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First Building - SSDA

Operational Noise and Vibration Impact Assessment

FEBRUARY 2022

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First Building - SSDA
Operational Noise and Vibration Impact Assessment

Western Parkland City Authority

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REV	DATE	DETAILS
4.1	15 February 2022	Updated with response to DPIE comments

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Approved by:	Rebecca Warren	15 February 2022	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Executive summary

WSP Australia Pty Ltd (WSP) was engaged to undertake an operational noise and vibration impact assessment for the proposed research and development facility (referred to as the First Building) located at 215 Badgerys Creek Road, Bringelly.

The Project forms part of the overall Western Sydney Aerotropolis development and is located within the Bradfield (Aerotropolis core) Precinct.

The operational noise and vibration impact assessment has been undertaken in accordance with the issued *Secretary's Environmental Assessment Requirements* (SEARs), the *Western Sydney Aerotropolis Development Control Plan* (DCP) – Phase 1 (2020) and other relevant standards and guidelines.

Sensitive receivers for both noise and vibration were identified using aerial images of the site and its surroundings. It was identified that the existing nearby residential dwellings will also be developed in the future, however information relating to whether these dwellings will be occupied when the Project is operational was unknown. For a conservative assessment, it has been assumed that these dwellings would be occupied and were included in the assessment.

Due to the COVID-19 lockdowns and the stay at home orders that occurred at the time of preparation of this report, long-term noise monitoring could not be undertaken as part of this assessment. Therefore, historical long term noise monitoring conducted near the Project site from publicly available documentation from the proposed Sydney Metro Line was adopted.

This report provides a summary of noise and vibration considerations for a commercial development project. Other identified aspects of noise and vibration impacts beyond the scope of the SEARs and DCP are reviewed against New South Wales Environmental Protection Authority Policies and Guidance.

The key elements of noise and vibration impacts covered in this report are:

- Operational noise from the development
- Noise from carpark and loading dock activities
- Noise from noisy internal equipment
- Noise related to road traffic

Noise emission from the car park and mechanical plant were predicted at the nearby sensitive receivers. The predicted noise levels complied with the operational noise criteria during all periods of the day. It is recommended that a more detailed assessment of mechanical plant should be undertaken during the Construction Certificate (CC) stage, when more details of the mechanical plant is available.

Based on the findings of this assessment, it is considered that the operational noise and vibration emissions from the Project can achieve compliance with relevant environmental noise and vibration criteria with commercially available measures.

1 Introduction

WSP Australia Pty Ltd (WSP) has been engaged by Western Parkland City Authority (WPCA) to provide an Operational Noise and Vibration Impact Assessment (NVIA) for the First Building, a proposed research and development facility ('the Project') located at 215 Badgerys Creek Road, Bringelly.

1.1 Site and Project Description

The Project site forms part of the planned Western Sydney Aerotropolis that surrounds the future Western Sydney Airport. The Western Sydney Aerotropolis is divided into several precincts, including Bradfield (Aerotropolis Core), Badgerys Creek, Wianamatta-South Creek, Northern Gateway and Agribusiness.

The Project site is located at 215 Badgerys Creek Road, Bringelly which forms part of the Bradfield Precinct. It is proposed that 215 Badgerys Creek Road is to be subdivided into multiple lots, as outlined in Figure 3.1.

The Project will include the construction, fit out and use of an advanced manufacturing research and development facility in Bradfield City Centre. The proposed facility will consist of the following areas:

- Laboratories;
- Open plan workspace;
- Outdoor plaza;
- Community park; and
- On grade carpark.

Indicative specialised equipment and machinery provided in the First Building may include:

- Industrial robots/collaborative robot/conveyor and continuous automation;
- Virtual reality/ augmented reality suites;
- Additive manufacturing plant (including Electron beam AM machine, Laser AM machine);
- Composites bay (including industrial oven, moulding press);
- Subtractive suites (including CNC machines);
- Microscopes, metrology and measuring; and
- digital technology (CAD/DM/PLM/MES); and
- Other various advance industrial equipment and technology.

This assessment has been conducted with consideration to the following guidelines:

- *Western Sydney Aerotropolis Development Control Plan 2020* (WSA DCP);
- *NSW Noise Policy for Industry 2017* (NSW NPfI);
- *NSW Road Noise Policy 2011* (NSW RNP);
- *NSW EPA Assessing Vibration: a technical guideline 2006* (AVTG);
- *NSW State Environmental Planning Policy (Infrastructure) 2007* (NSW ISEPP); and
- *NSW Development Near Rail Corridors and Busy Roads – Interim Guideline 2008* (NSW ISEPP).

1.2 Acoustic Engineer Accreditation

WSP staff involved with the preparation of this report are ‘suitably qualified’ through:

- An Engineering degree from an Australian University;
- Membership of the Australian Acoustical Society (AAS); and/or,
- Working for a member firm of the Association of Australasian Acoustical Consultants (AAAC).

2 Planning requirements

This report addresses the following planning requirements.

2.1 Western Sydney Aerotropolis DCP

For developments within the Western Sydney Aerotropolis Precinct, the site specific DCP (2020) is applicable. Section 4.5 of the DCP outlines the following requirements relating to noise and vibration:

P01: *The generation of noise and vibration from the development does not cause environmental harm or nuisance to adjoining properties or other noise sensitive land uses.*

Development should:

a) be located in appropriate areas;

b) propose best practice design and noise attenuation measures; and

c) *propose operational practices that will minimise noise nuisance for adjoining sensitive land uses.*

P02: *Noise sensitive land uses are located to avoid adverse impacts from transport corridors or noise generating developments (e.g. the Airport, entertainment venues, child care centres or industrial zones).*

PO3: *Mechanical plant and equipment do not adversely impact on the acoustic and vibration amenity of adjoining sites.*

P04: *The construction phase of the development does not cause adverse acoustic impacts on surrounding sensitive uses/receivers.*

PO5: *Industrial development is to be in accordance with Protection of the Environment Operations Act 1997 and NSW Industrial Noise Policy 2000.*

The NSW *Industrial Noise Policy 2000* has since been superseded by the NSW NPfI 2017 which has been adopted for this assessment; as per the transition guidance notes from the NSW NPfI.

