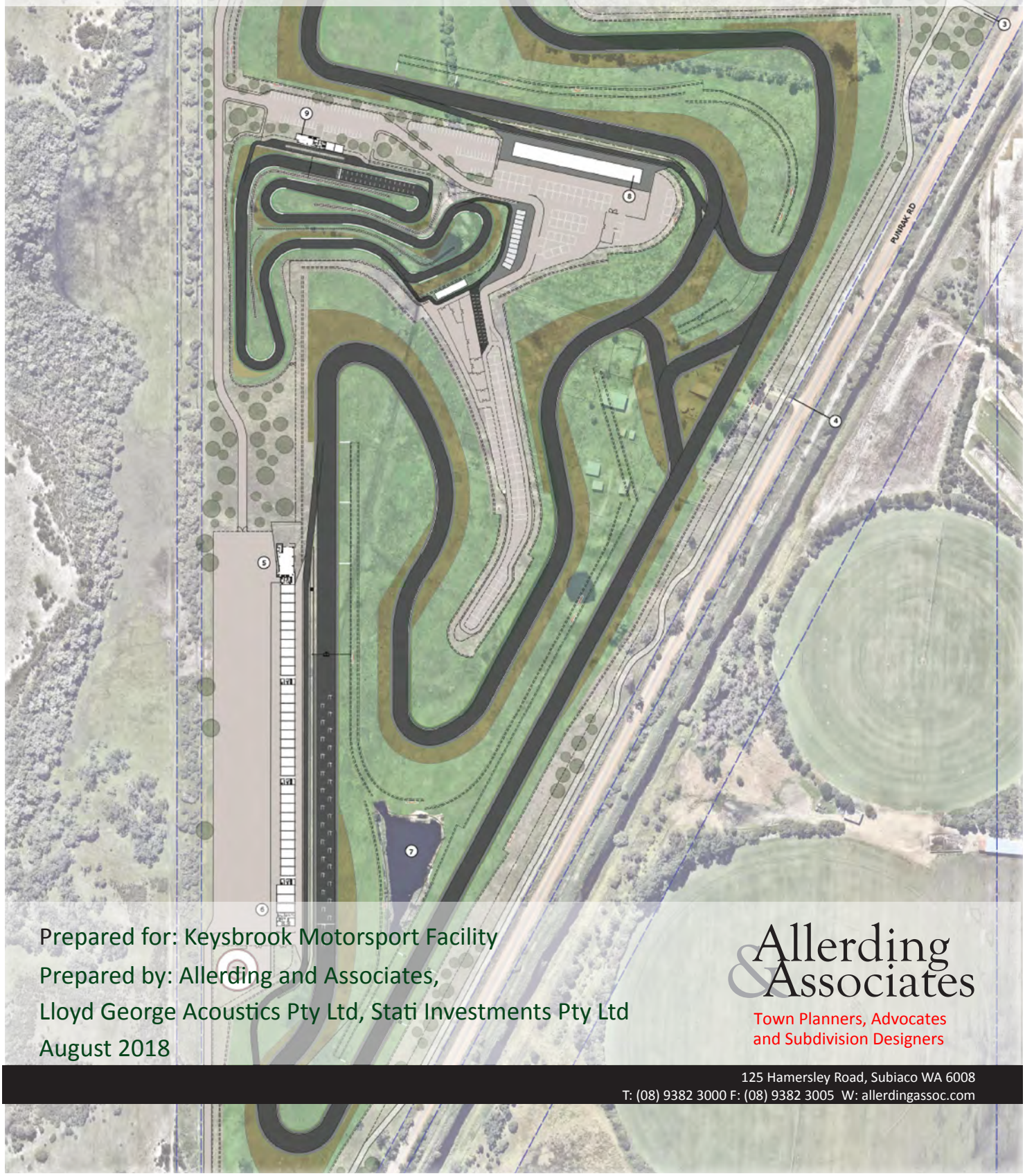
Noise Management Plan

Motorsport Facility

Lots 78 (#732) Punrak Road, Keysbrook
Shire of Serpentine Jarrahdale



Prepared for: Keysbrook Motorsport Facility

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1 INTRODUCTION

This Noise Management Plan (**NMP**) has been prepared to outline the procedures for managing noise impacts to nearby residents resulting from noise producing activities conducted at the proposed Keysbrook Motorsport Facility (**the Motorsport Facility**). It provides a framework for ensuring that noise emissions are managed to ensure compliance with the limits set out by the Confederation of Australian Motor Sport (**CAMS**) for race events; that procedures are regularly reviewed in line with best practice; that there is a clear and transparent mechanism for affected residents to tender enquiries or raise concerns regarding noise impacts; and to clearly set out monitoring and reporting procedures.

The NMP will consist of the following key components:

- Mechanisms for ensuring continuing compliance with operating conditions;
- Noise monitoring and reporting of noise emissions from the Motorsport Facility;
- Notification of events to stakeholders;
- Response to noise enquiries or concerns regarding noise;
- Details of the chain of responsibility for implementation of the NMP; and
- Continuing development of strategies to reduce the noise impacts from the Motorsport Facility in line with best-practice noise management procedures.

A description of the terminology used in the NMP is provided in **Appendix A**.

2 BACKGROUND

2.1 Activities

The proposed Keysbrook Motorsport Facility is to be located at Lot 78 (No. 732) Punrak Road, Keysbrook and will be designed with the ability to gain FIA accreditation for national and international racing.

The activities proposed to be conducted from the Motorsport Facility will generally include:

- local and national car racing;
- motorbike racing;
- driver training;
- vehicle manufacturer events;
- amateur and pro go kart race events;
- hire karts; and
- ancillary activities.

Predicted noise levels for the various motorsports activities proposed are provided in the report: *Environmental Noise Assessment Keysbrook Motorsports Facility Lloyd George Acoustics Reference: 17094123-01B dated 2 August 2018* (**the Noise Assessment**).

A copy of the Noise Assessment is included at **Appendix B**.

A key aspect of the proposal is to ensure that all vehicles do not exceed the maximum allowable noise level of 95 dB L_{Amax} at a distance of 30m from the exhaust in accordance with the CAMS noise limits and to ensure vehicle noise is mitigated as much as possible.

2.2 Ancillary Activities

A range of ancillary events will also occur as part of the activities noted above. These ancillary events will typically be lower noise generating activities including:

- Education and seminars (involving corporate hire of meeting rooms);
- Cycling events;
- School hire for sporting and educational events; and
- Other incidental activities associated with motor vehicle use.

Any event that falls outside of the activities typical to a motor sport venue as defined by Regulation 16A of the *Environmental Protection (Noise) Regulations 1997* (**the Noise Regulations**) will be required to comply with the level of noise emissions prescribed under regulation 7. Such events will be subject to the notification process in accordance with the notification requirements contained within Section 6.5 of this NMP and in addition will be listed on the Motorsport Facility website with the corresponding noise limit listed together with the other information outlined in the Activity Log at Section 4.2.1.

2.3 Noise Effects on Residents

The main noise source likely to affect local residents from the Motorsport Facility is vehicles on the race track. There is also potential annoyance from the public address systems during race events. An online noise feedback form will be available on the Motorsport Facility website to provide residents a platform to record the date, time and nature of any noise disturbances, as discussed in Section 7. A copy of the Feedback Form is included at **Appendix C**. Feedback will be used by the Motorsport Facility to identify the types of events and activities that cause disturbance, and to continually improve its noise management processes.

3 RESPONSIBILITY AND AUTHORITY

3.1 Key Personnel

The management team of the Keysbrook Motorsport Facility is responsible for the development and implementation of this NMP, including:

- Compliance measure procedures;
- Implementation of noise management initiatives;
- Noise monitoring, reporting of results, and procedures for when parameters are exceeded;
- Communications and notifications;
- Investigation and response to complaints; and
- NMP review.

The contact details for the key personnel and their key responsibilities relevant to this NMP are provided in **Table 3-1**:

Table 3-1 Key Personnel

Role / Responsibility	Name	Position	Contract Phone	Email
Compliance, Implementation of NMP, Noise Monitoring, Communications and Complaints.	TBC	Track Supervisor	TBC	TBC
Provide assistance to Track Supervisor in relation to Compliance, Implementation of NMP, Noise Monitoring, Communications and Complaints.	TBC	Deputy Track Supervisor	TBC	TBC
NMP Review upon direction of the Track Supervisor	TBC	Noise Consultant	TBC	TBC
Investigating Compliance, Noise Monitoring and Complaints.	Shire of Serpentine-Jarrahdale	Environmental Health Officers	TBC	TBC

4 VENUE DESCRIPTION

4.1 Venue Layout

The Keysbrook Motorsport Facility broadly consists of a main racing circuit, two separate pit areas with associated car parking and storage areas, and a go-kart track. The proposed layout of the Keysbrook Motorsport Facility is provided in **Figure 4-1**.

Figure 4-1 – Proposed Track Layout

4.1.1 Track Layout

The Motorsport Facility is located within a triangular shaped allotment with a site area of approximately 50ha. The site has a gradual and slight fall from east to west, which is generally reflective of the surrounding land.

