Dunes Beach Resort

Acoustics Report and Noise Management Plan

26 September 2023 **Ref: 301251650**

PREPARED FOR:

Eco Tourism Pty Ltd as Trustee for the Quinns Resort Unit Trust

PREPARED BY:

NPK

Stantec

Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer	Independent Reviewer	Project Manager Final Approval
001	26/09/2023	Issued for Use	NPK	BEM	IK	BEM

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Executive Summary

Stantec Australia Pty Ltd (Stantec) were commissioned by Eco Tourism Pty Ltd as Trustee for the Quinns Resort Unit Trust to provide an Acoustic Report and Noise Management Plan for the venue at Lot 211(2) Quinns Road, Mindarie WA.

The site was formerly the Quinns Rocks Caravan Park and is surrounded by commercial and residential properties. The proposed development will be including ecotourism accommodation, café and an event space with capacity of up to 240 patrons (including the accommodation guests).

This Acoustic Report and Noise Management Plan address the obligations under the "*WA Environmental Protection (Noise) Regulations 1997*" (EPNR).

To support the Development Application, a 3D noise model was developed using the software package SoundPLAN 8.2, with noise emissions assessed for all operational periods. Based on the predicted noise emissions, the project is not expected to have a significant impact on acoustic amenity of the community. Noise management measures to ensure the ongoing acoustic amenity of the area have been provided.

The following management measures are required in addition to the detail provided in the included Noise Management Plan:

- Music:
  - The design allows for a DJ playing internally up to a Sound Pressure Level of 85 dB(A) average within the Function space. Subwoofers are not allowed for;
  - External glazing and doors must be closed when amplified music is played internally;
  - Music must not become audible at external receivers. This must be actively managed by the operator and may require closing doors and/or operable facades;
  - General music and entertainment to be background in nature and doors may remain open. Any music in the Alfresco must be set such as not to become audible over patron noise and attract adjustments to the received level.
- Glazing / operable facades:
  - External glazing is to be minimum 6.38mm laminated glass (R_W 33);
  - Sliding external doors to Function areas to be acoustic rated and fitted with full perimeter acoustic seals, achieving minimum R_W 30 for the complete system;
  - At full patron capacity, openings in the Function area operable facades must be limited to maximum of 30m^2 on Sundays, Public Holidays and after 7pm on any day;
- Roof/ceiling:
  - In order to adequately contain the proposed DJ music, the roof/ceiling should achieve minimum R_W 40, example construction;
  - Colorbond sheet steel or similar (0.42mm),
  - 65mm high-density anti-con insulation hard-fixed to the underside of the purlins;
  - Min. 300mm ceiling cavity with 50mm glass wool insulation blanket (14 kg/m^3);
  - Suspended ceiling of 13mm standard plasterboard.

- Mechanical Plant:
    - Limiting Sound Power Level of 77 dB(A) for the Kitchen Exhaust Fan, or treated to equivalent emissions;
    - Limiting Sound Power Level of 75 dB(A) for cool room / freezer condenser units (2 units).

In summary, in view of the available information, we consider that the development will be able to comply with the EPNR. The predictions in this report consider that the assumptions, building recommendations and Noise Management Plan provided will be implemented.

1. Introduction

Stantec Australia Pty Ltd (Stantec) were commissioned to provide an Acoustic Report and Noise Management Plan for the venue at Lot 211 (2) Quinns Road, Mindarie WA.

The proposed Dunes Beach Resort development will include accommodation, café and an event space with capacity of up to 240 patrons (including the accommodation guests).

This Acoustic Report and Noise Management Plan address the Development Application Conditions of Approval for the site obligations under the "*WA Environmental Protection (Noise) Regulations 1997*" (EPNR).

1.1 Site Description

The project site was formerly used as a caravan park, located at 2 Quinns Road and falls under the land zoned "Parks and Recreation MRS" (City of Wanneroo District Planning Scheme No. 2) and the project site is surrounded by commercial receivers immediately to north-west and residential receivers along Quinns Rd, Seaham Wy and Kinsale Dr. The project site and nearest noise sensitive receivers are shown in Figure 1.

Source: MetroMap

Figure 1: Project Location and Nearest Receivers

1.2 Study Inputs

Acoustic assessment and preparation of this report has been based on the received documentation provided in Table 1.

Table 1: Received Documentation

Dated	Detail	Prepared By	Format
29 August 2023	SK-MINDARIE-REV 0-1.01	Hospitality Total Services	PDF
18 September 2023	SK-MINDARIE-REV 0-1.02	Hospitality Total Services	PDF

2. Acoustic Criteria

2.1 Environmental Noise Emissions

Environmental noise impacts resulting from the noise emissions from the project are addressed through the Environmental Protection Act 1986, with the regulatory requirements detailed in the Environmental Protection (Noise) Regulations 1997 (EPNR).

The EPNR establishes the maximum permissible noise emission levels (assigned levels) to be received at all adjacent noise-sensitive premises during specific periods of the day as a result of the cumulative noise emissions from all sources proposed for the project site. Compliance to relevant noise limits outlined in the EPNR is compulsory.

The EPNR states noise emissions from any premises are considered not to *significantly contribute to* the noise at a receiver if the noise emissions are 5 dB or below the assigned levels.

In brief, the assigned levels are determined by considering of the amount of commercial and industrial zones, as well as main transport corridors and sporting venues surrounding the noise sensitive premises. In addition, the Environmental Protection (Noise) Regulations 1997 identify the following in Schedule 3, clause 2A:

"If the land within either of the circles is categorised on the land use map as land in respect of which mixed uses are permitted, the use of that land that results in the highest influencing factor is to be used in the determination of the influencing factor."

The current District Planning Scheme No.2 (DPS2) was accessed via the City of Wanneroo Intramaps service and was used in the determination of the influencing factor.

The nearest noise sensitive receivers in the vicinity of the project have been identified as:

- Double-storey residential dwellings along Kinsale Drive, for example no. 62 and
- Single-storey and double-storey residential dwellings along Seaham Way, for example no. 44 and
- Single-storey and double-storey residential dwellings along Quinns Road, for example no. 3, 5.

Traffic data for roads surrounding the nearest noise sensitive receiver were obtained from Main Roads Western Australia (MRWA) TrafficMap website on the 14th September 2023.

Table 2: Traffic count data (MRWA)

Transport Corridors	EPNR Classification [1)]	Average Daily Traffic Volumes				
		2018/19	2019/20	2020/21	2021/22	2022/23
Anchorage Drive North, West of Marmion Ave	Secondary Road	—	—	11,296	—	—
Quinns Rd, West of Marmion Ave	Secondary Road	12,167	—	—	—	—

1) As defined by the EPNR. Major roads have greater than 15,000 vehicles per day. Secondary roads have between 6,000-15,000 vehicles per day.