It is anticipated that compliance with the NSW NPfI, as per Section 4.1.1, will satisfy the DCP requirements.

2.2 Planning Secretary's Environmental Assessment Requirements (SEARs)

The SEARs (Application Number: SSD-25452459) require an Environmental Impact Statement (EIS) to be prepared for the Project. The requirements specific to noise and vibration are as follows:

Noise and Vibration – a quantitative noise and vibration impact assessment undertaken by a suitably qualified acoustic consultant in accordance with the relevant Environment Protection Authority guidelines and Australian Standards. The assessment must:

- *detail construction and operational noise and vibration impacts (including cumulative impacts, provision of operational noise contours and sleep disturbance assessment) on nearby sensitive receivers and structures*
- *outline the proposed management and mitigation measures that would be implemented.*

It is anticipated that this report will satisfy the SEARs requirements.

This report assesses operational noise and vibration impacts only. Construction noise and vibration are discussed in the Construction Noise and Vibration Impact Assessment (CNVIA) report.

2.3 Liverpool Council Advice

The Liverpool Council response to the request for SEARs (ref: SSD1-3/2021; dated 10 September 2021), outlines the following requirements:

11. Section 8 EIS Technical Studies identifies the technical reports anticipated as being prepared for the EIS. With respect to Environmental Health, the following reports are noted as appropriate for this development:

Phase 1 Site Investigation,

- *Air Quality Impact Assessment,*
- *Noise and Vibration Impact Assessment, and*
- *Construction and Operational Waste Management Plan*

To improve environmental health outcomes and efficiency during the development assessment process, Liverpool City Council requires development applications to be supported by technical reports prepared by suitably qualified and industry certified environmental consultants.

Liverpool City Council currently recognizes environmental consultants with the following qualifications, membership and/or certifications;

(…)

b) Acoustic Reports

- *A member of the Australian Acoustical Society*
- *Employed by an Association of Australasian Acoustical Consultants (AAAC) member firm*

It is anticipated that this report, will satisfy the requirements as set out by Liverpool City Council.

3 Existing environment

This section provides an overview of the existing noise environment surrounding the site.

3.1 Sensitive Receivers

The Project has the potential to adversely impact nearby properties that are considered sensitive to noise and vibration. Receivers potentially sensitive to noise and vibration, as defined in the NPfI, have been identified in the area surrounding the Project.

It is noted that the nearby properties form part of the Bradfield Precinct and will also be developed in the future. The timing of when the nearby properties are to be developed is not known at this stage but for a conservative assessment, it is assumed that the nearby residential dwellings are still occupied and considered as noise sensitive receivers for the purpose of this assessment.

The most affected receivers are the residential dwellings located to the west of the Project site.

Sensitive receiver locations are identified in Table 3.1. A summary of assessed residential receivers is presented in Figure 3.1. No vibration-sensitive heritage items or areas containing vibration-sensitive equipment have been identified in the Project area.

Table 3.1 Nearby noise sensitive receivers

RECEIVER ID	RECEIVER ADDRESS	RECEIVER TYPE	APPROXIMATE DISTANCE FROM PROJECT SITE (m)
R1	145 Badgerys Creek Road, Bringelly	Residential	60
R2	155 Badgerys Creek Road, Bringelly	Residential	40
R3	175 Badgerys Creek Road, Bringelly	Residential	60
R4	475 Badgerys Creek Road, Bringelly	Residential	1500
R5	25 The Retreat, Bringelly	Residential	700
R6	11 Medich Place, Bringelly	Residential	1200
R7	Proposed Metro Station	Commercial	130

3.2 Existing noise environment

3.2.1 Impact of Covid-19

Due to Stay-At-Home orders to reduce the spread of COVID-19, noise monitoring was not able to be conducted at the time of writing of this report. It is expected that current noise levels will be considerably lower than normal levels, due to reduced traffic and pedestrian activity, and they therefore cannot be considered representative for the location, affected land uses or conditions.

WSP has adopted publicly available existing noise measurement data from past developments near the Project site. This method has previously been accepted by the NSW EPA and TfNSW where site-specific measurements were unable to be completed.

Noise monitoring data was adopted from the noise assessment previously undertaken for the *Sydney Metro – Western Sydney Airport Noise and Vibration Assessment*, dated October 2020 ('the Sydney Metro Report')[1].

3.2.2 Historical long term monitoring

Long term noise monitoring was conducted as part of the Sydney Metro Report. The noise monitoring location identified as NM13 in the Sydney Metro Report was located at 80 Mersey Road, Bringelly. The noise logger was located approximately 2 km west of the Project site as shown in Figure 3.1. Monitoring was undertaken between Thursday 27 February and Tuesday 10 March 2020.

It is considered that in the absence of site-specific data, the adoption of these 2020 noise levels is suitable for the purpose of this assessment, and that the measured noise levels in 2020 are representative of the current noise environment.

It is anticipated that background noise levels at the receivers near the Project would be influenced by traffic noise along Badgerys Creek Road and distant traffic noise from The Northern Road.

As a result, it is considered that the background noise levels adopted from NM13 provide a conservative estimate of background noise levels at Project affected receivers, which are likely to experience lower background noise levels.

The adopted background noise levels (rating background levels) are summarised in Table 3.2.

Table 3.2 Summary of ambient noise levels

LOCATION	BACKGROUND NOISE LEVEL dBA RBL[2]			AMBIENT NOISE LEVEL dBA $L_{EQ\ 15\ MIN}$[3]		
	DAY	EVENING	NIGHT	DAY	EVENING	NIGHT
NM13 - 80 Mersey Road, Bringelly	38	35	34	58	52	51

(1) All values expressed as dBA and rounded to nearest 1 dBA

(2) RBL – rating background level. The overall single-figure background level representing each assessment period (daytime/evening/night-time) as defined in the NPfI.

(3) L_{eq} - Equivalent continuous (energy average) A-weighted sound pressure level

(4) Daytime (7am-6pm), Evening (6pm-10pm), Night (10pm-7am), 6am – 7am

Noise monitoring locations identified in Figure 3.1.