The Motorsport Facility incorporates a main track circuit comprising approximately 3.5kms of track, including a 1.2km northern track and a 2.3km southern track. The Motorsport Facility has been designed to operate either as a full circuit or two separate circuits. The direction of vehicle movement throughout the site is clockwise with the main starting line located in the south-western portion of the site adjacent to the main pit building. An alternative starting line will be located adjacent to the secondary pit building in the north of the site which will be used only when the northern circuit is operating separately to the southern circuit.

A go-kart track is also located between the northern circuit and southern circuit and comprises the main track and associated pit lane and marshalling areas.

The main public vehicle access point to the Motorsport Facility will be via Wigg Road to the north-west of the site. The majority of traffic accessing the site is likely to use Yangedi Road to the north. Other emergency access points are provided to Punrak Road to the east.

Two main dedicated parking areas are located within the site, one adjacent to the main pit building and the other adjacent to the secondary pit building and go-kart clubrooms. These parking areas will be utilised for both competitor and visitor parking, depending on the event. Race vehicle preparation will not be permitted in the parking area. A third overflow parking area is located to the north of the site in a cleared paddock.

4.1.2 Facilities

The main pit building adjacent to the western boundary includes the following facilities:

- main club rooms;
- function room;
- catering facilities;
- race control;
- administration rooms;
- ablutions;
- main pits/garage area;
- medical building; and
- caretakers dwelling.

The secondary pit building adjacent to the northern circuit comprises a series of 10 garages and one toilet block.

The go-kart building to the north of the track comprises a double storey structure with a welcome centre and two garages downstairs with offices upstairs.

All vehicle preparation will occur within the pit buildings (of the main track) or within the go-kart pit buildings. The extensive pit buildings comprising the main pits, secondary pits and go-kart pits will provide an all weather facility whilst also performing a noise mitigation function for vehicle noise off the track.

4.2 Venue Management and Operation

The Motorsport Facility will be managed and operated in accordance with the following measures.

4.2.1 Activity Logging

A log of all activity at the Motorsport Facility will be maintained by the Track Supervisor or delegated staff member. The log will include:

- Date of activity;
- Start/finish times;
- Vehicle class and event/activity description;
- Event noise limits (trackside maximum noise level);
- Record of trackside maximum noise levels; and
- Record of wind speed and direction, temperature and rainfall.

The log will be formatted so the total number of days for each noise limit can be readily determined. The log will be uploaded next day to the Motorsport Facility website and maintained by the operator.

Separate logs will be recorded and maintained involving actions taken on vehicles exceeding trackside limits (refer Section 6.2) and complaints received and actions taken in response (refer Section 7).

4.2.2 Bookings

The following requirements apply to activities organised by both the Motorsport Facility operator and hirers of the track. When making any booking, the Motorsport Facility operator will:

1. Determine the activity noise limits;
2. Check whether the activity can be undertaken in accordance within the noise limit restrictions; and
3. Establish an individual responsible for noise management during the activity, outline their responsibilities for noise management at their event, and provide training to that individual about this NMP as required (see Section 4.2.3).

4.2.3 Track Hire

The operator of the Motorsport Facility will be responsible for noise management of track hire activities. The Motorsport Facility will include a contractual requirement for hirers to operate in accordance with this NMP as part of the Terms and Conditions of Hire. The Motorsport Facility will provide training for each hiring organisation to include:

- Overview of this NMP;
- Explanation of noise limit restrictions;
- Operation of the trackside noise monitor;
- Potential noise effects on neighbouring residents; and
- Complaint and response procedures.

Following each event/activity the hirer will submit a report to the Motorsport Facility with details to complete the track log.

4.2.4 Go-kart Hire

Go-kart hire will be undertaken in accordance with Sections 4.2.2 and 4.2.3 above.

4.2.5 Welcome Centre Hire

The operator of the Motorsport Facility will be responsible for noise management of any activity within the Welcome Centre. The Motorsport Facility will include a contractual requirement for hirers of the Welcome Centre to operate in accordance with this NMP as part of the Terms and Conditions of Hire which will include:

- Compliance with the noise limit restrictions (pursuant to Regulation 7 of the Noise Regulations);
- Recognition of potential noise effects on neighbouring residents; and
- Limiting the use of any amplified music to internal spaces after 7pm.

4.2.6 Operating procedures

During activities within the Motorsport Facility the person responsible for noise management will:

- Ensure that trackside noise monitoring is conducted and acted upon in accordance with Sections 6.2 and 6.4 (for track use);
- Act on any recorded noise limit exceedances in accordance with Section 6.2; and
- Address any complaints received in accordance with Section 7.

5 RACE ACTIVITIES DESCRIPTION

5.1 Overview of Track Use

Table 5-1 below provides an overview of track use with the associated reference to the noise modelling as provided within the Noise Assessment. A copy of the Noise Assessment is included at **Appendix B**. For the purposes of **Table 5-1**, track and test days are anticipated to produce equivalent noise to race events and have therefore been assessed against their related noise modelling figures within the Noise Assessment.

The class of cars modelled for each type of activity represents the worst case scenario vehicle for that category. For example, the class of cars modelled for the amateur car event include GT3 and Formula Fords which represent the highest noise generating vehicle for that class. For bike race events, a worst case scenario noise rating of Superbikes has been applied.

The vehicle Class is based on the following parameters:

- Class A is a noise limit above 95 dB(A)*;
- Class B is a noise limit up to 95 dB(A)*;
- Class C is a noise limit up to 75 dB(A)*; and
- Class D is a noise limit below 65 dB(A)*.

** - measured trackside at 30m from the vehicle exhaust.*

Table 5-1 Overview of Track Use

Track Use	Modelled Class of Vehicle	Noise Modelling reference in Noise Assessment	Modelled Maximum Sound Pressure Level at 30m from exhaust	Vehicle Class
Hire Karts	Hire Karts	Figure 4-5	64 dB(A)	D
Amateur Go Kart Race Events	125cc Rotax Kart Race	Figure 4-4	84 dB(A)	B
International and National Race Go Kart Race Events	125cc Rotax Kart Race	Figure 4-4	84 dB(A)	B
Manufacturer Days	Manufacturer Car	Figure 4-6	73 dB(A)	C
Driver Training	Manufacturer Car	Figure 4-6	73 dB(A)	C
Amateur track/test days for road and race cars	GT3 and Formula Ford	Figure 4-1 and Figure 4-2	95 dB(A)	B
Amateur Car Events (State)	GT3 and Formula Ford	Figure 4-1 and Figure 4-2	95 dB(A)	B
Amateur Car Events (National)	GT3 and Formula Ford	Figure 4-1 and Figure 4-2	95 dB(A)	B
Track/test days for road and street bikes	Superbikes	Figure 4-3	95 dB(A)	B
Bikes Race Days	Superbikes	Figure 4-3	95 dB(A)	B

As outlined in Section 6 of this NMP, all vehicles using the track must comply with relevant governing body noise limits. In all cases the maximum allowable noise levels at the Motorsport Facility will be 95 dB L_{Amax} at a distance of 30m from the exhaust in accordance with the CAMS noise limits. Table 3-2 of the Noise Assessment at **Appendix B** demonstrates how the sound source power levels of the varying classes of vehicle contained in the table below will produce a maximum sound pressure level ranging from 57 dB to 95 dB for typical track activities.

5.2 Frequency of Track Use

The primary noise sources on site will be vehicles during training and racing events. It is estimated that between 5 to 36 cars would operate during amateur track/test days and race events, with the same estimated range in motorbikes to be operating during amateur track/test days and race events. These numbers are considered to represent the maximum number of vehicles on the race track at any one time. Regular activities, such as driver training, manufacturer days and go-kart hire would comprise a similar number of vehicles, however the noise generated by these activities would be substantially less than race events. Whilst it will only be possible to determine an average frequency of events once the Motorsport Facility is operational, the estimated frequency of events is provided in **Table 5-2** as a guide.

Table 5-2 Estimated Track Use Frequency

Track Use	Estimated Frequency (days per year)	Estimated Duration (per day)	Race Description	Expected Racing Duration (hours per day)
Hire Karts	Daily	9am-6pm	40min p/hr for 6hrs	4
Amateur Go Kart Race Events	15	9am-6pm	8 categories, 10 min each, 4 races	5.5
International and National Race Go Kart Race Events	5	9am-6pm	10 categories, 15 min each, 2 races	5
Manufacture Days	74	9am-6pm	20 cars on track for 5 hrs. Std cars used.	5
Driver Training	74	9am-6pm	20 cars on track for 5 hrs. Std cars used.	5
Amateur track/test days for road and race cars	55	9am-6pm	Three groups. 1 road car, 2 race car with limited noise mufflers. each group on track for 15min per hour. 6 sessions each group	4.5
Amateur Car Events (State)	10	9am-6pm	12 categories. Each category on track for 8 - 10 laps races (12-15min) per session. 2 sessions each per day	6
Amateur Car Events (National)	5	9am-6pm	8 categories. Each category on track for 8 - 10 laps races (12-15min) per session. 3 sessions each per day.	6
Track/test days for road and street bikes	55	9am-6pm	3 groups. Each group on track for 15min per hour. 6 sessions each group	4.5
Bikes Race Days	18	9am-6pm	6 categories. 8 – 10 laps races (12-15min sessions) 4 sessions	4.5
Other recreational, educational and entertainment based events, including Seminars, Cycling Events; and School Hire (e.g. Cross Country events)	Average 6 per year	Case by case	Case by case	Not Applicable

6 NOISE CONTROL MECHANISMS

The Keysbrook Motorsport Facility management are committed to minimising noise impacts to nearby residents as a result of track users. There are a number of factors that contribute to the degree of noise impact on residents from motor sports events. These include:

- The events schedule, including the time at which events take place, the number and type of events held per year and the spread of events throughout the year;
- The noise emission level of vehicles and the level of noise at the affected residence;
- The operational aspects of the facility, including the design and use of public address systems and the management of track use and hire; and
- The prior notification provided to affected residents about upcoming events.