2.1.1 Influencing Factor

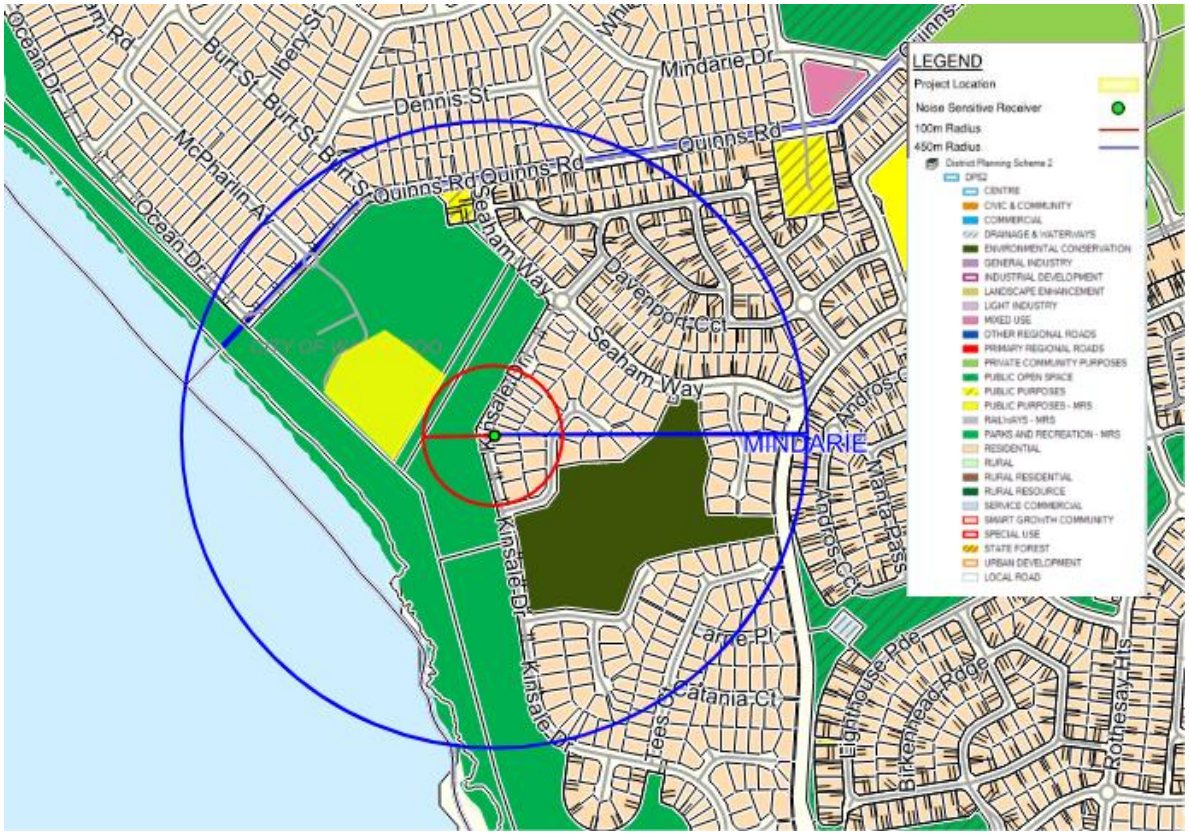
The influencing factor for nearest receivers from identifying major roads, commercial and industrial areas for all nearest noise sensitive receivers. The overall influencing factor assessment is summarized in Table 3 and the planning maps indicating the land use type (obtained from City of Wanneroo Intramaps) has been marked up in Table 3.

The commercial use buildings north of the project site were considered to be Commercially zoned for the purpose of the influencing factor calculation.

Table 3: Influencing factor (IF) noise sensitive receiver

Noise Sensitive Premises	Commercial Zones	Industrial Zones	Transport Corridors	Influencing Factor
2 Quinns Rd, Mindarie	0 % within 100m radius 2 % within 450m radius	0 % within 450m radius	Quinns Rd within 100m radius	2 dB
44 Seaham Wy, Mindarie	0 % within 100m radius 2 % within 450m radius	0 % within 450m radius	Anchorage Dr N (Seaham Rd) within 100m radius	2 dB
62 Kinsale Dr, Mindarie	0 % within 100m radius 2 % within 450m radius	0 % within 450m radius	Anchorage Dr (Secondary) within 450m radius	0 dB

Figure 2: Zoning map of areas surrounding receiver at 62 Kinsale Drive (noise sensitive receiver)



Source: MAP: City of Wanneroo online mapping system

2.1.2 Assigned Levels

Table 4 summarises the assigned levels at the nearest noise sensitive premises. It is required that all noise emissions from the development are below the assigned level criteria for all defined periods of the day and at the lot boundary of the receiver or 15m from any associated building.

Table 4: Assigned levels – 62 Kinsale Drive, Mindarie WA

Type of premises receiving noise	Time of day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: Highly sensitive area	0700 to 1900 hours Monday to Saturday	45	55	65
	0900 to 1900 hours Sunday & public holidays	40	50	65
	1900 to 2200 hours all days	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday, and 0900 hours Sunday & public holidays	35	45	55
Noise sensitive premises: any area other than highly sensitive areas	All Hours	60	75	80
Commercial premises	All Hours	60	75	80
Industrial and utility premises	All Hours	65	80	90

2.1.3 Noise Character Adjustments

Regulation 7 states that the noise character must be “free” of annoying characteristics, namely —

- Tonality, e.g. whining, droning;
- Modulation, e.g. like a siren; and
- Impulsiveness, e.g. banging, thumping.

Regulation 9 (1) establishes the methodology for determining noise characteristics. If these characteristics cannot be reasonably and practicably removed, a series of adjustments to the measured levels are required, indicated in Table 5 .

Table 5: Noise character adjustment

Adjustment where noise emission is not music these adjustments are cumulative to a maximum of 15 dB			Adjustment where noise emission is music	
Where tonality is present	Where modulation is present	Where impulsiveness is present	Where impulsiveness is not present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

Should music noise from the development become audible at the receiving locations, a +10 / +15 dB adjustment will be required, likely resulting in non-compliance to the EPNR.

2.1.4 Noise Emissions from Mechanical Services

Mechanical equipment serving the development is required to meet the assigned levels of the EPNR at the nearest sensitive receivers. It is important that noise emissions from the site do not present any form of tonality, modulation or impulsiveness (as defined by the EPNR).