[1] Source:https://www.sydneymetrowsa.com/static/25c75e763511034fa769fb69b351b734/eis-technical-paper-2-part-1.pdf (accessed 10 October 2021)

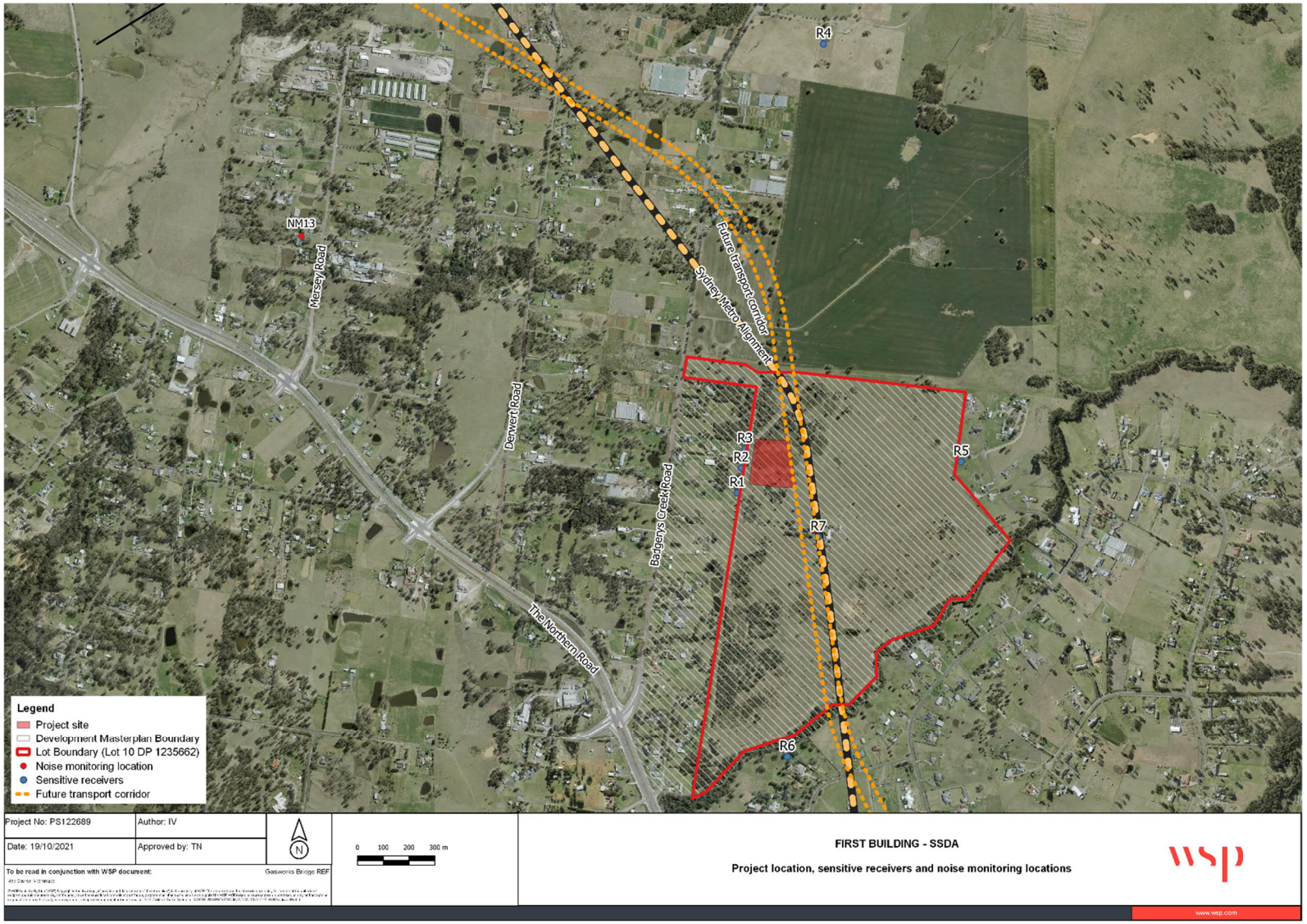


Figure 3.1 Project site, sensitive receivers and monitoring locations

4 Noise and Vibration Criteria

Noise and vibration criteria applicable to any future residential development are derived from various Australian Standards, local and state policies and industry guidelines. These are summarised in Table 4.1.

Table 4.1 Applicable policies and guidelines

ASSESSMENT	APPLICABLE POLICIES AND GUIDELINES	RELEVANT ASPECTS OF DEVELOPMENT
Industrial noise emissions	NSW EPA Noise Policy for Industry Western Sydney Aerotropolis DCP	Noise from sources (such as mechanical plant) associated with the development Noise emissions from vehicular movements on the site, including car parking
Road traffic noise emissions	NSW Road Noise Policy	Noise from additional traffic on public road generated by the development
Ground-borne rail noise and vibration	NSW State Environmental Planning Policy (Infrastructure) NSW Assessing Vibration: a technical guideline	Internal ground/structure borne noise and vibration to development

4.1 Environmental Noise Emissions

Operational noise emissions from the development will be governed by the NSW NPfI. The NSW NPfI is designed to ensure continued amenity as developments are built and as such applies to emissions such as from fixed mechanical plant and air conditioning.

While it is the ultimate responsibility of Council to determine appropriate noise emission limits for residential developments, the following sections of this report provide a guideline on the appropriate noise limits for fixed mechanical plant (such as external air conditioner units).

The assessment procedure for noise egress from the development has three components:

- Controlling intrusive noise impacts in the short term for nearby residences;
- Maintaining noise level amenity for nearby residences and other land uses; and
- Assessment of sleep disturbance for nearby residences.

In assessing the noise impact of the development, all three components must be considered for nearby residential receivers. In most cases, one component will become the limiting criterion and form the project trigger level.

4.1.1 NSW Noise Policy for industry

Noise emission from noise sources associated with the development must comply with the noise criteria stipulated in the NSW NPfI.

4.1.1.1 Project intrusiveness noise level

The project intrusiveness noise level for residential receivers prescribed in the NSW NPfI may be summarised as:

- $L_{Aeq,\ 15\text{-}minute} \leq$ *Rating Background Level* (L_{A90}) + 5 dB

Based on the RBL as outlined in Section 2 of this report, the project intrusiveness noise level has been established for the Project in accordance with the NSW NPfI and is presented in Table 4.2.