The following measures will be implemented during the initial phases of the facility development. Noise control initiatives will continue to be developed on an ongoing basis.

6.1 The Events Schedule

The events schedule is intended to provide a means of determining the amount of weekly and monthly race and training events to minimise noise that adjacent residents would be exposed to. This includes consideration of other daily events, including driver training, manufacturer events and hire karts, which have noise characteristics that are equivalent to or less than normal road vehicles and which are unlikely to result in noise disturbance to neighbouring residents.

An event matrix outlining the equivalent A-weighted continuous sound level (L_{Aeq}) over a 365 day period will be used in the preparation of the annual calendar of events to inform the permitted number of events in each Class or lower. This has been adapted from other comparable motorsport venues in Australia as a means of assuring that an adopted maximum L_{Aeq} over a 365 day period results in a practical constraint to the number of louder events that can occur at the facility. The Keysbrook base case is shown below in **Table 6-1** based upon applying a maximum L_{Aeq} of 93.7 dB.

Table 6-1 Equivalent Noise Level at 30m: Base Case

Class	Noise Limit	Weekday	Weekend	L_{Aeq}
A	Above 95dB(A)	0	0	0.0
B	Up to 95dB(A)	115	48	93.6
C	Up to 75dB(A)	110	38	70.8
D	Below 65dB(A)	36	18	62.6
	Totals	***261***	***104***	***93.7***
			365 days	

The calculations apply a +5 dB penalty for weekend events, as it is assumed these will create more nuisance than a weekday event.

The matrix allows for an event trade off system, based on the equivalent noise level never exceeding the 93.7 dB base case. For example, if the Class B number of weekday events were to increase from 115 to 125 per year, the weekend Class B events could reduce from 48 to 46 to

maintain the L_{Aeq} of 93.7 dB. Similarly, if the number of Class B weekend events increased from 48 to 50, the number of weekday Class B events would need to decrease from 115 to 113.

Further, the matrix represents the number of days per year that potentially relate to each vehicle Class or lower operating on any one day. For example, using **Table 6-1** as a base case, for 148 days of the year, Class C events (eg. Driver Training) and lower will operate and on 54 days of the year, Class D events will exclusively operate only. This is also demonstrated as follows:

- Total exclusive quiet days per year – 54 days (Class D events only);
- Total exclusive lower noise days per year – 202 days (inclusive of Class C and D events only); and
- Total louder noise days per year – 163 days (potentially inclusive of Class B, C and D events).

However, it is possible that a different configuration of events can occur, but only on the proviso that any event combinations achieve an L_{Aeq} of 93.7 dB or less.

6.2 Vehicle Noise Limit and Compliance Measurement Procedures

All vehicles using the track must comply with relevant governing body noise limits. In all cases the maximum allowable noise levels at the Motorsport Facility will be 95 dB L_{Amax} at a distance of 30m from the exhaust in accordance with the CAMS noise limits. The following procedure will be implemented by the track supervisor (or delegated staff member):

- Noise monitor set up trackside at a distance of 30m from the exhaust (refer **Figure 6-1** for indicative location of trackside microphone) prior to operation of the Motorsport Facility;
- Recordings received from the noise monitor will be fed to the main control building where data is recorded and stored;
- Noise monitor permanently switched on (to be confirmed based on the design of monitor) or switched on by track supervisor (or delegated staff member) prior to the first track use of each day of operation;
- Track supervisor (or delegated staff member) to be stationed in the race control building for the duration of the track use to monitor track noise;
- If the recorded vehicle noise levels exceeds 95 dB LAmax during track use, a photograph of the non-compliant vehicle will be provided to the race control;
- The non-compliant vehicle will be removed from the track as soon as possible and not be permitted back on the track until appropriate modifications are made. The non-compliant vehicle form included at **Appendix D** has been developed for notification and record keeping purposes;
- An exceeding vehicle is recorded by the assessing staff member in a register of non-compliant vehicles to be kept by the Motorsport Facility;
- If the same vehicle has been found to exceed the noise levels twice in the same event, the vehicle will be removed for the remainder of the event;

- Records of vehicle tests and non-compliant vehicles are to be made available on request; and
- Data from the noise monitor will be fed into the activity log which will be released next day onto the Facility's website and made publicly available.

Figure 6-1 – Indicative Microphone Location

6.3 Permanent Noise Monitoring

The Keysbrook Motorsports Facility will install a permanent noise monitoring system within the Facility grounds (refer **Figure 6-1** for indicative location of trackside microphone). The final location of the microphone will ultimately be subject to CAMS and/or FIA approval. The noise monitoring system will be submitted by the Motorsports Facility operator for a full laboratory NATA calibration every 2 years. The noise monitoring system will run continuously and be designed to allow the results to be recorded and made available to the local authority on request.

Data from the noise monitoring system will be programmed to upload data (L_{Amax}, L_{A10} and L_{Aeq}) to the Motorsport Facility database. The noise monitoring data will be included in the compliance reporting and can be used to gauge the overall noise impact from various events or racing categories. It will also provide a valuable reference and management tool if a complaint regarding noise is received from nearby residents.

6.4 Operational Noise Management Initiatives

In addition to the compliance measurement procedures, the following additional noise management initiatives will be implemented:

- Installation of a permanent noise monitoring system within the Motorsport Facility in accordance with Section 6.3. The noise monitoring system will run continuously and be designed to allow the results to be recorded and made available to the general public through the facility website;
- All vehicles participating in scheduled race events and other activities will undergo testing for noise limit compliance in accordance with the measurement procedures in Section 6.2;
- The public address system will be designed to minimise impact as far as practicable, while ensuring the volume is adequate for commentary and safety requirements. The design and operation of the installed public address system will be reviewed in response to any feedback from residents once operational;
- The Motorsport Facility operator will be available for ongoing dialogue with nearby residents through its feedback procedures and live noise monitoring results to determine which vehicles might cause annoyance and determine management measures to mitigate the noise for those events;
- To avoid unauthorised use of the track, the Motorsport Facility will be secured after hours. A caretaker will be present at all times after hours to monitor any security breaches and contact police or the security contractor as required.

6.5 Notification of Proposed Events

The Motorsport Facility will maintain an annual events schedule on its website which will include the type and dates for events, the event duration and start/finishing time. The Motorsport Facility will also use social media platforms as an additional form of community notification of upcoming scheduled events.

Notifications will be sent out by mail to all residential properties within a 1km radius of the Motorsport Facility if the schedule for an event is changed or an additional event is included into the annual events schedule. Notification will be made no less than 1 month in advance of the new or changed event. The notification will include the type and dates for events, the event duration and start/finishing times in the format as included in **Appendix E**.

The Motorsport Facility will review its notifications procedures after the first 12 months of operation to consider additional communications methods if required based upon the feedback received from residents and other stakeholders.

The proposed events to be held at the Keysbrook Motorsports Facility and the estimated frequency and duration of the events are provided in **Table 5-2** above and within Section 6.1.

7 NOISE ENQUIRIES AND FEEDBACK PROCEEDURES

Keysbrook Motorsport Facility is committed to addressing noise enquiries in a timely manner and to implement strategies to be resolved to the satisfaction of the enquirer where practicable.

Urgent enquiries can be made directly to the operations team at the Keysbrook Motorsports Facility on the day through a link provided on the website.

Keysbrook Motorsport Facility will also maintain a feedback form on their website that allows residents to comment on or lodge non-urgent enquiries about activities at the facility. The Noise Feedback Form is included in **Appendix C**.

Keysbrook Motorsport Facility will undertake the following procedure in actioning noise enquiries:

1. Complaint/noise enquiry received during an event by the Motorsport Facility or the local authority;
2. Complaint forwarded to the Track Supervisor or delegated staff member of the Motorsport Facility;
3. Initial telephone or email response will be made by the Track Supervisor to the complainant immediately where a non-compliance has been recorded on the noise monitoring system. Where further investigation into the complaint is required, a telephone or email response will be made to the complainant within 24 hours of receiving the complaint;
4. Initial investigation conducted by Track Supervisor and remedial action taken within 24 hours;
5. Response made in writing to complainant within 7 days;
6. Summary of complaint forwarded to Track Supervisor and entered into complaints log;
7. Follow up investigation conducted within 10 days (if required);
8. Additional response made to complainant in writing (if required); and
9. Summary of complaint, responses and any remedial action carried out will be entered into complaints log and forwarded to local authority.