It is expected that the fans (kitchen exhaust fans) and condensing units will be considered within the proposed development, however equipment selection data is unavailable at the Development Application stage.

Given that data from mechanical plant manufacturers is generally limited to broadband data or in 1/1 octave band value, it is not possible to objectively determine tonality, as it is described in the EPNR. 1/3 octave band data is required yet is typically unavailable.

Therefore, a +5 dB adjustment shall be conservatively assigned when assessing noise emissions from mechanical equipment. In summary, noise emissions from mechanical equipment shall comply with L_{10} 30 dB(A) at the nearest sensitive receivers (Kinsale Dr).

3. Noise Modelling

Noise emissions from the proposed development will be primarily due to:

- Patron activity and Music;
- Mechanical services equipment;
- Carpark (door slams) and
- Waste collection.

Noise emissions from the indoor and outdoor areas were calculated using 3D noise modelling software (SoundPLAN 8.2).

3.1 Noise Modelling Parameters

3.1.1 Scenarios

The following scenarios are presented in this Report:

1. Patrons and ambient music, doors/operable facades open;
2. Patrons and ambient music, doors/operable facades limited to 30m^2 opening;
3. Patrons and internal amplified music, doors/operable facades closed;
4. Car doors slamming.

Non-compliant scenarios have not been presented, but rather management measures have been included to demonstrate that compliance to the EPNR can be achieved.

Noise contours for each scenario are presented in Appendix B.

3.1.2 Operating Hours

The maximum operating hours of the proposed development will be as per the Hotel Restricted liquor license category and are summarised in Table 6. The operational periods span all assessment time of periods of the EPNR.

Table 6 : Assumed Operating Hours

Days Operating	Operating Hours
Monday – Saturday	06:00 AM – 12:00 AM (Midnight)
Sundays	10:00 AM – 12:00 AM (Midnight)

3.1.3 Algorithm and Meteorological Conditions

The CONCAWE algorithm has been selected to model meteorological conditions, as presented in Table 7. Conditions approximating the worst-case weather conditions for enhancement of sound propagation have been considered (*Draft Guideline: Environmental Noise for Prescribed Premises, WA Department of Environment Regulation 2016*).

Table 7: Meteorological Conditions Used for Noise Modelling

Parameter	Day (0700 – 1900)	Evening / Night (1900 – 0700)
Wind Speed (m/s)	4	3
Temperature (C)	20	15
Relative Humidity (%)	50	50

Parameter	Day (0700 – 1900)	Evening / Night (1900 – 0700)
Pasquill Stability Class	E	F
Wind Direction	Source to Receiver	Source to Receiver

3.1.4 Receivers

All noise receivers were located at 1.4m above ground and each floor level and 1m away from buildings associated with highly sensitive uses. Residential garages were not considered to be highly sensitive areas.

Reflected noise from the building façade is included in the received noise levels.

3.1.5 Topography

Terrain contours were sourced from *Geoscience Australia, Digital Elevation Model (DEM) 5 Metre Grid of Australia derived from LiDAR, 2015*.

A reflective ground condition (0) was used to model a paved urban environment. A ground condition of 0.6 was used for vegetated areas.

A reflection order of 3 was used in all assessments.

3.1.6 Building Façade Acoustic Performance

Based on the architectural plan (SK-MINDARIE-REV 0-1.02), we note and assume the following:

- The gross area of the function space is 208m^2;
- The proposed development will have an alfresco with seating comprising a total area of 139 m^2;
- Façade of the function space and lounge is glazing (including glazed openings);
- Roof construction will be conventional metal sheeting with insulation and standard plasterboard ceiling;
- The functions will curfew at midnight (12 am) and we note that the kitchen exhaust fans will be operating till 11:30 pm and therefore, assigned values at night-time have been considered for assessment purposes.

The following building element acoustic performance has been used in the calculation of radiated Sound Power.

- Glass facades (sliding doors) are to be minimum 6.38mm laminated glass (R_W 33)
- Sliding doors to Function areas should be fitted with full perimeter acoustic seals to each panel, achieving minimum R_W 30 for the complete system;
- The roof is assumed to be colorbond steel of minimum 0.42mm thickness with standard plasterboard ceiling in a suspended steel grid.
- A reverberation time of 1 second within the venue (consistent with AS2107:2016) has been assumed in the calculations.

An image from the noise model is shown in Figure 3.

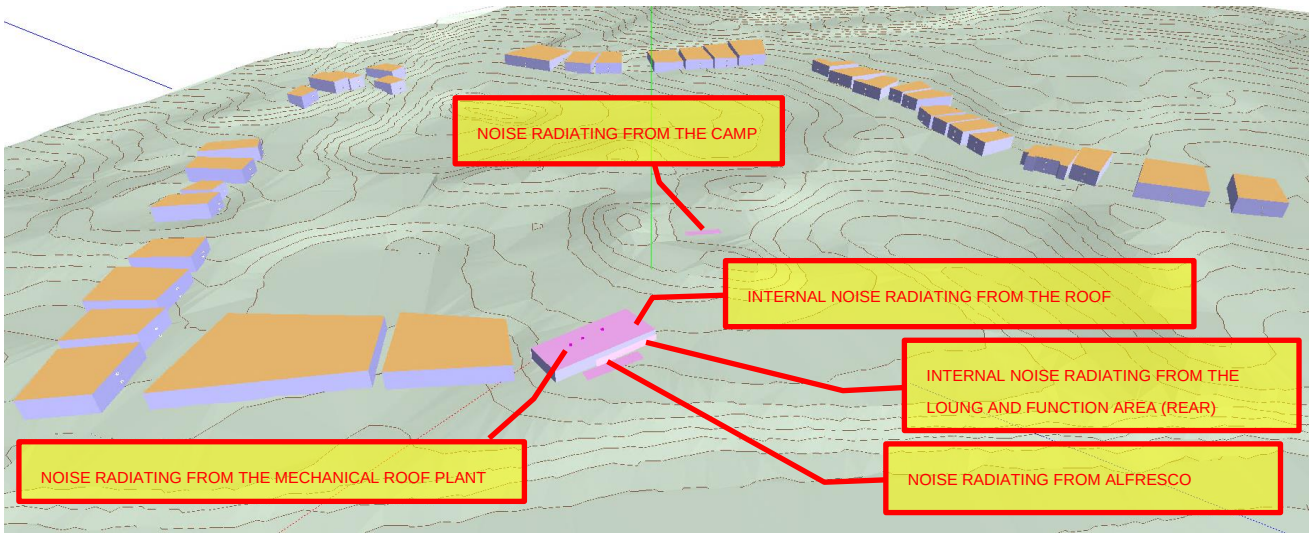


Figure 3: Site Image from Noise Model

3.1.7 Sound Power Levels

Based on the area of the function space, lounge and alfresco as indicated in the Hospitality Total Services drawing SK-MINDARIE-REV 0-1.02, the number of patrons for different internal and external spaces considered for the assessment purpose are as follows:

- Function space – 150 pax;
- Alfresco – 50 pax;
- Accommodation social gathering area – 40 pax.