Project intrusiveness noise levels are used in combination with amenity noise levels to assess the potential impact of noise on nearby sensitive land uses.

Table 4.2 Established Project Intrusiveness Noise Level, residential receivers only

RECEIVER LOCATION	TIME PERIOD	RBL dBA	PROJECT INTRUSIVENESS NOISE LEVEL (RBL + 5 dB) dBA $L_{eq,\ 15\ min}$
Residential receivers	Day	38	**43**
	Evening	35	**40**
	Night	34	**39**

4.1.1.2 Project amenity noise levels

To limit continuing increases in noise levels, the maximum amenity noise level within an area from industrial noise sources should not normally exceed the amenity noise levels prescribed in the NSW NPfI. Amenity noise levels are set in conjunction with the project intrusiveness noise level to limit increases in noise levels in an area over time.

The recommended amenity noise levels represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level** represents the objective for noise from a **single** industrial development at a receiver location as follows:

— *Project amenity noise level = recommended amenity noise level (Table 2.2 of NSW NPfI) minus 5 dB*

Given that the Project and its nearby residential sensitive receivers are located within close proximity to a busy sub-arterial road (Badgerys Creek Road) it would not be considered a rural noise environment based on the descriptions provided in Table 2.3 of the NSW NPfI. As a result, the surrounding areas have been characterised as Suburban to account for the influence of traffic. The established amenity criteria applicable to the proposed development are presented in Table 4.3.

Table 4.3 Established Project Amenity Noise Level

LOCATION	TYPE OF RECEIVER	RECOMMENDED AMENITY NOISE LEVEL (ANL) dBA $L_{eq,\ period}$	PROJECT AMENITY NOISE LEVEL (ANL -5dB) dBA $L_{eq,\ period}$	PROJECT ADJUSTED ANL dBA $L_{eq\ period}$		
				DAY	EVENING	NIGHT
Residential receivers	Residential (suburban)	Day: 55 Evening: 45 Night: 40	Day: 50 Evening: 40 Night: 35	50	40	35
Commercial areas surrounding the subject site	Commercial Premises	65 (When in use)	60 (When in use)	60 (When in Use)		

4.1.1.3 Maximum noise level event assessment

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

As outlined in the NSW NPfI, where the development night-time noise levels at a residential location exceed the following, a detailed maximum noise level event assessment should be undertaken:

— *"$L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*

— *L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater."*

Table 4.4 summarises the maximum noise level event screening criteria for the Project. These criteria are recommended levels which should not be exceeded at the nearest residences to prevent sleep disturbance.

Table 4.4 Maximum noise level event – project screening criteria

	PROVIDED SCREENING CRITERIA	ADJUSTED BACKGROUND NOISE LEVEL	PROJECT SCREENING CRITERIA
Sleep disturbance screening criteria	40 dBA $L_{eq, 15 min}$	*(34+5)*[1] = 39 dBA $L_{eq, 15 min}$	**40 dBA $L_{eq, 15 min}$**
	52 dBA L_{Fmax}	*(34 + 15)*[2] = 49 dBA L_{Fmax}	**52 dBA L_{Fmax}**

(1) RBL + 5 as outlined in the NPfI

(2) RBL + 15 as outlined in the NPfI

4.1.1.4 Project noise trigger level

In assessing the noise impact of the proposed development on surrounding residential receivers, both the intrusiveness and amenity criteria must be considered. In most cases, only one criterion will become the limiting criterion and form the project noise trigger levels (PNTL) for the source under assessment.

It is noted that, to standardise the time periods for the intrusiveness and amenity noise levels, the following conversion between $L_{eq, period}$ and $L_{eq, 15 minute}$ has been applied (as per Section 2.2 of the NSW NPfI):

— $L_{Aeq, 15 min} = L_{Aeq, period} + 3$ *dB*

As required in Section 2.2 of the NSW NPfI, all project noise trigger levels and limits are expressed as $L_{Aeq,15 min}$, unless otherwise expressed. A summary of all relevant criteria is presented in Table 4.5.

Table 4.5 Summary of NSW Noise Policy for Industry Project Noise Trigger Levels (PNTL)

RECEIVER LOCATION	ASSESSMENT/ RECEIVER TYPE	PROJECT NOISE TRIGGER LEVELS dBA $L_{eq\ 15\ min}$		
		DAY	EVENING	NIGHT
Residential Receiver				
Residential receivers	*Intrusiveness*	*43*	*40*	*39*
	Amenity	*53*	*43*	*38*
	PNTL	**43**	**40**	**38**
Other receivers				
Commercial areas surrounding the subject site	Amenity	63 (when in use)		

4.2 Road Traffic Noise

The NSW *Road Noise Policy* (NSW RNP) provides objective criteria to assess the impact of the proposed development in terms of increase of traffic noise to nearby residences.

The road policy is used in this assessment to address noise associated with potential traffic increases on the surrounding road network due to the Project, in consideration to the following:

— Noise generated by additional traffic on the road is to be assessed against façade-corrected noise levels when measured in front of a building façade;

— External criteria are assessed at 1 metre from the affected residential building façades and at a height of 1.5 metres from the ground; and

— Internal criteria are assessed at the centre of the habitable room most exposed to traffic noise, with operable windows open to provide sufficient ventilation.

Based on the road categories provided in Table 2 of the RNP, Badgerys Creek Road is classified as a sub-arterial road since it connects the Northern Road (an arterial road) and Elizabeth Drive (a sub-arterial road). Therefore, the sub-arterial criteria would apply for additional traffic from construction works.

Road traffic noise criteria are outlined in Table 4.6.

Table 4.6 Noise assessment criteria - residential land uses (Source: NSW RNP Section 2.3.1)

ROAD CATEGORY	PROJECT TYPE/LAND USE[1]	ASSESSMENT CRITERIA	
		DAY (7AM-10PM)	NIGHT (10PM-7AM)
Sub-arterial road	Existing residences affected by additional traffic on existing sub-arterial roads generated by land use developments	60 dBA $L_{eq\ 15hr}$	55 dBA $L_{eq\ 9hr}$

(1) Since the timing when the nearby properties are developed near the Project is not known at this stage, the criteria remain applicable to the future receivers.