Keysbrook Motorsport Facility will maintain a log of all noise related enquiries, showing the date and time of the enquiry, and the action taken to resolve the issue. A log of the enquiries will be made available to the local authority on request.

8 REVIEW OF NOISE MANAGEMENT PLAN

The review of the noise management plan will be undertaken as follows:

- Within two months of completion of the first 12 months of operation of the Motorsport Facility, the NMP will be reviewed taking into consideration the type events scheduled, response from neighbouring residences, results from the noise monitoring program and contents of the log of noise enquiries;
- The NMP review will be undertaken by a professionally qualified noise consultant upon direction from the Track Supervisor;
- The reviewed NMP will be forwarded by the Track Supervisor to the relevant authorities for comment before being finalised;
- Following the first 12 month review, the NMP will be reviewed annually for the first 5 years, then every 5 years on an ongoing basis; and
- Noise modelling will occur over the first 5 years to determine whether it would be of benefit for physical noise management measures to be implemented. Such physical measures may include earth bunds along the northern boundary of the site or future building development in the north of the site which may have future benefits for noise mitigation.

9 CONTINGENCIES

In addition to the regular NMP review process as outlined in Section 8, where it is identified that noise issues arise outside of the regular review period then the Motorsport Facility will take action to review the NMP and determine appropriate controls in addressing the issue.

Appendix A
Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)
The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting
An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

Sound Power Level (L_w)
Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

Sound Pressure Level (L_p)
The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

L_{ASlow}
This is the noise level in decibels, obtained using the A frequency weighting and the S time weighting as specified in AS1259.1-1990. Unless assessing modulation, all measurements use the slow time weighting characteristic.

L_{AFast}
This is the noise level in decibels, obtained using the A frequency weighting and the F time weighting as specified in AS1259.1-1990. This is used when assessing the presence of modulation only.

L_{APeak}
This is the maximum reading in decibels using the A frequency weighting and P time weighting AS1259.1-1990.

L_{Amax}
An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

L_{A1}
An L_{A1} level is the A-weighted noise level which is exceeded for one percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L_{A10}
An L_{A10} level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "*intrusive*" noise level.

L_{Aeq}
The equivalent steady state A-weighted sound level ("equal energy") in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the "average" noise level.

L_{A90}
An L_{A90} level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the "*background*" noise level.

One-Third-Octave Band
Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

L_{Amax} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded at any time.

L_{A1} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period.

L_{A10} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period.

Tonal Noise
A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between -

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

Modulating Noise
A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

(a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;

(b) is present for at least 10% of the representative.

Impulsive Noise
An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between $L_{A\ peak}$ and $L_{A\ Max\ slow}$ is more than 15 dB when determined for a single representative event;

Major Road
Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

Secondary / Minor Road
Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

Influencing Factor (IF)

$$= \frac{1}{10}(\%\ \text{Type}\ A_{100} + \%\ \text{Type}\ A_{450}) + \frac{1}{20}(\%\ \text{Type}\ B_{100} + \%\ \text{Type}\ B_{450})$$

where:

$\%\ \text{Type}\ A_{100}$ = the percentage of industrial land within a100m radius of the premises receiving the noise

$\%\ \text{Type}\ A_{450}$ = the percentage of industrial land within a 450m radius of the premises receiving the noise

$\%\ \text{Type}\ B_{100}$ = the percentage of commercial land within a100m radius of the premises receiving the noise

$\%\ \text{Type}\ B_{450}$ = the percentage of commercial land within a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

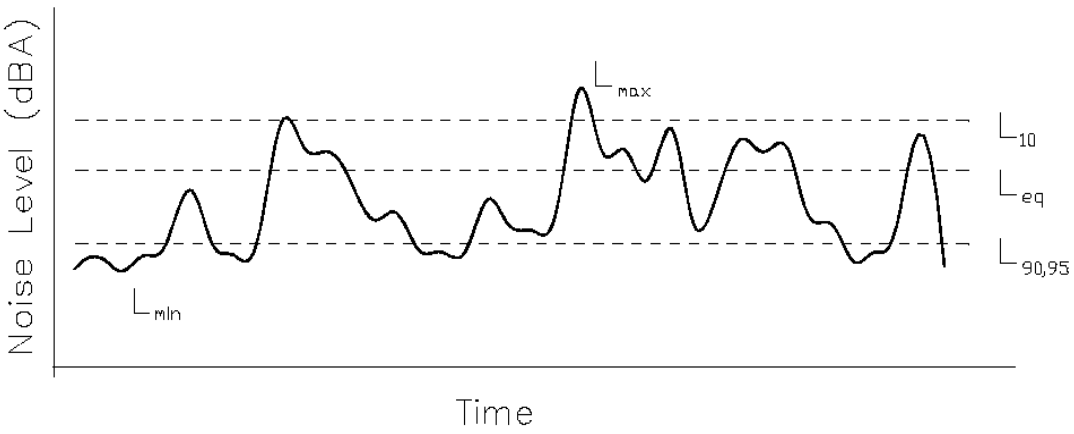
= 2 for each major road within 450m

= 6 for each major road within 100m

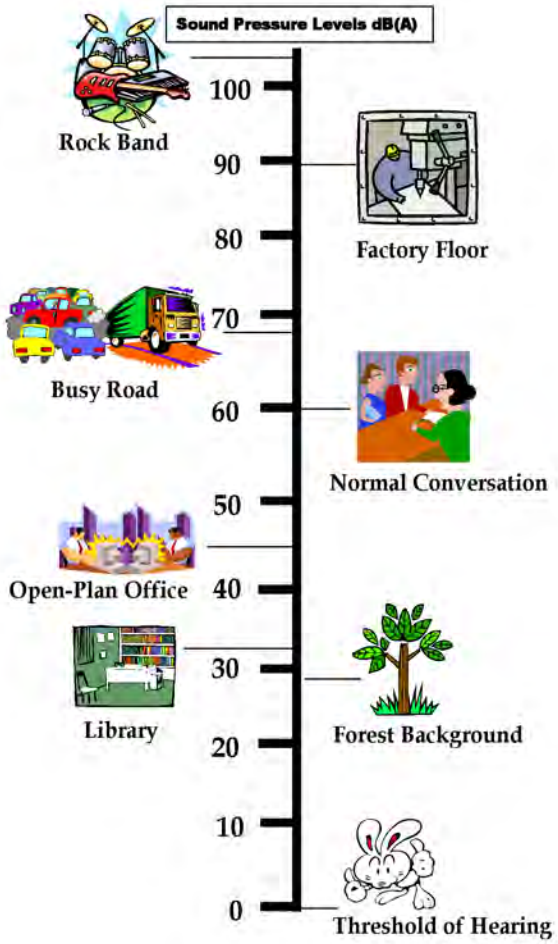
Representative Assessment Period
Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Background Noise
Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