The technical research paper '*Prediction of Noise from Small to Medium Sized Crowds'* (Hayne et al., November 2011), was used to estimate patron noise levels within the Function space. L_{10} patron Sound Power Levels are approximated by the formula *15*Log(N)+67*, where N is the number of patrons.

Patron noise levels used in the noise emissions assessment have considered the following:

- Sound level associated with speech from a 50% mixture of male and female patrons;
- Even distribution of patrons within the Function space.

An acoustic assessment was conducted for patrons and music at during a maximum capacity event. Noise management measures have been proposed to achieve compliance to external noise levels as per the EPNR.

To achieve compliance, any outdoor music must be at a conversational level only and must not be audible at nearby receivers.

The paper referenced also notes that larger crowds of patrons tend not to exhibit tonal characteristics, hence no adjustments to the received noise level for intrusive characteristics will be applied. Patrons were assumed to be evenly distributed around the respective indoor and outdoor areas.

Alfresco patron Sound Power Levels were predicted using the formula 66 dB(A)/m^2 presented by VDI Standard 3770:2012, "Emissionskennwerte von Schallquellen - Sport und Freizeitanlagen". Predicted Sound Power Levels were benchmarked against the local document "*Licenced Premises Noise Assessment Technical Guideline*". Version 1.0, Association of Australian Acoustical Consultants, AAAC, 2019 and found to be within the range of predictions used by Acoustical Consultants in Australia.

Patron and ambient music noise inputs to the noise model are presented in Table 8. Music Level must be set such as not to become audible over patron noise and attract adjustments to the received level per the EPNR criteria. Refer to Section 3.2.1 for noise management measures required.

Table 8: Patron and Ambient Music Sound Power Levels

Area	Patron and Ambient Music SWL, dB(A) (1)
Internal – Function space/lounge/cafe	101
Alfresco – Outdoor Feature	83
Accommodation social gathering area	82

Note 1: Music Level must be set such as not to become audible over patron noise and attract adjustments to the received level per the EPNR criteria. Refer to Section 3.2.1 for noise management measures required.

Music

In typical operations, all music and entertainment will be background in nature. Amplified and/or DJ music may be present occasionally within the Function spaces.

Music Sound Power Levels were modelled as follows:

- DJ Music – average Sound Pressure Level of 85 dB(A) within the indoor space, doors and windows closed;
- Typical ambient music, under full patron capacity must be set such as not to become audible over patron noise and attract adjustments to the received level.

Car Door Slams

Maximum levels resulting from car/truck doors slamming were modelled and assessed against the EPNR L_{Amax} criterion. The Sound Power Level was based on the average maximum noise level of car/truck door shutting.

Reference has been made to the technical research paper *"Prediction of parking area noise in Australian conditions"* from the Australian Acoustical Society Conference (Nicol and Johnson, 2011) and parking lot study *"Parking Area Noise – Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Storey Car Parks and Underground Car Parks"* (Bavarian Landesamt für Umwelt, 2007, 6th edn), referred to as BayLfU 2007:

- The Sound Power Level according to Table 19 of BayLfU 2007 has been calculated as 99 dB(A);
- The modelled location is shown in the noise contours in Appendix B.

3.2 Results

3.2.1 Patron and Music Noise

Noise management measured required to ensure predicted compliance with EPNR during all operational hours are summarised in Table 9, with the results of each calculation scenario presented in Table 10. Noise management measures should be put in place to ensure music noise is not dominant at the site boundary (refer Section 4.1).

Table 9: Management Measures for Predicted Compliance with EPNR

Noise Source	Time of Day	Management Measures [1]
Patrons	0700 to 1900 hours Monday to Saturday	• Doors/operable facades may be left open in typical operations.
	0900 to 1900 hours Sunday & public holidays; and 1900 to 2200 hours all days	• Doors/operable facades must be limited to 30m^2 opening under full patron capacity.
Ambient Music	All times	• Music Level must be set such as not to become audible over patron noise and attract adjustments to the received level
DJ Music	All times	• Must not become audible at sensitive receivers. This must be actively managed by the operator and may require closing doors and/or operable facades.

Note 1: Patron numbers in alfresco areas are based on predictive desktop assessment and may be varied provided the assigned levels are not exceeded when measured at the nearest noise sensitive receivers.

Table 10: Highest Predicted Noise Levels at Residences – with Management Measures

Scenario	Assigned Level dBA	64 Kinsale Dr L_{10} dBA	1 Quinns Rd L_{10} dBA	46 Seaham Wy L_{10} dBA	Compliance to EPNR (Y/N)
1 – Patrons and ambient music(1), doors open	L_{10} 45	44	35	31	**Yes**
2 – Patrons and ambient music(1), Sunday & public holidays, doors opening limited to 30m^2	L_{10} 40	39	30	28	**Yes**
3 – Patrons and DJ music, doors closed	L_{10} 35	31	30	27	**Yes**
4 – Car Door Slam (2)	L_{max} 55	42	48	43	**Yes**

Note 1): Ambient music level set such that music does not become audible over patron noise at the receivers.
Note 2): Includes +10 dB adjustment to received level for impulsive noise characteristic.

Noise management measures provided in Section 4 must be put in place to ensure venue contributions to received noise levels are not significant.

4. Noise Management Plan

The key objective of the Noise Management Plan (NMP) is to engage with affected properties to address the amenity impacts of noise emissions from the development to the greatest practical extent possible.

Achieving this objective should minimise the number of complaints received, which reduces the likelihood of ongoing issues and compliance investigations.

The purpose of the NMP is to:

- Identify any change in planned operations;
- Target compliance with the Environmental Protection (Noise) Regulations 1997; and
- Encourage engagement with nearby noise sensitive premises on managing noise impacts.

The approach is to provide for ongoing dialogue, communication and mitigations with potentially affected residents, in the context of the intended use of the development.

4.1 Patrons and Music

Indicative measures to comply with the EPNR have been provided in Section 3.2.1. Where noise emissions include audible music, adjustments to measured noise levels are required per the EPNR that would likely result in non-compliance.

