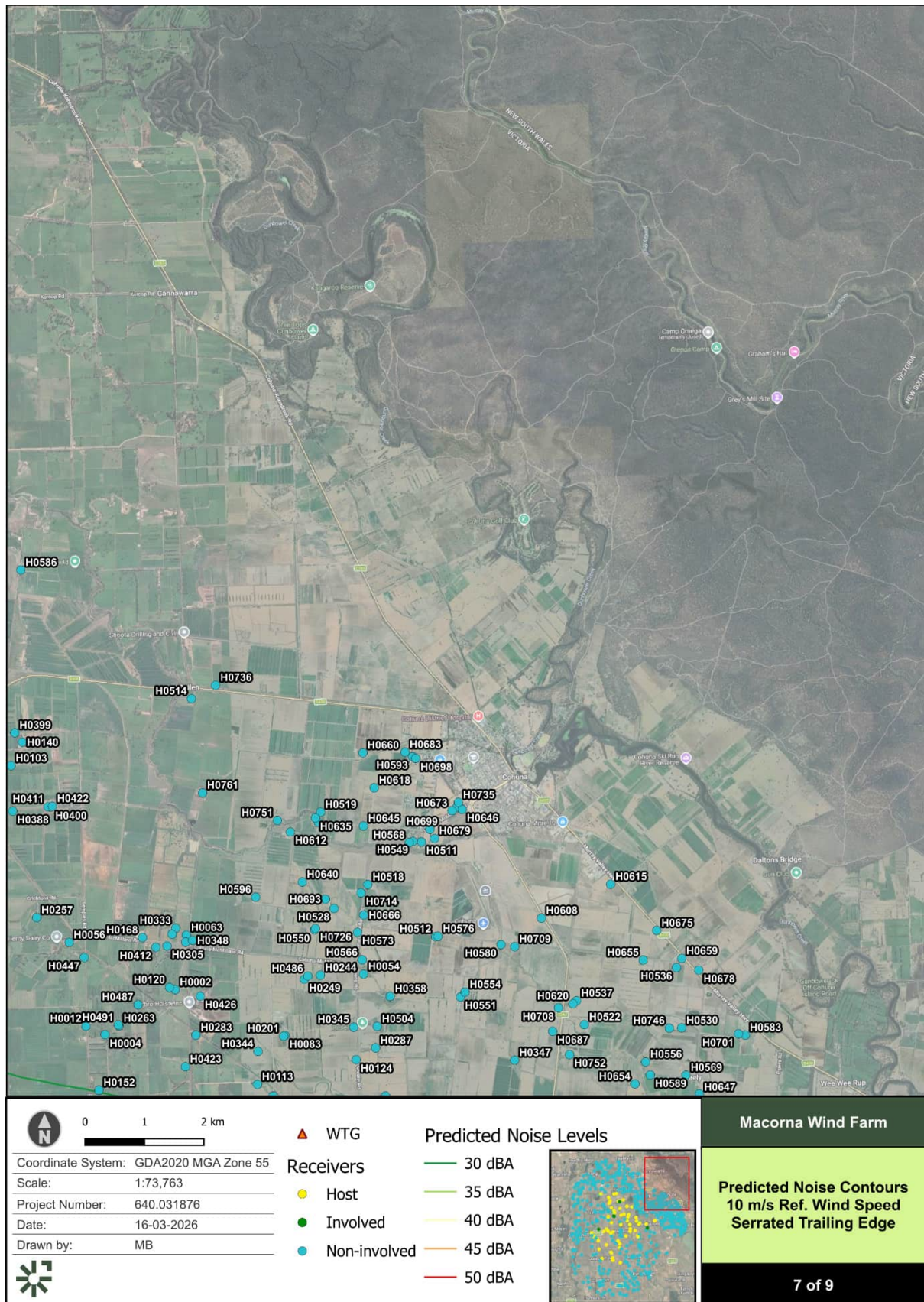