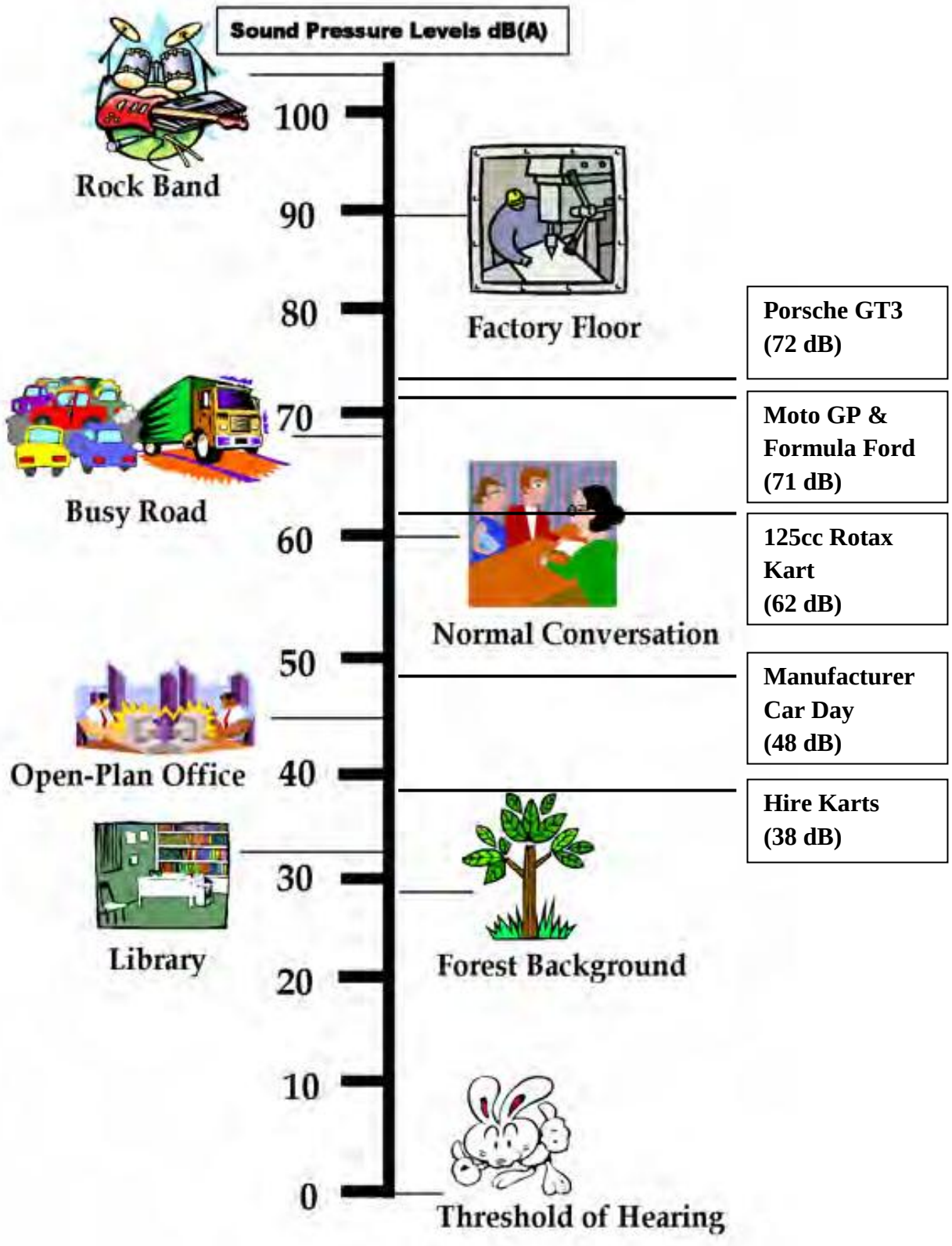
Chart of Noise Level Descriptors



Typical Noise Levels



COMPARISON OF SOUND PRESSURE LEVELS FROM ACTIVITIES FOR EACH VEHICLE CATEGORY AT NEAREST SENSITIVE PREMISES



Appendix B
Environmental Noise Assessment

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Environmental Noise Assessment

Keysbrook Motorsports Facility

Reference: 17094123-01C

Prepared for:
Stati Investments Pty Ltd

Report: 17094123-01B

Lloyd George Acoustics Pty Ltd

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Date:	Rev	Description	Prepared By	Verified
11/12/17	-	Final Issued to Client for Comment	Daniel Lloyd	Terry George
5/04/18	A	Updated sound power levels to reflect noise limits at trackside and removed reference to V8	Daniel Lloyd	Terry George
23/07/18	B	Removed reference to MotoGP	Daniel Lloyd	Terry George
2/08/18	C	Updated Table 5-1	Daniel Lloyd	Terry George

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Appendices

1 INTRODUCTION

Stati Investments Pty Ltd is the proponent for the proposed Keysbrook Motorsport facility (the Motorsport Facility) to be located at Lot 78 (No. 732.) Punrak Road, Keysbrook. The locality of the proposed Motorsports Facility is provided in *Figure 1-1*.

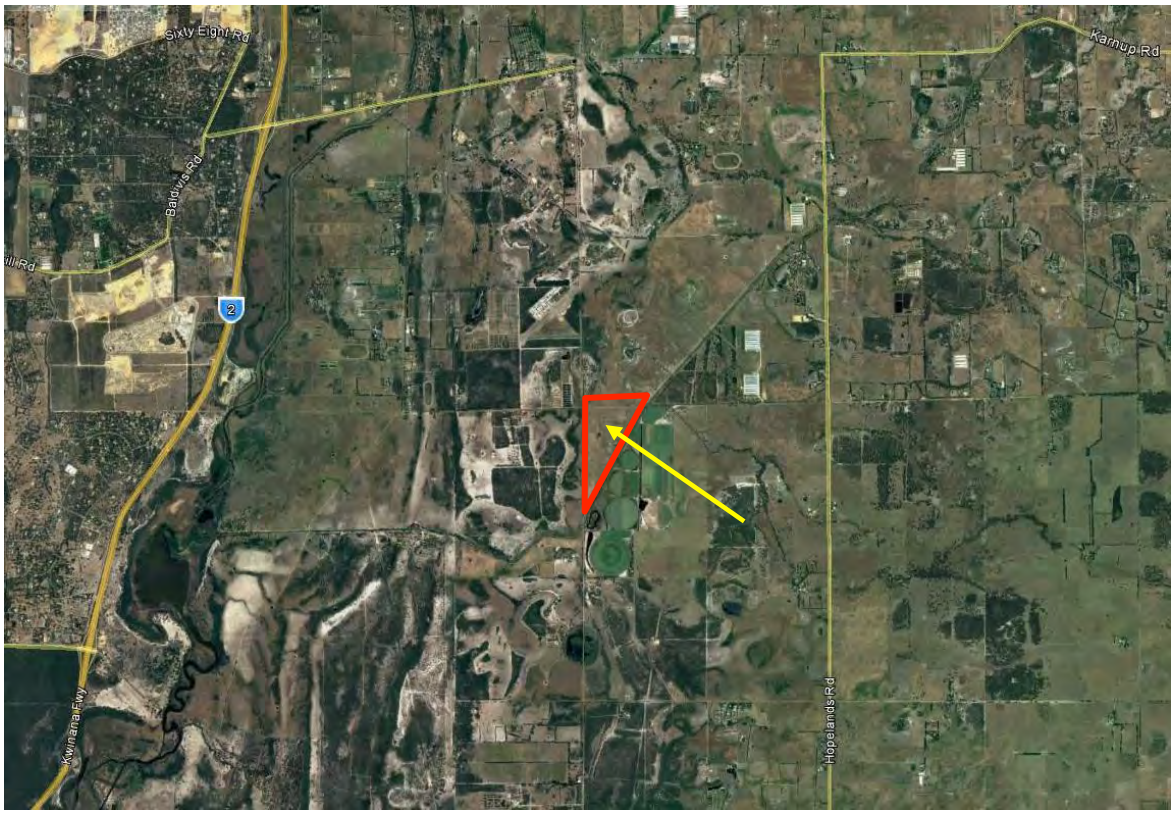


Figure 1-1 Project Locality

The Motorsport Facility will ultimately have the ability to host national and international sporting events with designed construction to achieve FIA and CAMS standards for cars and motorbikes and CIK level for Go-Karts.

The main circuit will be designed with the ability to gain FIA accreditation for national and international ratings. Stage 1 of the development of the Motorsport Facility, which is the subject of this assessment, will include local and national racing and a range of activities that promote road and driver safety and opportunities for other significant corporate and private events. Stage 2, of the development will be to obtain accreditation for international racing. The proposed track layout is provided in *Figure 1-2.*

Lloyd George Acoustics have been commissioned to determine the expected noise emissions from the Motorsports Facility and provide recommendations on noise management procedures to minimise impacts to noise sensitive premises surrounding the proposed facility.

Appendix A contains a description of some of the terminology used throughout this report.

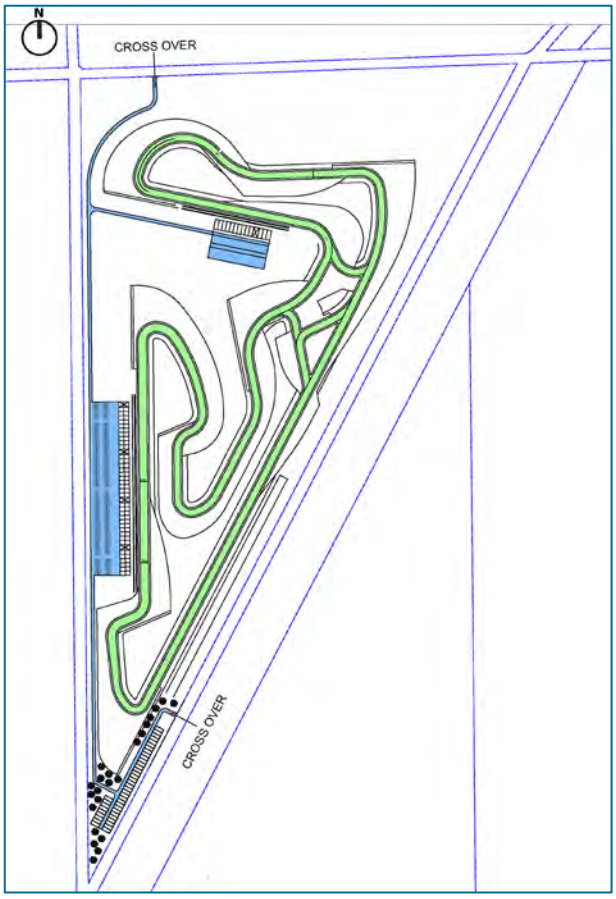


Figure 1-2 Proposed Motorsport Facility Layout

2 CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

"7. (1) Noise emitted from any premises or public place when received at other premises –

(a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and

(b) Must be free of –

i. tonality;

ii. impulsiveness; and

iii. modulation,

when assessed under regulation 9"

A "…noise emission is taken to significantly contribute to a level of noise if the noise emission … exceeds a value which is 5 dB below the assigned level…"

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

(a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and

(b) The noise emission complies with the standard prescribed under regulation 7 after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

Table 2-1 Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

Note: The above are cumulative to a maximum of 15dB.