The RNP application states that '*for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dBA above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dBA of, or exceeds, the relevant day or night noise assessment criterion.*'

Therefore, a maximum 2 dB increase in traffic noise levels is considered to be the applicable assessment criterion for receivers which are already experiencing traffic noise levels greater than the criteria given in Table 4.6.

4.3 Rail Noise and Vibration

Vibration may be generated within the site during the operation of rail lines. These impacts may result in adverse impacts on human comfort or the damage of physical structures such as dwellings. These two impacts are assessed against different criteria, with the effects of vibration on human comfort having a lower threshold.

Internal ground/structure borne noise and vibration levels to the Project should be controlled to within the requirements of the NSW ISEPP and *Assessing Vibration: a technical guideline* (c).

The Project is located above the proposed Sydney Metro train lines. A detailed ground borne noise and vibration impact assessment of the underground passenger railway lines is required in accordance with the NSW ISEPP as the passenger services line is within 60 m of the site perimeter.

It is noted that the development consists of commercial areas only.

4.3.1 Airborne Rail Noise

The NSW ISEPP Section 3.6.1 does not provide any applicable airborne noise criteria for commercial developments. Airborne rail noise has therefore not been assessed in this report.

4.3.2 Ground Borne Rail Noise

The NSW ISEPP guideline Section 3.6.2 does not provide any applicable ground borne criteria for commercial developments. Ground borne rail noise has therefore not been assessed in this report.

4.3.3 Ground Borne Rail Vibration

The NSW ISEPP Section 3.6.3 outlines that intermittent vibration levels emitted by trains should comply with the criteria in digital technology (CAD/DM/PLM/MES) as referenced in Section 3.6.3 of the NSW *Development Near Rail Corridors and Busy Roads – Interim Guideline 2008*.

Recommended vibration dose values for intermittent vibration have been taken from Table 2.4 of the AVTG and summarised in Table 4.7.

Table 4.7 Acceptable vibration dose values for intermittent vibration

LOCATION	PREFERRED VALUE	MAXIMUM VALUE
Critical areas	0.10 $m/s^{1.75}$	0.20 $m/s^{1.75}$
Offices	0.40 $m/s^{1.75}$	0.80 $m/s^{1.75}$

5 Noise and Vibration Impacts from the Development

The following sections outline a preliminary review of potential environmental noise emissions from the Project to nearby sensitive receivers.

5.1 Noise Emissions from the Development

All noise emissions from the development are to comply with the criteria from the NSW NPfI (refer to Section 4.1.1).

5.1.1 Noise Sources

5.1.1.1 Car Park Noise

It is anticipated that there is potential for noise to emanate from the on grade car park located along the eastern boundary of the site. The noise typically generated by car park activities includes noise from doors closing, vehicle engines starting and vehicles moving within the car park. The sound power levels associated with the car park activities are based on previous noise measurements conducted by WSP and are summarised in Table 5.1.

Table 5.1 Car park activities sound power levels

ACTIVITY	SOUND POWER LEVEL, dBA
Vehicle door closing	86
Vehicle engine start	92
Vehicle moving (10km/h)	79

The on grade car park is proposed to accommodate 51 car spaces. For a conservative assessment, it is assumed that 51 vehicles arrive (or leave) within a single 15 minute period during the AM/PM peak hour. Given that the movements are to occur during the AM/PM peak hour, car park noise has been assessed for the daytime period only.

5.1.1.2 Mechanical Plant

At this stage details of the mechanical plant are not available. For the purpose of this assessment, mechanical plant sound power levels have been assumed to provide indicative sound power levels for mechanical plant.

Sound power levels for mechanical plant have been provided for each time period and refer to the cumulative sound power levels for all external mechanical plant. The design sound power levels adopted for this assessment are detailed in Table 5.2.

Table 5.2 Mechanical plant sound power levels

TIME PERIOD	DESIGN SOUND POWER LEVEL, dBA
Day	90
Evening	87
Night	85

Should Sound Power Levels of the proposed equipment exceed the levels noted in Table 5.2, additional noise mitigation measures should be incorporated in the design. This could include, noise barriers, attenuators, acoustic louvres, etc.

5.1.1.3 Noise Breakout from Internal Spaces

It is expected that the internal plant and equipment (listed in Section 1.1) will be relatively loud (up to 100 dBA). However, the internal partitions and external walls will be designed to ensure that noise emitted from internal plant and equipment does not adversely impact other spaces within the development (such as office spaces) or nearby sensitive receivers. The exact construction of the internal partitions and external walls will be determined during the Detailed Design stages of the project, when more details relating to the internal plant and equipment is available.

5.1.1.4 Noise from Loading and Unloading Activities

It is predicted that the development would likely require a loading truck on site once a fortnight. Furthermore, the loading and unloading activities will be limited to the daytime period. Since the events will occur infrequently and during the day time period, it is not anticipated that the noise emissions from loading truck activities will have an adverse impact on nearby sensitive receivers. Therefore, noise impacts associated with loading activities have not been assessed further.

5.1.2 Predicted Noise Levels

A noise propagation model was established utilising SoundPLAN (Version 8.2) noise modelling software for the proposed development. The site and surrounding environment were digitised to create a 3-dimensional model of the project area using the inputs provided in Table 5.3.

Table 5.3 Noise modelling inputs

PARAMETER	INPUT DATA
Receiver locations	As identified in Figure 3.1.
Terrain	5 meter ground contours from ELVIS elevation and depth
Ground surface / absorption	The land surrounding the site has been modelled with a ground cover factor of 0.6, which is considered indicative of grassland and paddocks
Source heights	Car park source height set at 1 m above ground level Mechanical plant set at 1 m above the roof level
Receiver heights	Point receivers have been placed at an elevation of 1.5 m. Due to the low density of receivers, receiver buildings have not been included in the noise model.
SoundPLAN module	ISO9613-2 1996 propagation model
Met condition	Neutral meteorological condition has been modelled

Noise emissions from the site were predicted using the 3D model and the noise data described in Section 5.1.1. The predicted noise levels are summarised in Table 5.4. Noise contour mapping of the noise emissions are provided in Appendix A.