The following is recommended for any amplifier / PA system used:

- DJ music shall be limited to an average Sound Pressure Level of 85 dB(A) with the Function space;
- General music and entertainment to be background in nature, must be set such as not to become audible over patron noise and attract adjustments to the received level;
- The system should incorporate a frequency equalizer that is set to control low frequency sound (bass);
- The speakers used should not be directly attached to the lightweight roof structure via hard connections, in order to reduce noise transmission through the roof. Anti-vibration mountings are recommended; and
- The venue amplifier / PA system should be accessible by the Licensee and/or the Approved Manager only;

In addition, the following administrative controls are recommended:

- Given the movement of patrons between indoor and outdoor areas, noise emissions from the venue should be managed, ensuring that they do not become a dominant source of noise at the site boundaries at any time;
- Patrons in alfresco areas will be advised to keep noise to a minimum, particularly after 10pm;
- Patrons will be advised to consider other campers when leaving the premises. Venue staff are to monitor dispersal of patrons and manage any noise issues arising.

4.1.1 Campground

The following measures are recommended:

- Any general music and entertainment used by campers is to be background in nature, must be set such as not to disturb other campers;
- A curfew of 10pm is recommended in typical operations of the campground (i.e. when there are no Functions).

4.2 Mechanical Plant

If there is a complaint or concern of a defect with the equipment, noise measurements should be undertaken near to the equipment and at the resident's property, ensuring measurements are representative of the source of the complaint. Audio recording may be used.

The make and model of the equipment should be recorded, with photographs taken of the piece of equipment in question, along with notes on any observed defects or high noise emitting components.

If the complaint is ongoing, a suitably qualified mechanical or acoustic consultant may be required to attend site to assess equipment defects as part of the complaint investigation process.

4.3 Deliveries / Loading Bay

Deliveries to the cafe/bar will be through the car park at the proposed development. The impact on amenity resulting from the change of ownership is not expected to be significant.

Loading bay usage should be limited to daytime hours Monday to Saturday where practicable.

4.4 Waste Collection

4.4.1 Refuse and Recycling Collection

Under the EPNR Regulation 14A, the assigned noise levels of Regulation 7 do not apply to waste collection (including commercial sources), provided:

- The works are carried out in the quietest reasonable and practicable manner;
- The equipment used to carry out the works is the quietest reasonable available; and
- In the case where a noise management plan is required (e.g. works are to occur outside of 0700 – 1900 hours Monday through Saturday or 0900 – 1900 hours Sundays and public holidays), the plan is submitted and approved, with works carried out according to the plan.

The following administrative measures are recommended:

- It is recommended that waste collection occur between the hours 7am – 7pm Monday to Saturday.
- An effort should be made to avoid the waste collection and recycling trucks being on site at the same time;
- If a truck is waiting in the carpark for bin access, the engine should be switched off; and
- Glass recycling trucks should not crush the bottles on premises but rather at a less noise sensitive location.

4.4.2 Emptying of Bins

The emptying of bins, especially when filled with glass bottles, can be an occupational peak noise hazard to the operator, as well as significant source of environmental noise.

The follow administrative measures are recommended:

- The handling of bins full of glass bottles should occur during daytime hours where possible to minimise disruption to the community;
- Venue staff should take care to reduce the drop height of glass onto glass when filling bins.

4.5 Complaint Management

Where possible, the neighbouring residences should be encouraged to report any complaints directly to the venue staff in the first instance.

Any complaints received will be recorded in a logbook, stating:

- The time and date of complaint;
- The address of the complainant;
- Source of complaint (e.g. music or patron noise);
- If a verbal response was given to the resident, notes on the conversation and the resident's satisfaction or dissatisfaction with the response;
- A record of any staff visits to the property to discuss the complaint and the outcome of the discussion; and
- If further complaint or noise assessment / mitigation measures were undertaken, records are to be updated with these details.

In the first instance the management are to check that the requirements of the NMP are being adhered to, and if practical make changes as soon as possible if the complaint relates to activities which are ongoing.

Once assessed, the venue management shall provide a response to the satisfaction of the complainant.

4.6 Review

The NMP is to be reviewed annually and updated as required.

More frequent reviews will be triggered for example in the event of non-compliance, ongoing complaints, or as reasonably required in writing by the City in the event of ongoing complaints.

5. Conclusion

Stantec Australia Pty Ltd (Stantec) were commissioned to provide an Acoustic Report and Noise Management Plan for the proposed development at Lot 211(2) Quinns Road, Mindarie WA.

The site is a former caravan park surrounded by commercial and residential properties. The proposed development will be including ecotourism accommodation, café and an event space with capacity of up to 240 patrons (including the accommodation guests)

To support the Development Application, a 3D noise model was developed using the software package SoundPLAN 8.2, with noise emissions assessed for all operational periods. Noise management measures to ensure the ongoing acoustic amenity of the area have been provided.

In summary, in view of the available information, we consider that the development will be able to comply with the EPNR. The predictions in this report consider that the assumptions, building recommendations and Noise Management Plan provided will be implemented.