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and the relevant assigned levels are shown in *Table 2-2*.

Table 2-2 Baseline Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building.

Generally, the influencing factor applicable at the noise sensitive premises in rural areas is 0 dB, so the baseline assigned levels would apply.

The regulations acknowledge that motor sport activities are an integral part of society and those motor sport venues generally struggle to achieve compliance with the assigned levels. To address this, the regulations specifically address motor sport venues in *regulation 16A* through a process of approval of a noise management plan.

The sections in *regulation 16A* most relevant to this assessment state:

16AA. Approval of noise management plan: motor sport venue

(1) The occupier of a motor sport venue may apply to the CEO for approval of —

(a) a noise management plan for the venue; or

(b) an amendment of an approved noise management plan for the venue.

(3) The CEO may, in writing —

(a) if the application is for the approval of a noise management plan — approve, or refuse to approve, the noise management plan for the motor sport venue; or

(b) if the application is for an amendment of an approved noise management plan — approve, or refuse to approve, the amendment.

(4) Before making a decision under subregulation (3) the CEO —

(a) must give the following a reasonable opportunity to make a submission on whether or not the plan or amendment should be approved —

(i) the occupier of any noise sensitive premises within 1 km of the motor sport venue;

(ii) the local government of each district in which noise emissions received from the venue are likely to fail to comply with the standard prescribed under regulation 7; and

(b) may give any other person the CEO considers appropriate in the circumstances a reasonable opportunity to make a submission on whether or not the plan or amendment should be approved.

(5) An approval of a noise management plan under subregulation (3) —

(a) may be granted subject to conditions imposed by the CEO; and

(b) subject to subregulation (6) and regulation 16AC, has effect for the period specified in the approval.

(7) The CEO must not approve a noise management plan for a motor sport venue unless the plan —

(a) contains a map (current at the time of the application) showing the motor sport venue, including the area where motor vehicles or motor vessels are raced or prepared for racing and car parks used by competitors in races at and visitors to the venue; and

(b) contains a description of the types of racing activities that can reasonably be expected to be conducted at the venue and classes of vehicles or vessels that can reasonably be expected to race at the venue; and

(c) sets out limitations on the racing activities to be conducted and the times during which racing activities may be conducted; and

(d) contains details of reasonable and practicable measures to be implemented to control noise emissions from the venue during the conduct of a racing activity at the venue; and

(e) contains details of when and the manner in which notice of racing activities at the venue is to be published or distributed to members of the public; and

(f) specifies the persons who will be responsible for implementing the approved noise management plan and sets out each person's responsibilities; and

(g) contains a complaint response procedure.

(9) Regulation 7 does not apply to noise emitted from a motor sport venue during the conduct of a racing activity at the venue if the racing activity is conducted in accordance with an approved noise management plan, excluding any ancillary measure, for the venue.

The purpose of this assessment is not to produce a noise management plan, however, to determine the impact from the Motorsport Facility to sensitive receivers to determine the actions required for the development of the noise management plan.

3 NOISE PREDICTION METHODOLOGY

Computer modelling has been used to predict noise levels from the proposed Motorsports Facility to nearby noise receivers. The advantage of modelling is that it is not affected by background noise sources and can provide the noise level for various weather conditions and operating scenarios.

For this assessment the noise prediction software used was *SoundPLAN 8.0* with the CONCAWE algorithms selected. These algorithms have been specifically selected as they include the influence of wind, atmospheric stability and the effect of ground conditions. Input data required in the model are:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.1.1 Meteorological Information

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and tends to mask out intrusive noise to some degree.

Table 3-1 Modelling Meteorological Conditions

Parameter	Night (1900-0700)	Day (0700-1900)
Temperature (^{o}C)	15	20
Humidity (%)	50	50
Wind Speed (m/s)	3	4
Wind Direction*	All	All
Pasquil Stability Factor	F	E

* Note that the modelling package used allows for all wind directions to be modelled simultaneously.

It is generally considered that compliance with the assigned noise levels needs to be demonstrated for 98% of the time, during the day and night periods, for the month of the year in which the worst-case weather conditions prevail. In most cases, the above conditions occur for more than 2% of the time and therefore must be satisfied.

3.1.2 Topographical Data

Topographical data was based on that publicly available from *GoogleEarth* in the form of spot heights, noting the topography is relatively flat with no significant natural/manmade features between the proposed Motorsports Facility and receivers.

3.1.3 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. water or bitumen) and 1 for acoustically absorbent ground (e.g. grass). In this instance, as the area is predominantly rural, a value of 1.0 has been used as an average across the study area.

3.1.4 Source Sound Levels

The sound power levels used in the modelling to represent the various types of racing are provided in *Table 3-2*. The data was obtained from publically available data, specifically, a report assessing the noise impacts associated with the Ruapuna Park Motorsport Complex and Kart Club in Christchurch New Zealand (courtesy of Marshall Day Acoustics) and measurements of go-karts operating at the Wanneroo go-kart facility. It should be noted that in some circumstances the sound power levels have been reduced to align with trackside sound limits of L_{Amax} 95 dB at 30m.

Where noise sources are located on straights, the "Straight" sound power level has been used. Where the sound source is located on a bend, then the "Braking" sound power level has been used.

Table 3-2 Source Sound Power Levels L_{max}

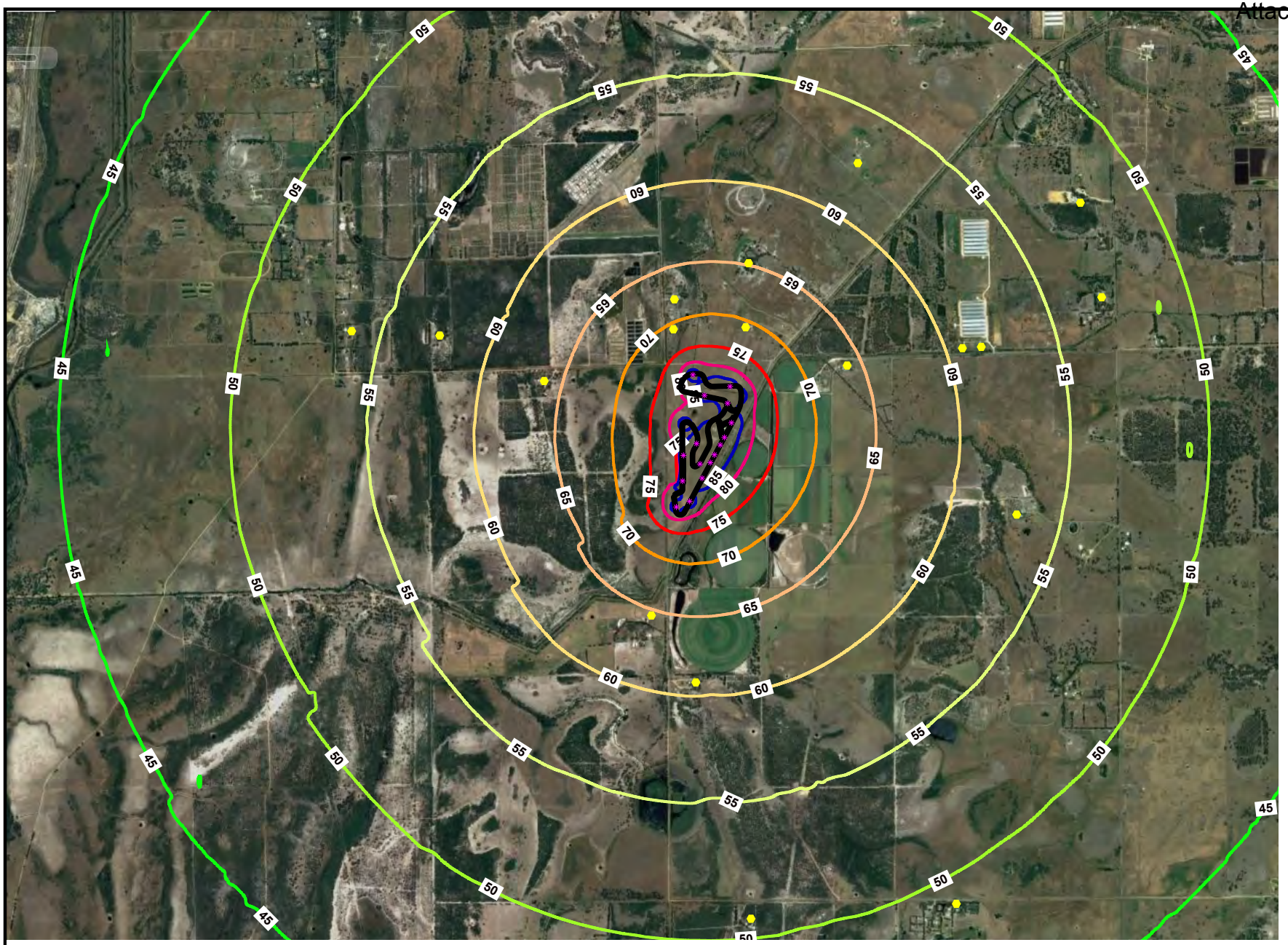
Description		Octave Band Centre Frequency (Hz)								Overall dB(A)
		63	125	250	500	1k	2k	4k	8k	
Formula Ford	Straight	121	137	135	131	126	118	113	104	**132**
	Braking	126	138	130	116	116	109	107	108	**126**
Porsche GT3	Straight	120	133	132	131	128	124	115	108	**132**
	Braking	130	140	133	122	125	120	116	118	**131**
Superbikes	Straight	112	120	126	132	126	119	116	113	**132**
	Braking	121	123	127	128	124	113	107	107	**128**
125cc Rotax Kart	Straight	112	123	123	120	114	107	108	98	**121**
	Braking	101	112	112	109	103	96	97	87	**110**
Hire Kart	Straight	110	107	105	97	93	92	91	87	**101**
	Braking	103	100	98	90	86	85	84	80	**94**
Manufactured Car	Straight	110	93	96	102	105	105	97	90	**110**
	Braking	95	89	89	97	100	100	93	85	**105**