Table 5.4 Predicted Noise Levels, $L_{eq,15min}$, dBA

RECEIVER	DESCRIPTION	NPFI NOISE CRITERIA			PREDICTED NOISE LEVELS			COMPLIES
		DAY	EVE	NIGHT	DAY	EVE	NIGHT	
R1	145 Badgerys Creek Road, Bringelly	43	40	38	35	28	26	**Yes**
R2	155 Badgerys Creek Road, Bringelly	43	40	38	39	34	32	**Yes**
R3	175 Badgerys Creek Road, Bringelly	43	40	38	43	40	38	**Yes**
R4	475 Badgerys Creek Road, Bringelly	43	40	38	< 20	< 20	< 20	**Yes**
R5	25 The Retreat, Bringelly	43	40	38	28	< 20	< 20	**Yes**
R6	11 Medich Place, Bringelly	43	40	38	< 20	< 20	< 20	**Yes**
R7	Proposed Metro Station	63 (when in use)			33	< 20	< 20	**Yes**

Based on the noise levels in Table 5.4, the development is predicted to comply during all periods of the day. The predicted noise levels are only indicative and may vary depending on the type or location of the proposed mechanical plant. Therefore, it is recommended that an assessment of the mechanical plant is undertaken during the Detailed Design Stages stage, when more details regarding the mechanical plant are available.

5.1.3 Maximum Noise Level Event Assessment

As discussed in Section 5.1.1, it is expected that the mechanical plant would be the only noise source operating during the night time period. It is noted that the noise generated from mechanical plant is constant, and therefore the predicted $L_{Aeq,15min}$ noise level is approximately equal to the L_{AFmax} noise level. The night time predicted noise levels presented in Table 5.4 were compared with the project screening criteria determined in Table 4.4. The maximum noise level event assessment is summarised in Table 5.5.

Table 5.5 Night time maximum noise levels, dBA

RECEIVER	DESCRIPTION	PROJECT SCREENING CRITERIA		PREDICTED NOISE LEVELS[1]	COMPLIES
		$L_{eq,15min}$	L_{Fmax}		
R1	145 Badgerys Creek Road, Bringelly	40	52	26	**Yes**
R2	155 Badgerys Creek Road, Bringelly	40	52	32	**Yes**
R3	175 Badgerys Creek Road, Bringelly	40	52	38	**Yes**
R4	475 Badgerys Creek Road, Bringelly	40	52	< 20	**Yes**
R5	25 The Retreat, Bringelly	40	52	< 20	**Yes**
R6	11 Medich Place, Bringelly	40	52	< 20	**Yes**
R7	Proposed Metro Station	-	-	< 20	**Yes**

(1) Predicted noise level represent the 15 minute ($L_{eq,15min}$) and maximum (L_{max}) noise parameters

Based on Table 5.5 it is not anticipated that the noise from the Project would cause sleep disturbance at the nearby residential receivers.

5.2 Road Traffic Noise

Changes to road traffic noise due to the development are subject to the NSW *Road Noise Policy* (NSW RNP) as detailed in Section 4.2.

The existing and future traffic flows for the surrounding public roads have been reviewed based on the *Sydney Metro – Western Sydney Airport – Technical Paper 1: Transport* dated October 2020.

Traffic flows for the development and the modelled increase in noise levels are summarised in Table 5.6.

Table 5.6 Summary of traffic flow increase in peak periods

LOCATION	TRAFFIC FLOW, VEHICLES/HOUR		TRAFFIC INCREASE		NSW RNP MAX INCREASE, dB	COMPLIES
	BASE YEAR	INCREASED TRAFFIC FLOW	TRAFFIC %	NOISE LEVEL, dB		
AM peak						
Badgerys Creek Road (south of Elizabeth Drive)	580	13	2.2%	0.1	≤ 2	**Yes**
Badgerys Creek Road (north of The Northern Road)	530	13	2.5%	0.1		**Yes**
PM peak						
Badgerys Creek Road (south of Elizabeth Drive)	590	11	1.9%	0.1	≤ 2	**Yes**
Badgerys Creek Road (north of The Northern Road)	550	11	2.0%	0.1		**Yes**

Based on the changes to traffic flow on Badgerys Creek Road, any changes as a result of the Project are expected to be minimal, with changes to existing traffic levels of less than 2 dB. Thus, the development is expected to comply with the requirements of the NSW RNP.

5.3 Sydney Metro - Ground Borne vibration

As the proposed development is located 60 m above the proposed Sydney Metro line, a ground borne noise and vibration assessment is required in accordance with the NSW ISEPP.

The current design includes a carpark (i.e. non-sensitive areas) on the eastern side of the development site. The proposed building is located at least 55 m from the eastern boundary line.

Therefore, the proposed commercial building is located further than 60 m from the underground Sydney Metro line. It is therefore unlikely that ground borne noise and vibration will impact the building and a detailed assessment is not triggered at this stage as per the guidance provided in the NSW ISEPP.

In order to minimise the effect of these potential impacts it is recommended that no vibration sensitive land uses are positioned within 60 m of the Sydney Metro corridor.

6 Conclusion

WSP has been engaged by Western Parkland City Authority to provide a Operational Noise and Vibration Impact Assessment for the proposed research and development facility located within the Aerotropolis Development at 215 Badgerys Creek Road, Bringelly.