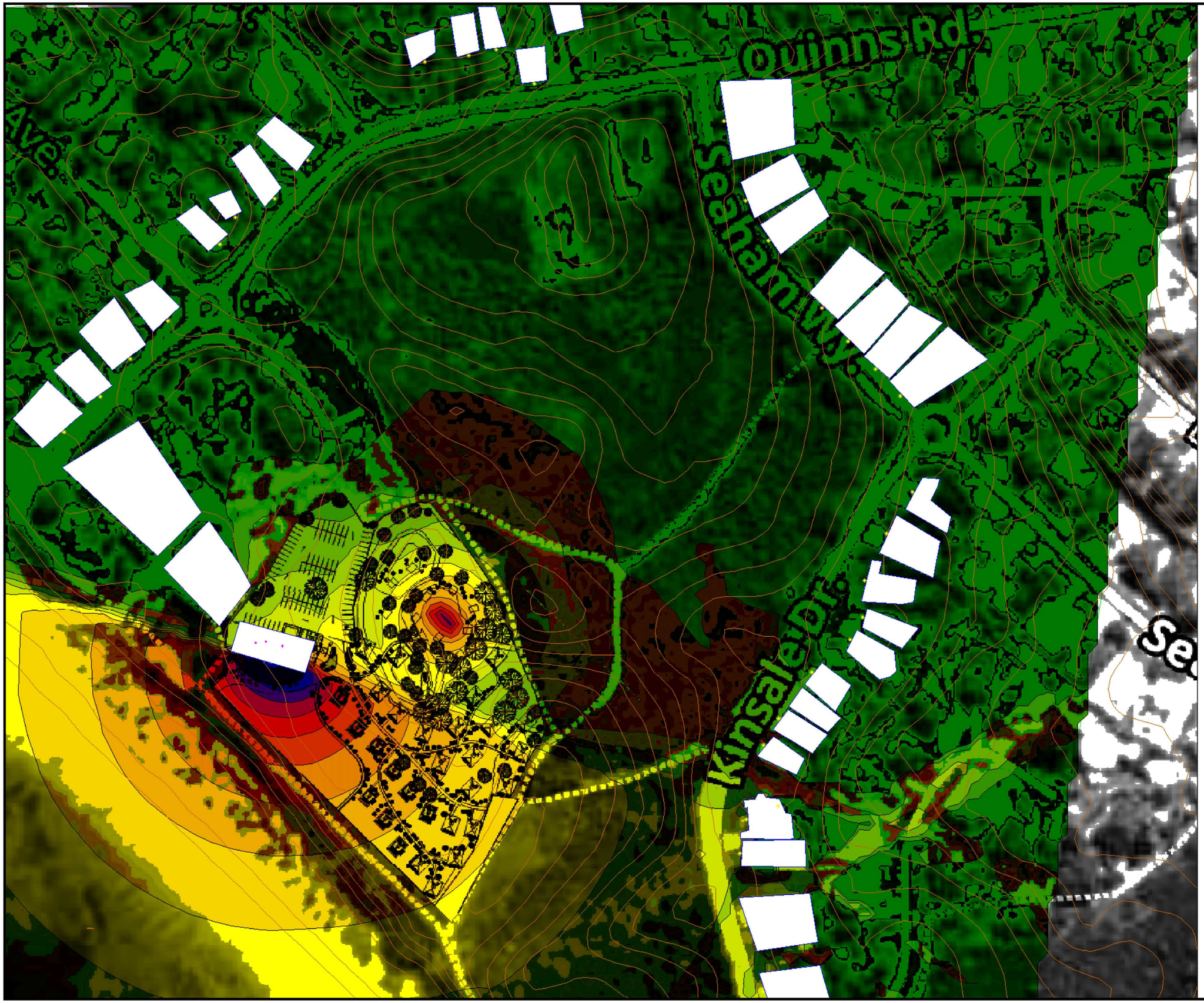
Appendices

Appendix A Glossary of Acoustic Terms

NOISE	
Acceptable Noise Level:	The acceptable L_{Aeq} noise level from industrial sources, recommended by the EPA (Table 2.1, INP). Note that this noise level refers to all industrial sources at the receiver location, and not only noise due to a specific project under consideration.
Adverse Weather:	Weather conditions that affect noise (wind and temperature inversions) that occur at a particular site for a significant period of time. The previous conditions are for wind occurring more than 30% of the time in any assessment period in any season and/or for temperature inversions occurring more than 30% of the nights in winter).
Acoustic Barrier:	Solid walls or partitions, solid fences, earth mounds, earth berms, buildings, etc. used to reduce noise.
Ambient Noise:	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment Period:	The period in a day over which assessments are made.
Assessment Location	The position at which noise measurements are undertaken or estimated.
Background Noise:	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{A90} noise level.
Decibel [dB]:	The units of sound pressure level.
dB(A):	A-weighted decibels. Noise measured using the A-filter.
Extraneous Noise:	Noise resulting from activities that are not typical of the area. Atypical activities include construction, and traffic generated by holidays period and by special events such as concert or sporting events. Normal daily traffic is not considered to be extraneous.
Free Field:	An environment in which there are no acoustic reflective surfaces. Free field noise measurements are carried out outdoors at least 3.5m from any acoustic reflecting structures other than the ground
Frequency:	Frequency is synonymous to pitch. Frequency or pitch can be measured on a scale in units of Hertz (Hz).
Impulsive Noise:	Noise having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent Noise:	Level that drops to the background noise level several times during the period of observation.
L_{Amax}	The maximum A-weighted sound pressure level measured over a period.
L_{Amin}	The minimum A-weighted sound pressure level measured over a period.
L_{A1}	The A-weighted sound pressure level that is exceeded for 1% of the time for which the sound is measured.
L_{A10}	The A-weighted sound pressure level that is exceeded for 10% of the time for which the sound is measured.
L_{A90}	The A-weighted level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{A90} noise level expressed in units of dB(A).
L_{Aeq}	The A-weighted “equivalent noise level” is the summation of noise events and integrated over a selected period of time.

$L_{Aeq,T}$	The constant A-weighted sound which has the same energy as the fluctuating sound of the traffic, averaged over time T.
Reflection:	Sound wave changed in direction of propagation due to a solid object met on its path.
R_w:	The Sound Insulation Rating R_w is a measure of the noise reduction performance of the partition.
SEL:	Sound Exposure Level is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L_{eq} sound levels over any period of time and can be used for predicting noise at various locations.
Sound Absorption:	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound Level Meter:	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound Pressure Level:	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound Power Level:	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise:	Containing a prominent frequency and characterised by a definite pitch.

Appendix B Noise Contours



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SCENARIO 1

PATRONS AND AMBIENT MUSI
(DOORS OPEN)

NOISE CONTOUR AT
1.4m RECIEVER HEIGHT

Noise level
in dB(A)

	< 35.0
35.0 <=	< 38.0
38.0 <=	< 41.0
41.0 <=	< 44.0
44.0 <=	< 47.0
47.0 <=	< 50.0
50.0 <=	< 53.0
53.0 <=	< 56.0
56.0 <=	< 59.0
59.0 <=	< 62.0
62.0 <=	< 65.0
65.0 <=	< 68.0

Signs and symbols
- Point source
- Line source
- Area source
- Ground absorption
- Main building
- Point receiver
- Noise calculation area