As a note, the table above provides the sound power level for each type of racing vehicle. As a guide, the measured sound pressure level, at 30m from a vehicle, would be the overall sound power level - 37 dB.

4 RESULTS

The results of the assessment for each of the race types are presented as noise level contour plots in *Figures 4-1 to 4-6.* The plots represent the maximum noise levels expected from the racing event types. It is anticipated that the L_{A10} noise level would be approximately 5 dB less than the maximum noise level shown.

Figure 4-1



Keysbrook Motorsports Facility - Formula Ford Race
L_{Amax} Predicted Noise Levels - Assumes 20 Cars Racing and Wind from All Directions

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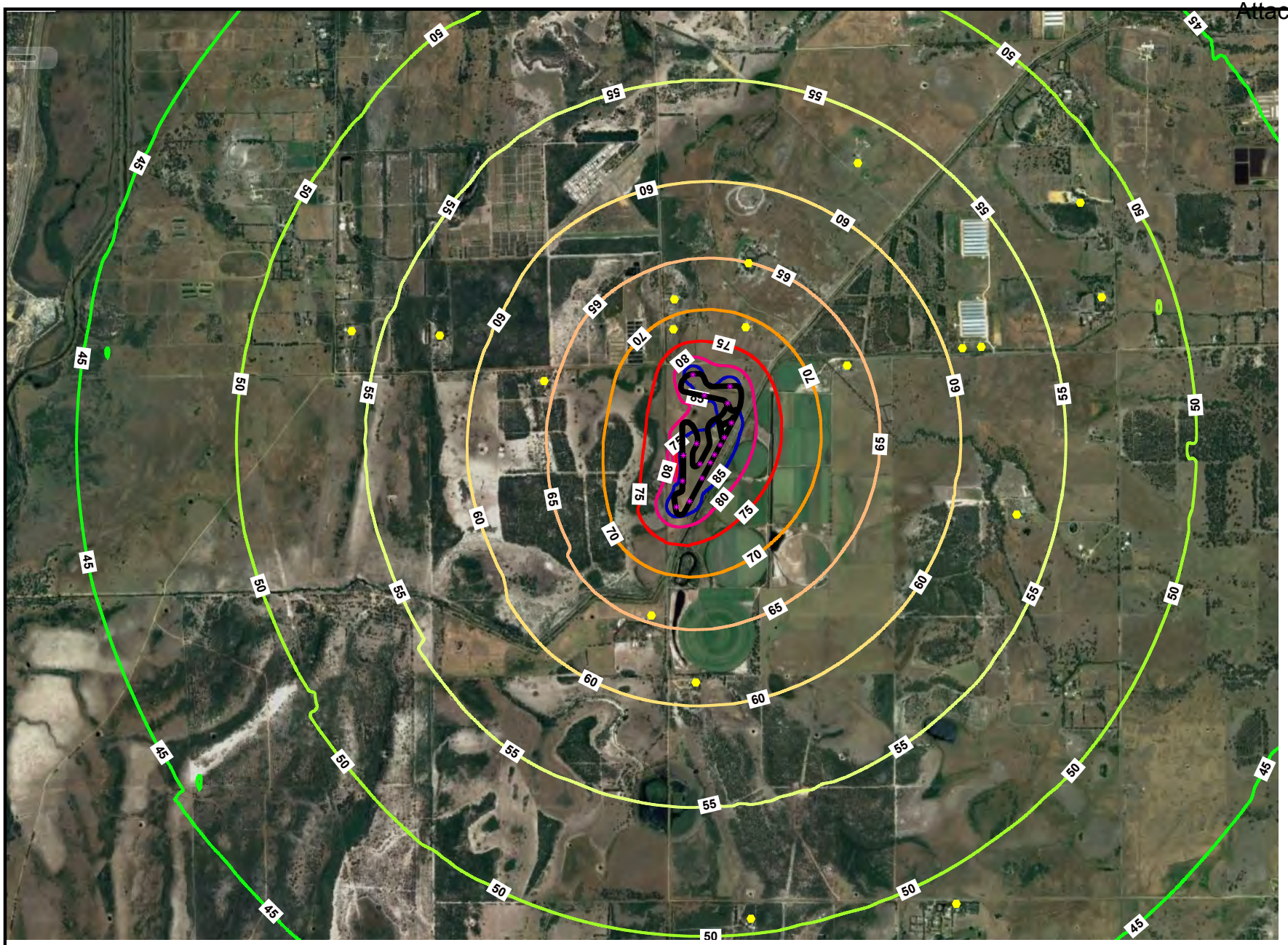
Figure 4-2



Keysbrook Motorsports Facility - Porsche GT3 Race
L_{Amax} Predicted Noise Levels - Assumes 20 Cars Racing and Wind from All Directions

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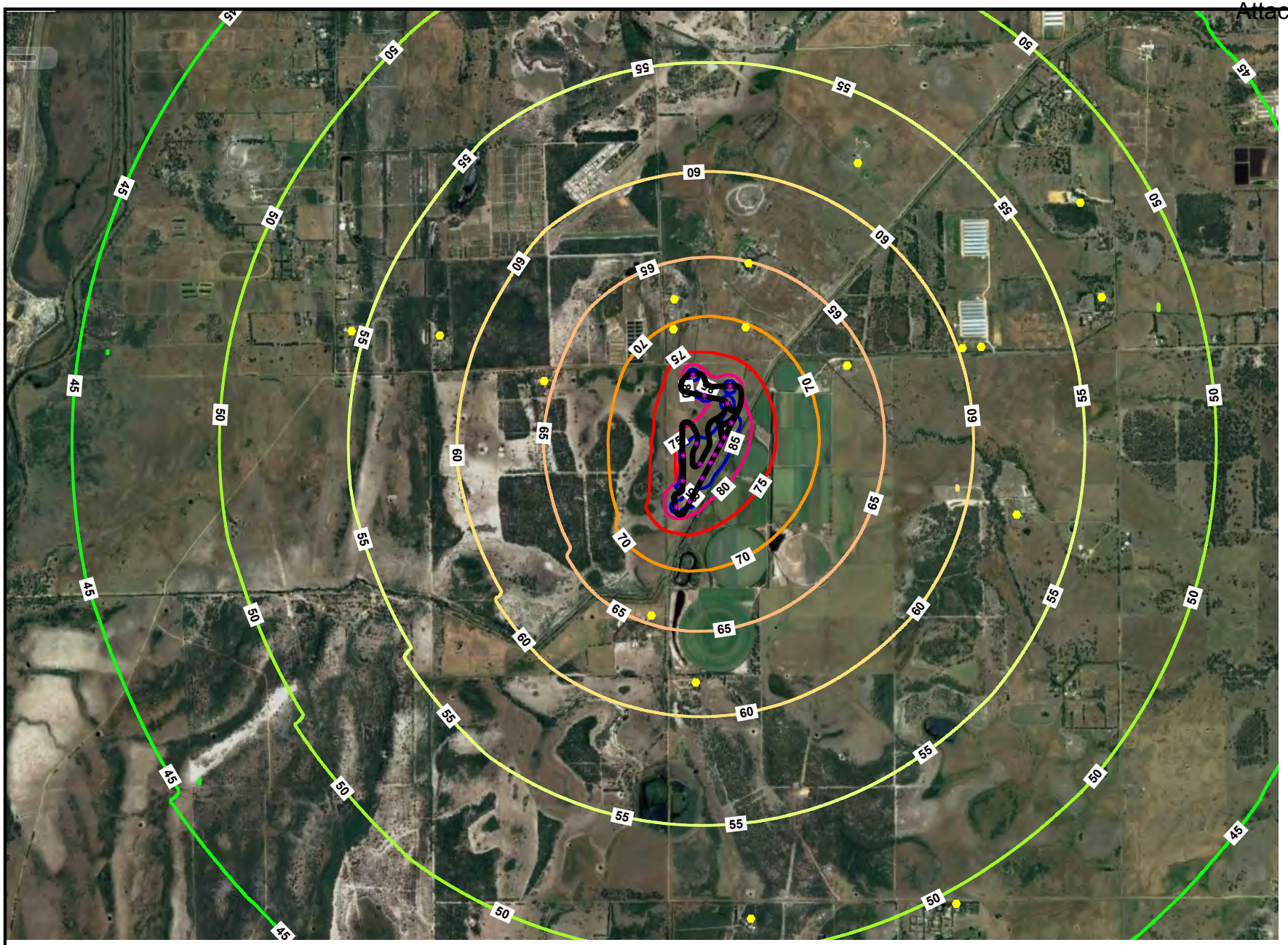
Figure 4-3