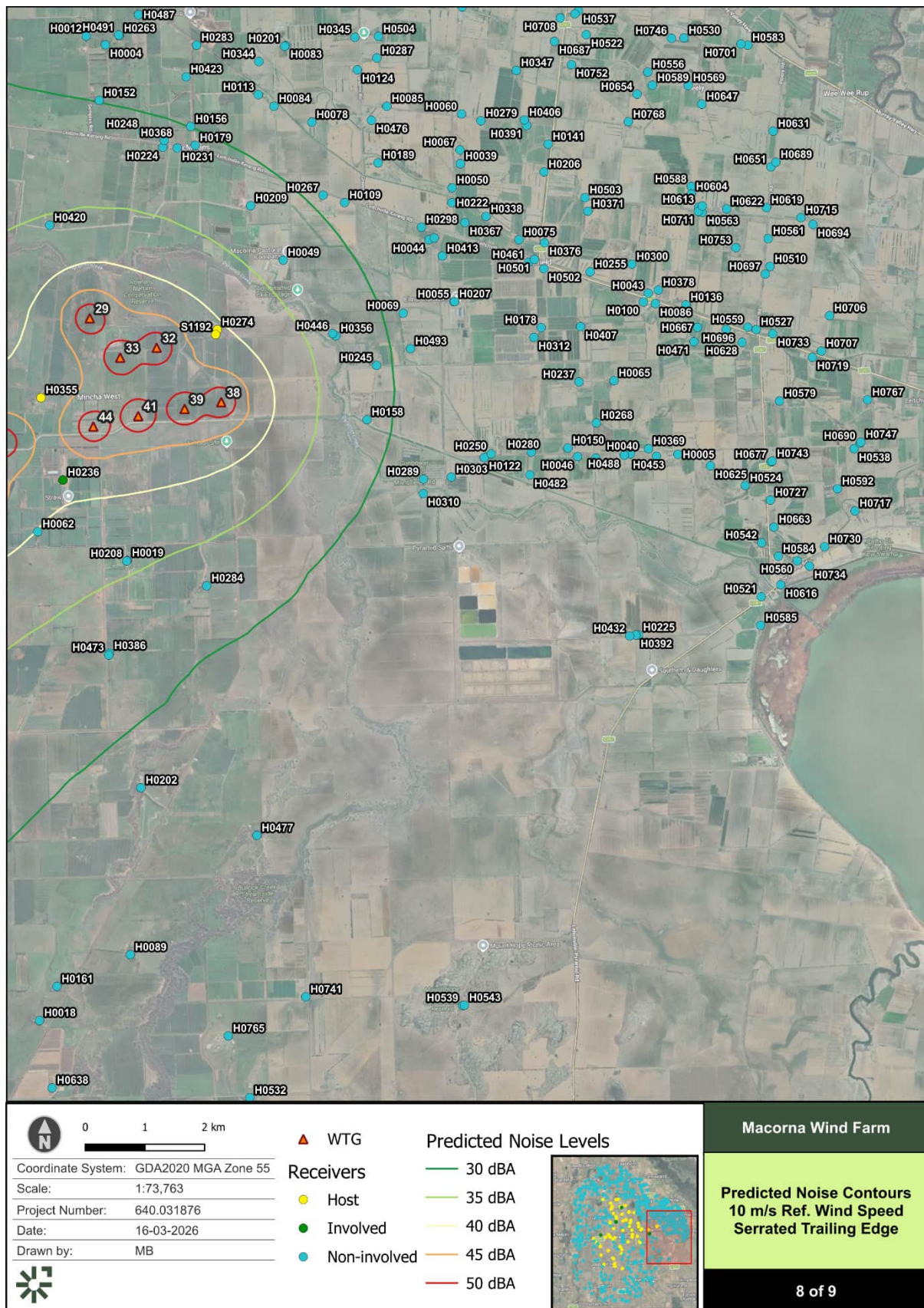