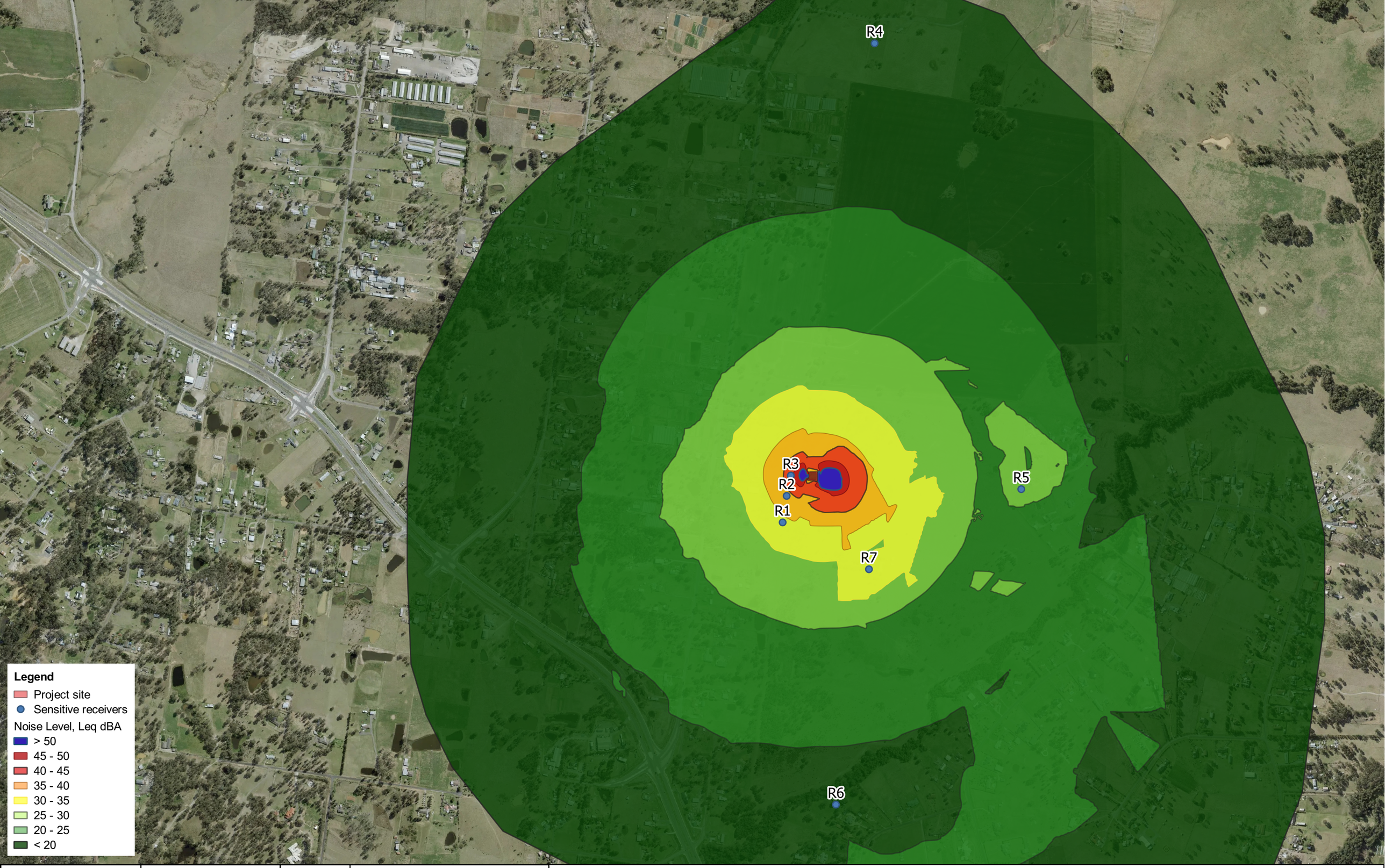
Noise design objectives were set in accordance with the criteria set out in Western Sydney Aerotropolis DCP, NSW NPfI, and NSW RNP and NSW ISEPP following an assessment of existing ambient and background noise levels for the Project area.

Noise emissions from the car park and mechanical plant were predicted at the nearby sensitive receivers. The predicted noise levels were found to comply with operational noise criteria during all periods of the day. It is recommended that a more detailed assessment of mechanical plant should be undertaken during the CC stage, when more details of the mechanical plant are available.

Overall, it is concluded that the proposed development will have limited acoustic impacts on the existing environment and the applicable operational noise and vibration criteria can be complied at the nearest sensitive receivers.