Area usages
- Elevation line
- Elevation point

0 10 20 30 40 50 m

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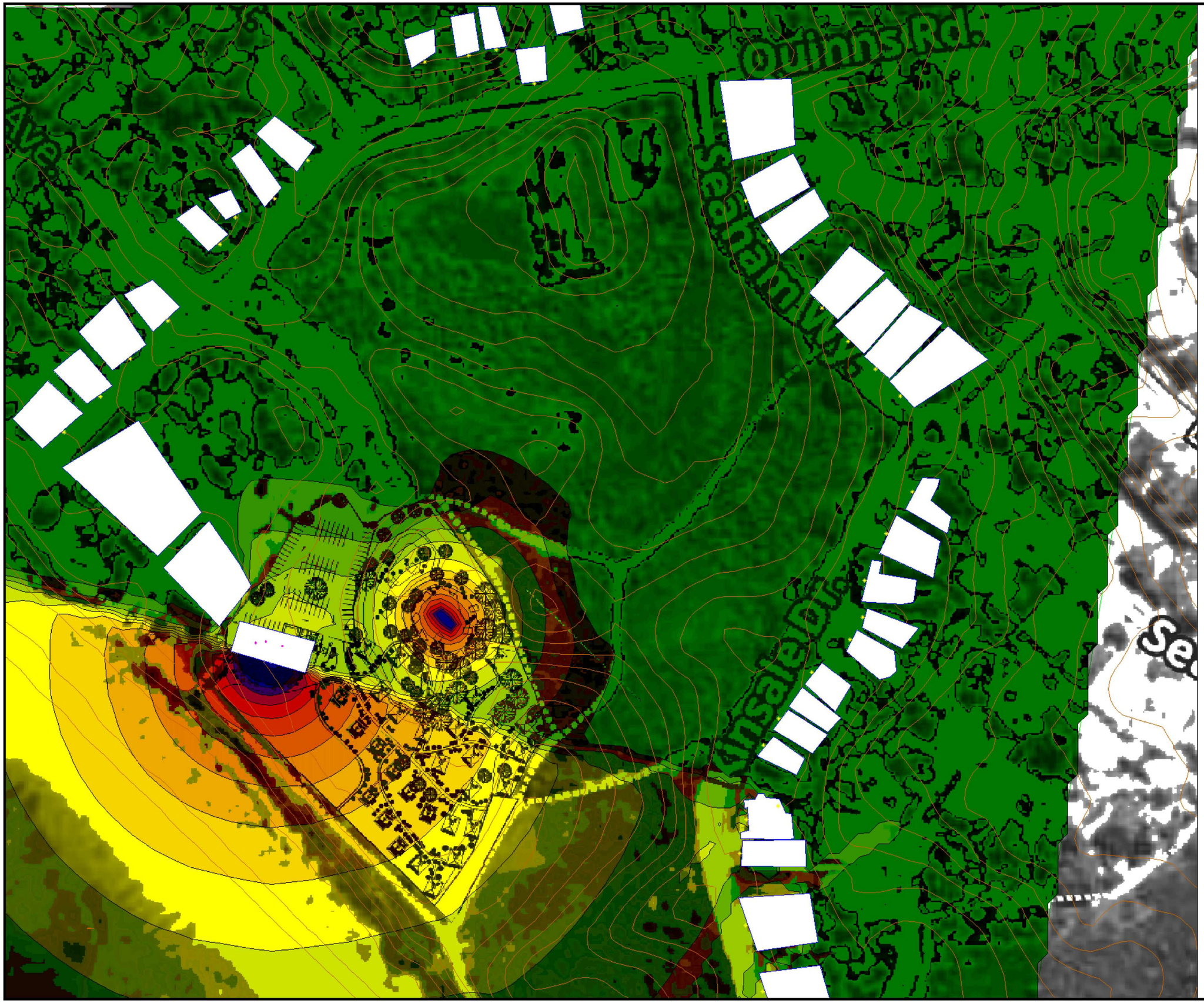

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SCENARIO 2
PATRONS AND AMBIENT
MUSIC (DOOR OPEN 30sqm)

NOISE CONTOUR AT
1.4m RECIEVER HEIGHT

Noise level
in dB(A)

	< 35.0
35.0 <=	< 37.5
37.5 <=	< 40.0
40.0 <=	< 42.5
42.5 <=	< 45.0
45.0 <=	< 47.5
47.5 <=	< 50.0
50.0 <=	< 52.5
52.5 <=	< 55.0
55.0 <=	< 57.5
57.5 <=	< 60.0
60.0 <=	< 62.5
62.5 <=	< 65.0
65.0 <=	< 67.5
67.5 <=	

Signs and symbols
- Point source
- Line source
- Area source
- Ground absorption
- Main building
- Point receiver
- Noise calculation area

Area usages
- Elevation line
- Elevation point

0 10 20 30 40 50 m

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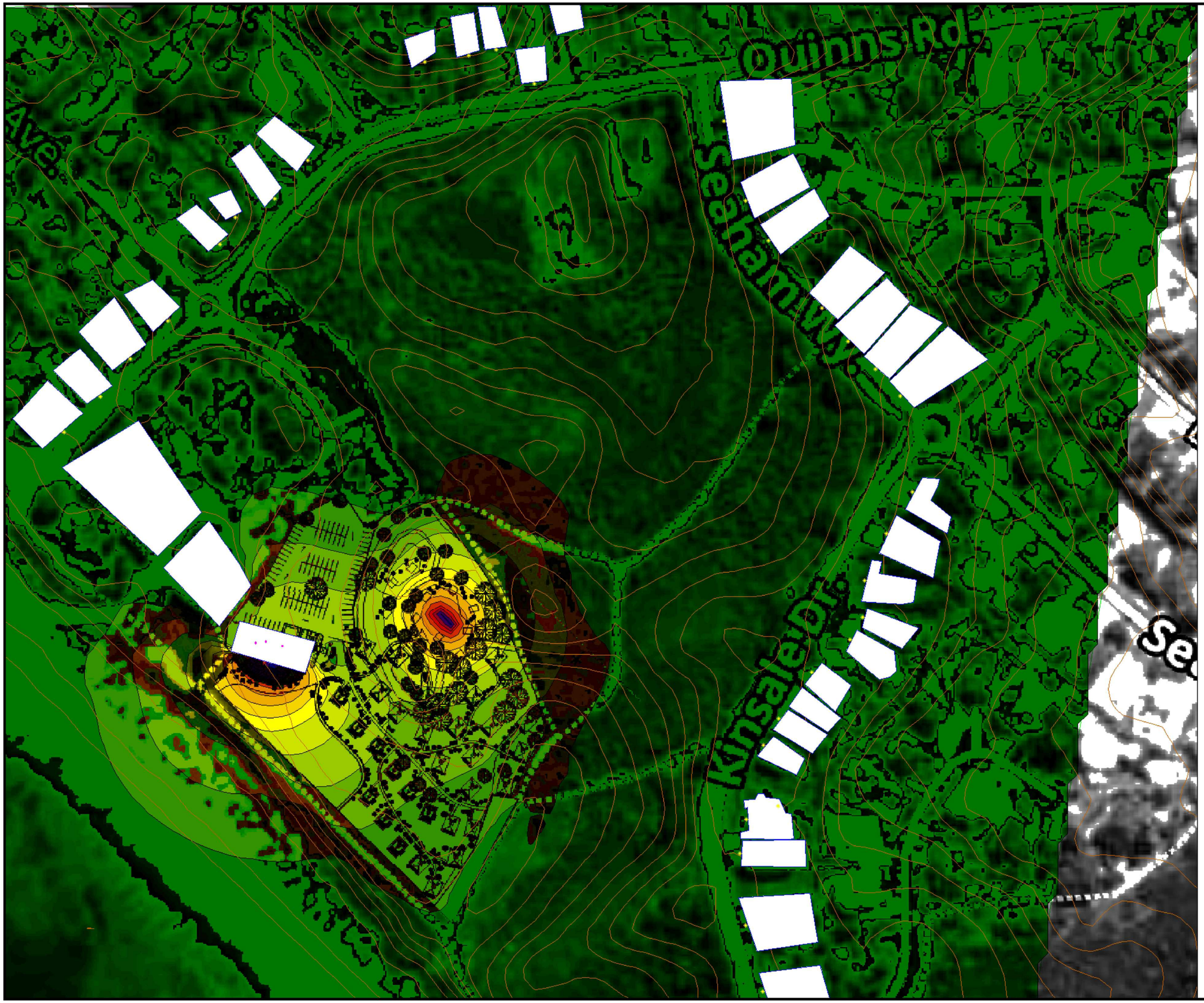