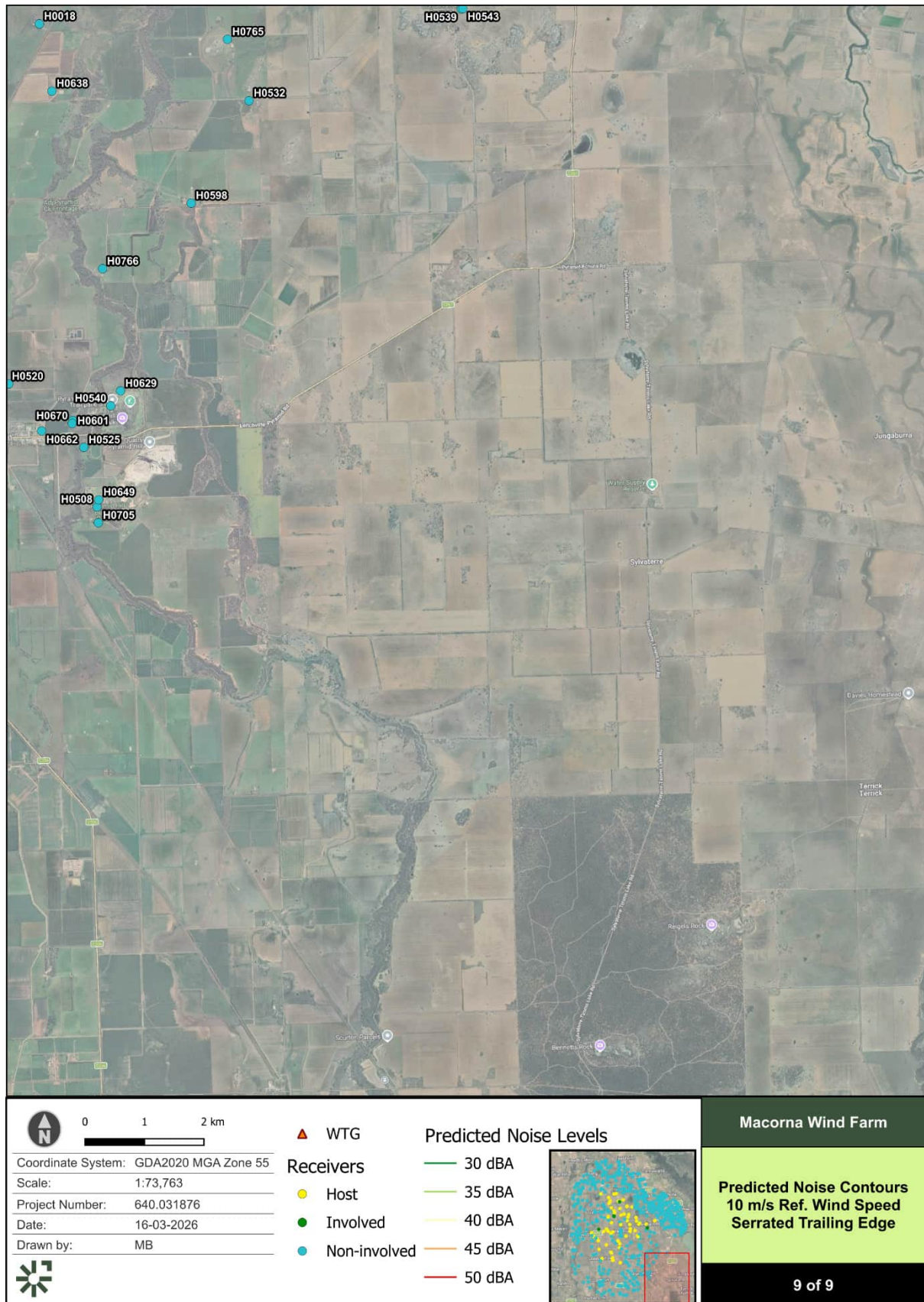


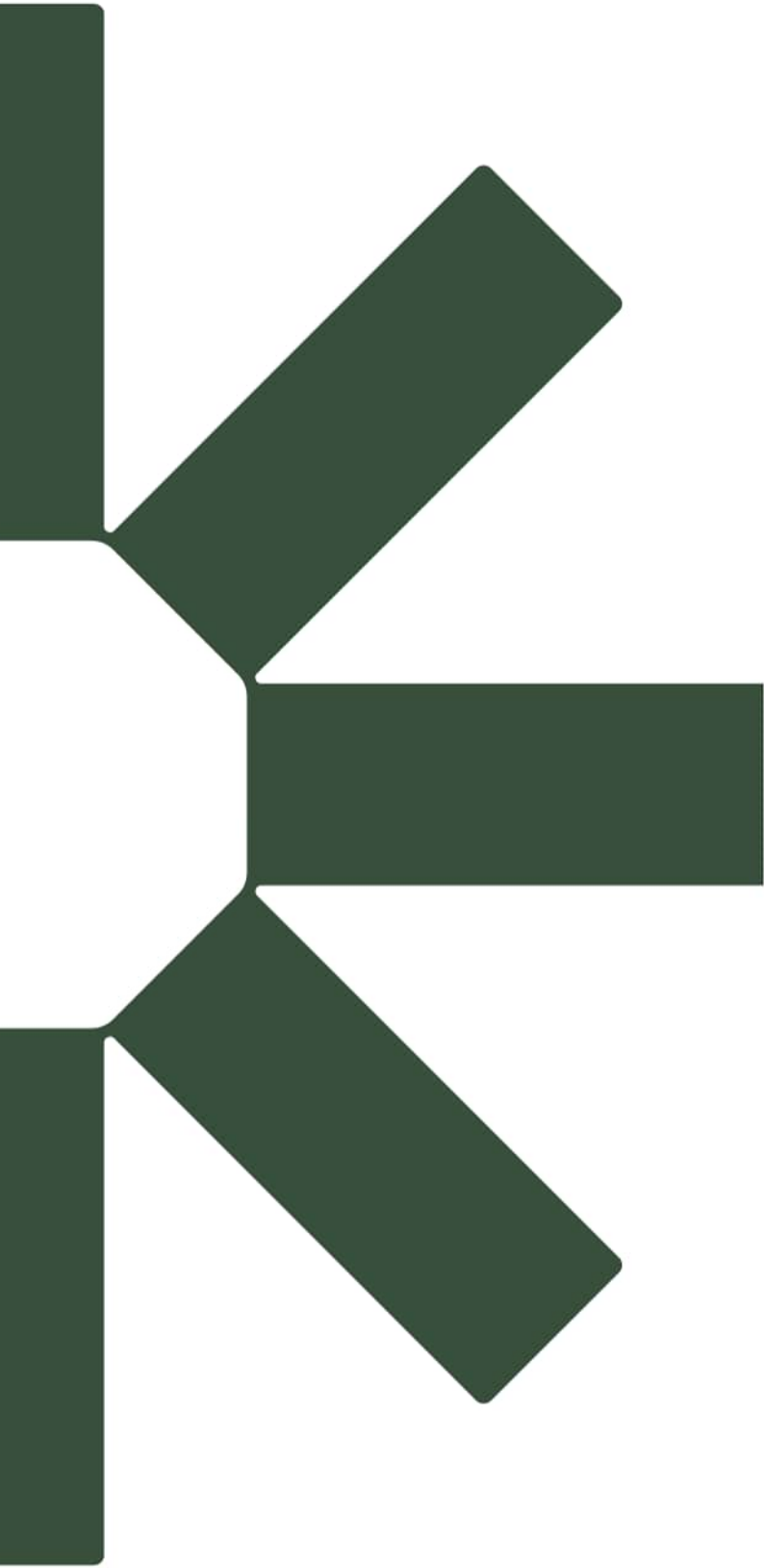












Making Sustainability Happen