Appendix A

Operational Noise Contour Map



Project No: PS122689	Author: IV	N
Date: 05/11/2021	Approved by: NM	

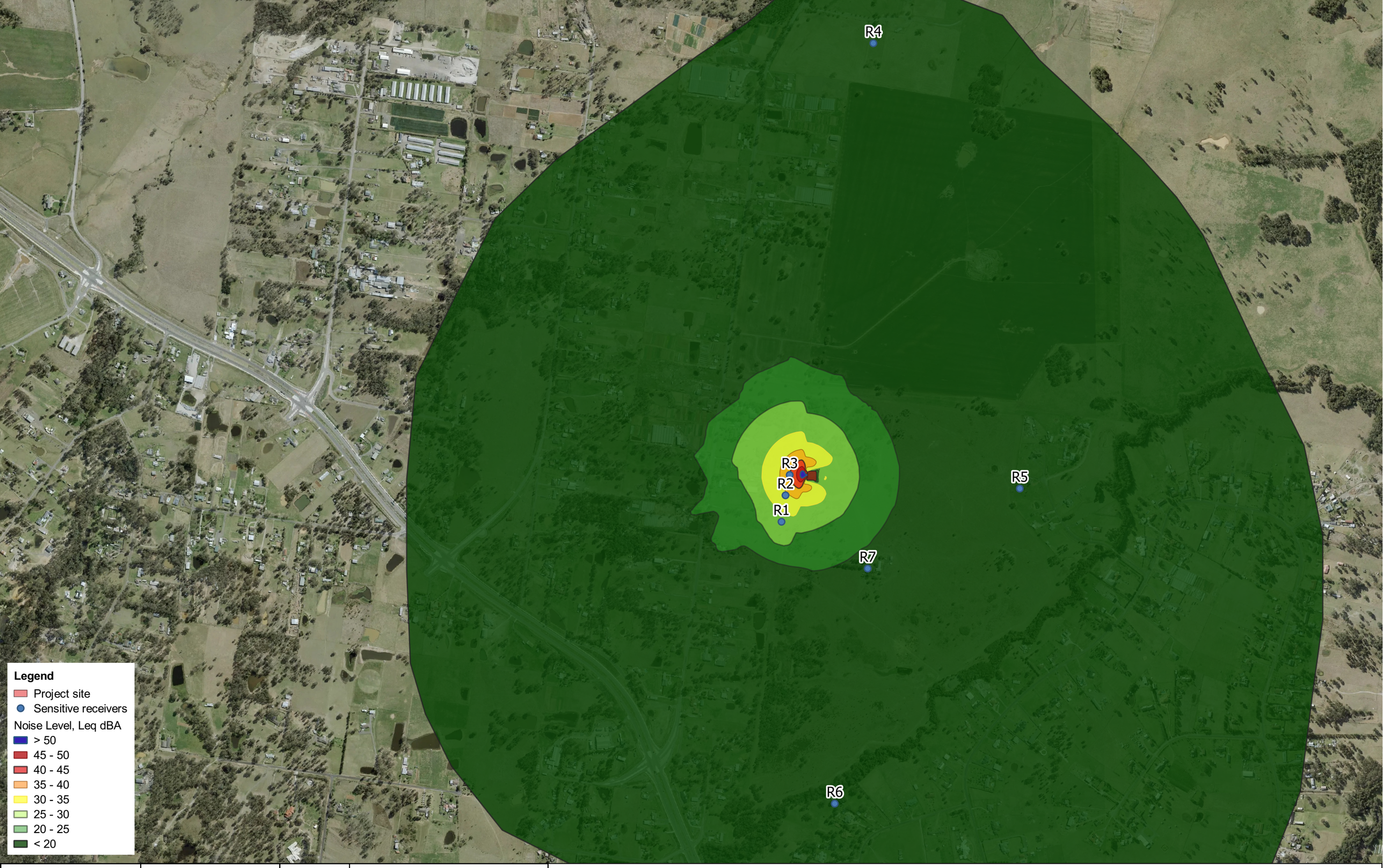
0 100 200 300 m

To be read in conjunction with WSP document: First Building SSDA - Operational NVIA Report

Map Source: Metromaps

FIRST BUILDING - SSDA

Predicted Operational Noise (Day)



Project No: PS122689	Author: IV	
Date: 05/11/2021	Approved by: NM	

N

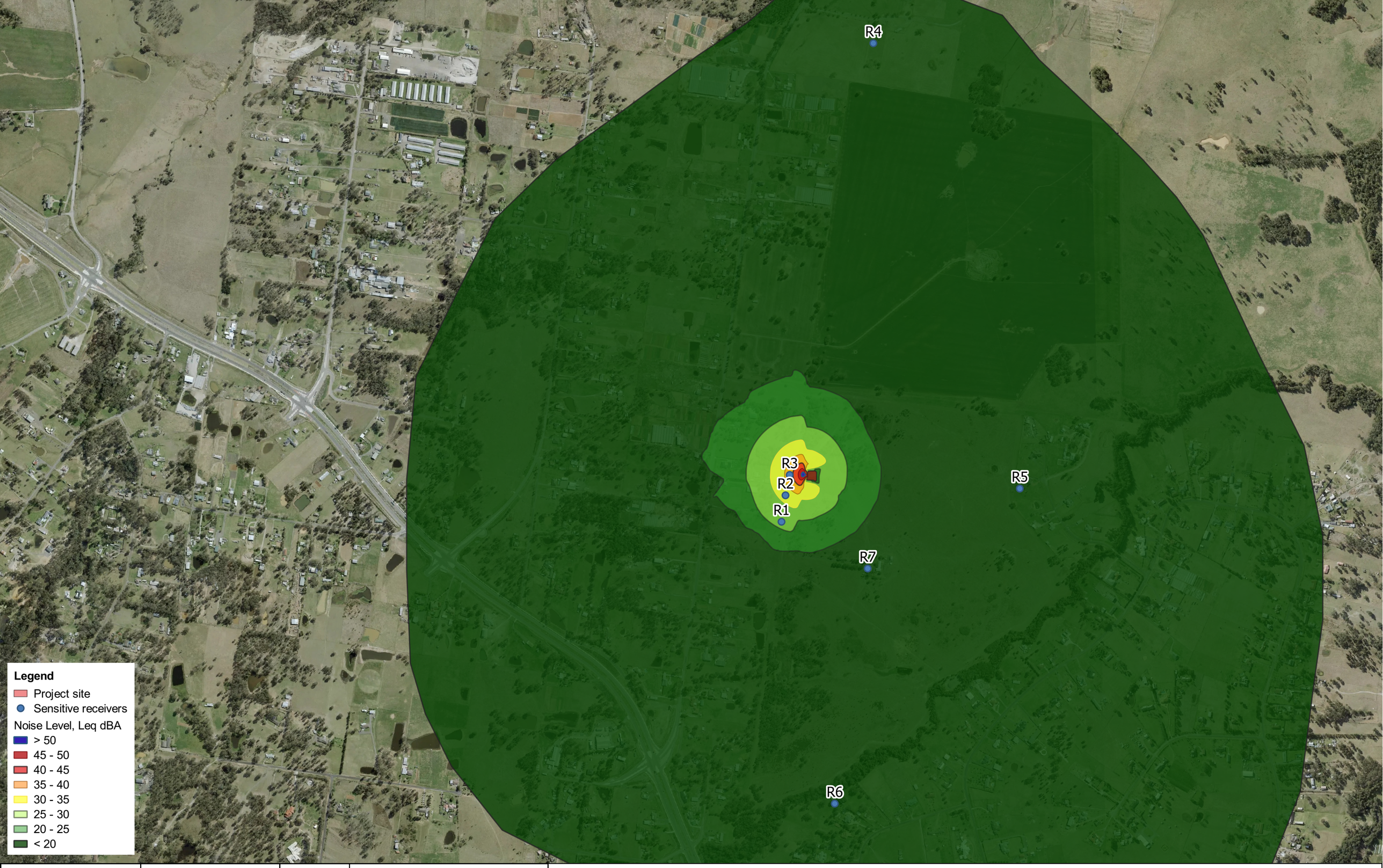
0 100 200 300 m

To be read in conjunction with WSP document: First Building SSDA - Operational NVIA Report

Map Source: Metromaps

FIRST BUILDING - SSDA

Predicted Operational Noise (Evening)



Project No: PS122689	Author: IV	
Date: 05/11/2021	Approved by: NM	

N

0 100 200 300 m

To be read in conjunction with WSP document: First Building SSDA - Operational NVIA Report

Map Source: Metromaps

FIRST BUILDING - SSDA

Predicted Operational Noise (Night)

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