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SCENARIO 3

PATRONS AND MUSIC NOISE
(DOORS CLOSED)

NOISE CONTOUR AT
1.4m RECIEVER HEIGHT

Noise level
in dB(A)

	< 35.0
35.0 <=	< 38.0
38.0 <=	< 41.0
41.0 <=	< 44.0
44.0 <=	< 47.0
47.0 <=	< 50.0
50.0 <=	< 53.0
53.0 <=	< 56.0
56.0 <=	< 59.0
59.0 <=	< 62.0
62.0 <=	< 65.0
65.0 <=	< 68.0

Signs and symbols
- Point source
- Line source
- Area source
- Ground absorption
- Main building
- Point receiver
- Noise calculation area

Area usages
- Elevation line
- Elevation point

0 10 20 30 40 50 m

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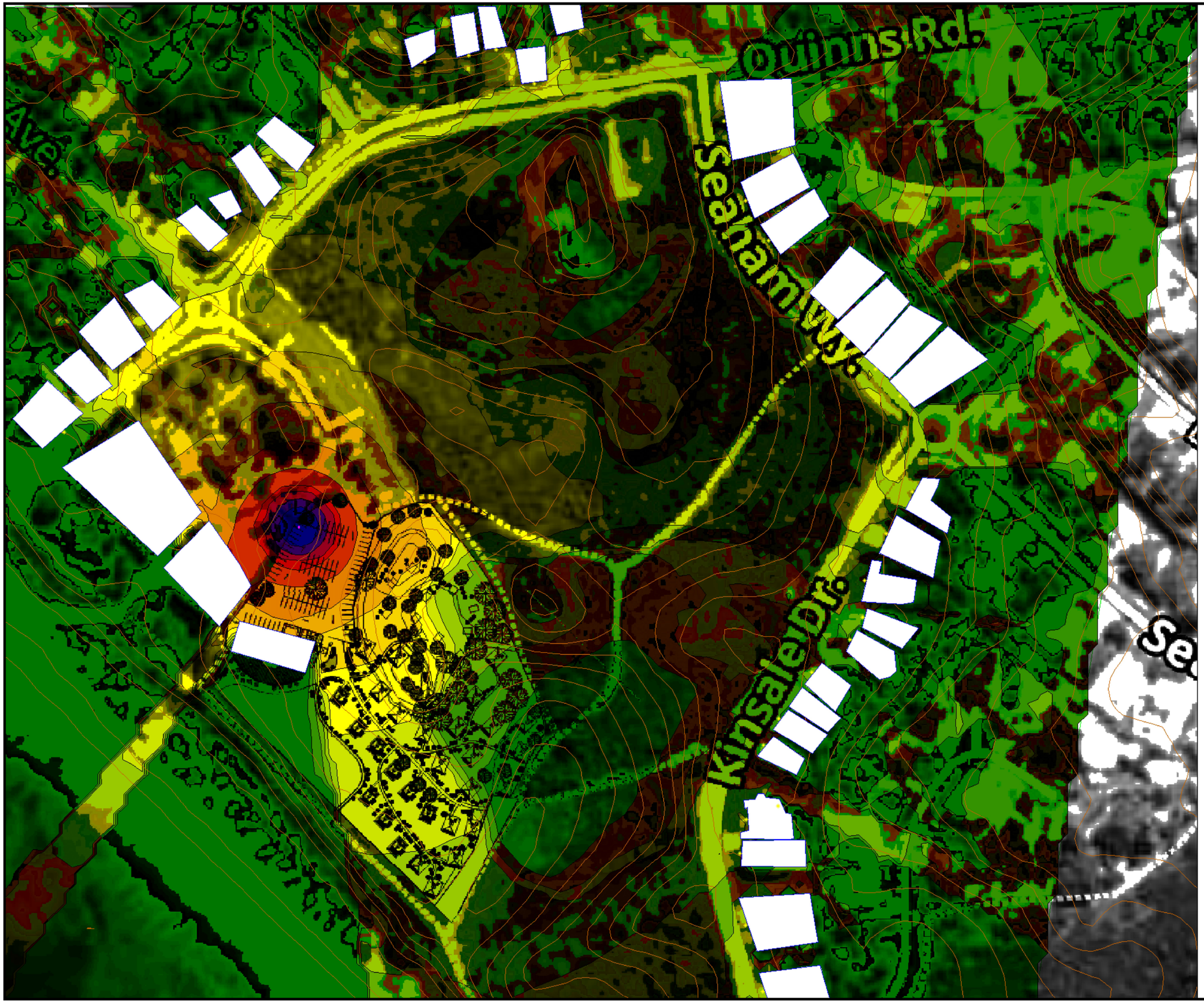

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SCENARIO 4

DOOR SLAM Lmax

NOISE CONTOUR AT
1.4m RECIEVER HEIGHT

Noise level
in dB(A)

	< 35.0
35.0 <=	< 38.0
38.0 <=	< 41.0
41.0 <=	< 44.0
44.0 <=	< 47.0
47.0 <=	< 50.0
50.0 <=	< 53.0
53.0 <=	< 56.0
56.0 <=	< 59.0
59.0 <=	< 62.0
62.0 <=	< 65.0
65.0 <=	< 68.0

Signs and symbols
- Point source
- Line source
- Area source
- Ground absorption
- Main building
- Point receiver
- Noise calculation area

Area usages
- Elevation line
- Elevation point

0 10 20 30 40 50 m

Stantec

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