Keysbrook Motorsports Facility - Superbike Race
L_{Amax} Predicted Noise Levels - Assumes 20 Bikes Racing and Wind from All Directions

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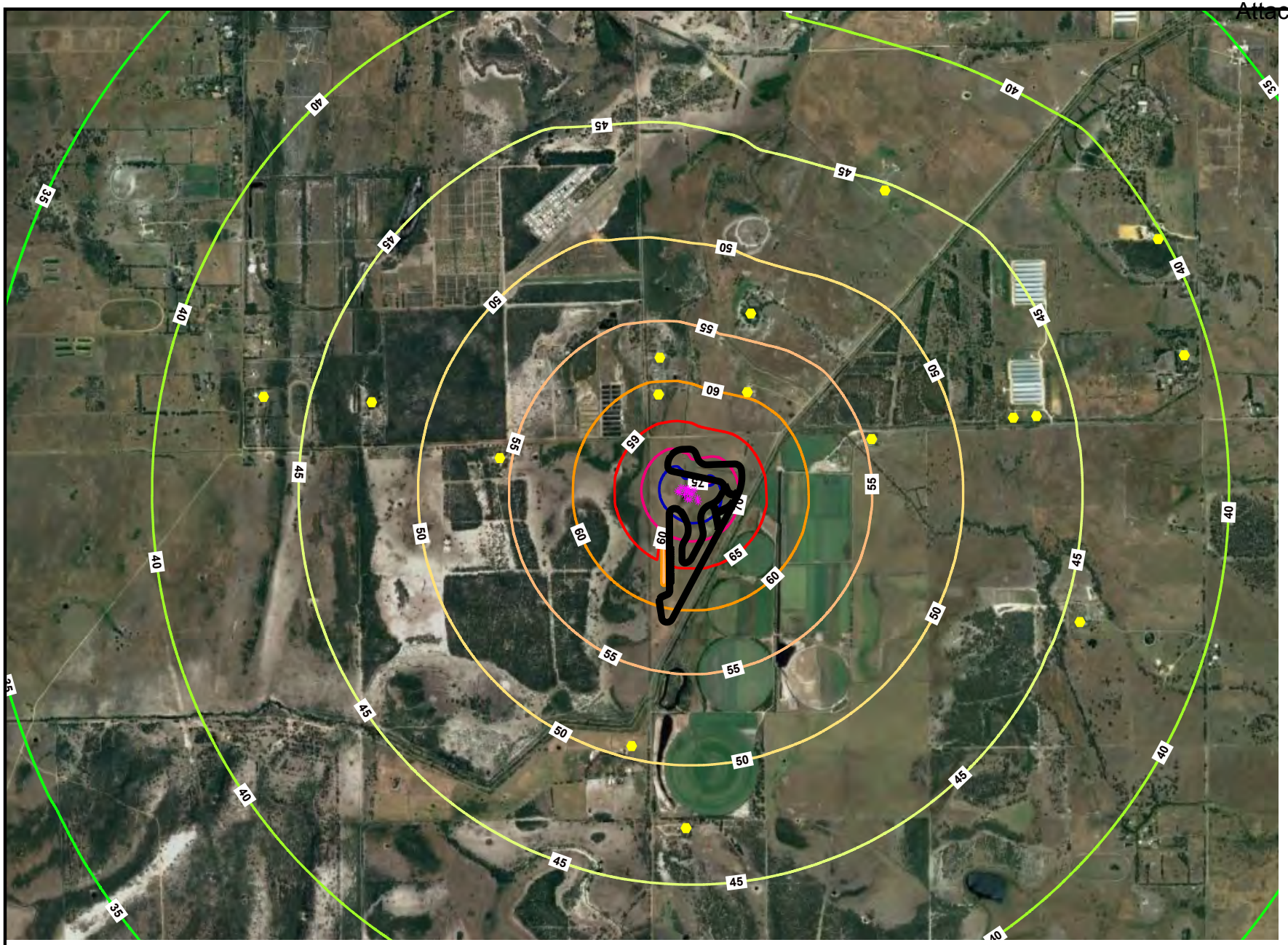
Figure 4-4



Keysbrook Motorsports Facility - 125cc Rotax Kart Race
L_{Amax} Predicted Noise Levels - Assumes 20 Karts Racing and Wind from All Directions

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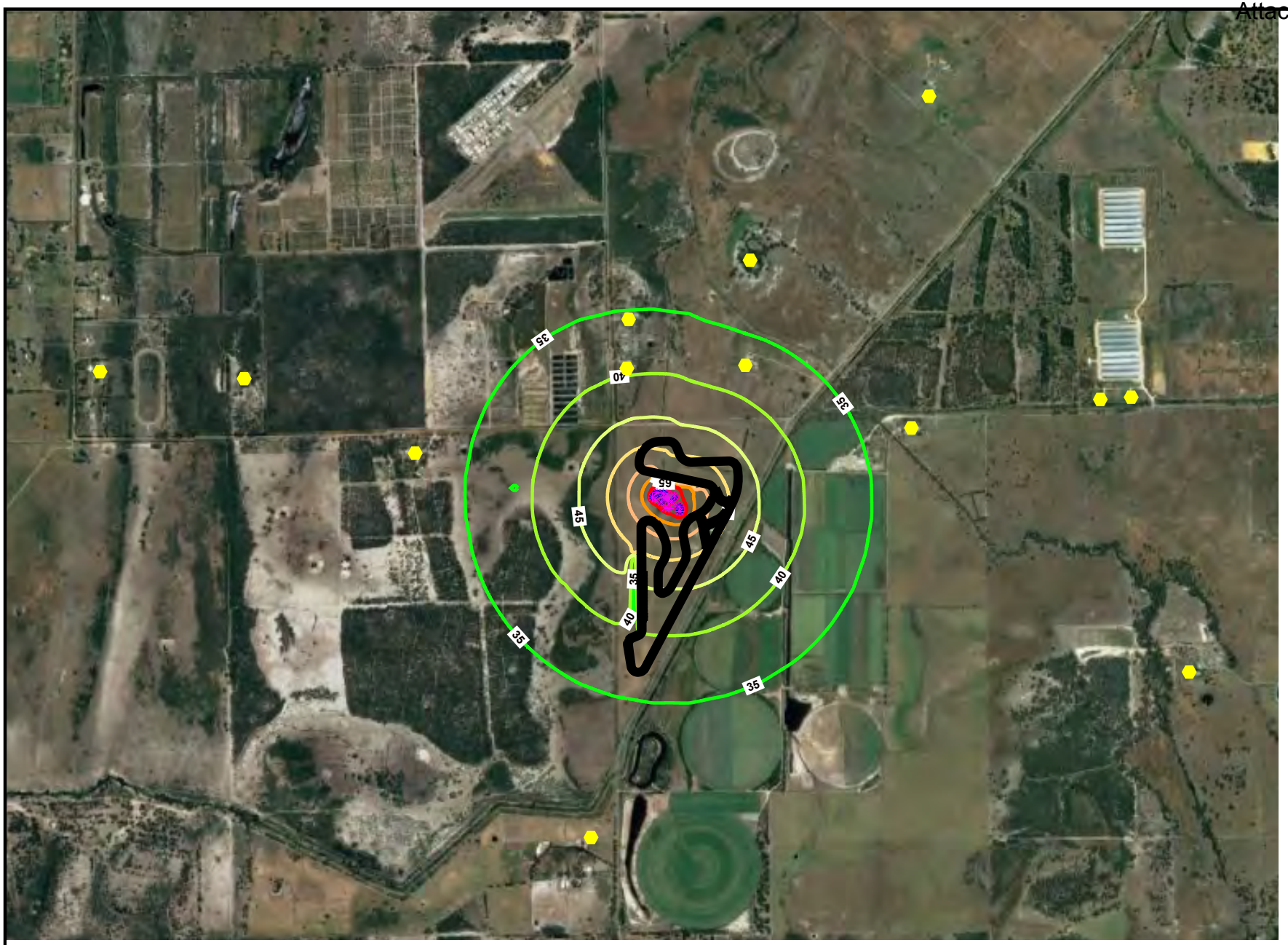
Figure 4-5



Keysbrook Motorsports Facility - Hire Kart Race
L_{Amax} Predicted Noise Levels - Assumes 20 Karts Racing and Wind from All Directions

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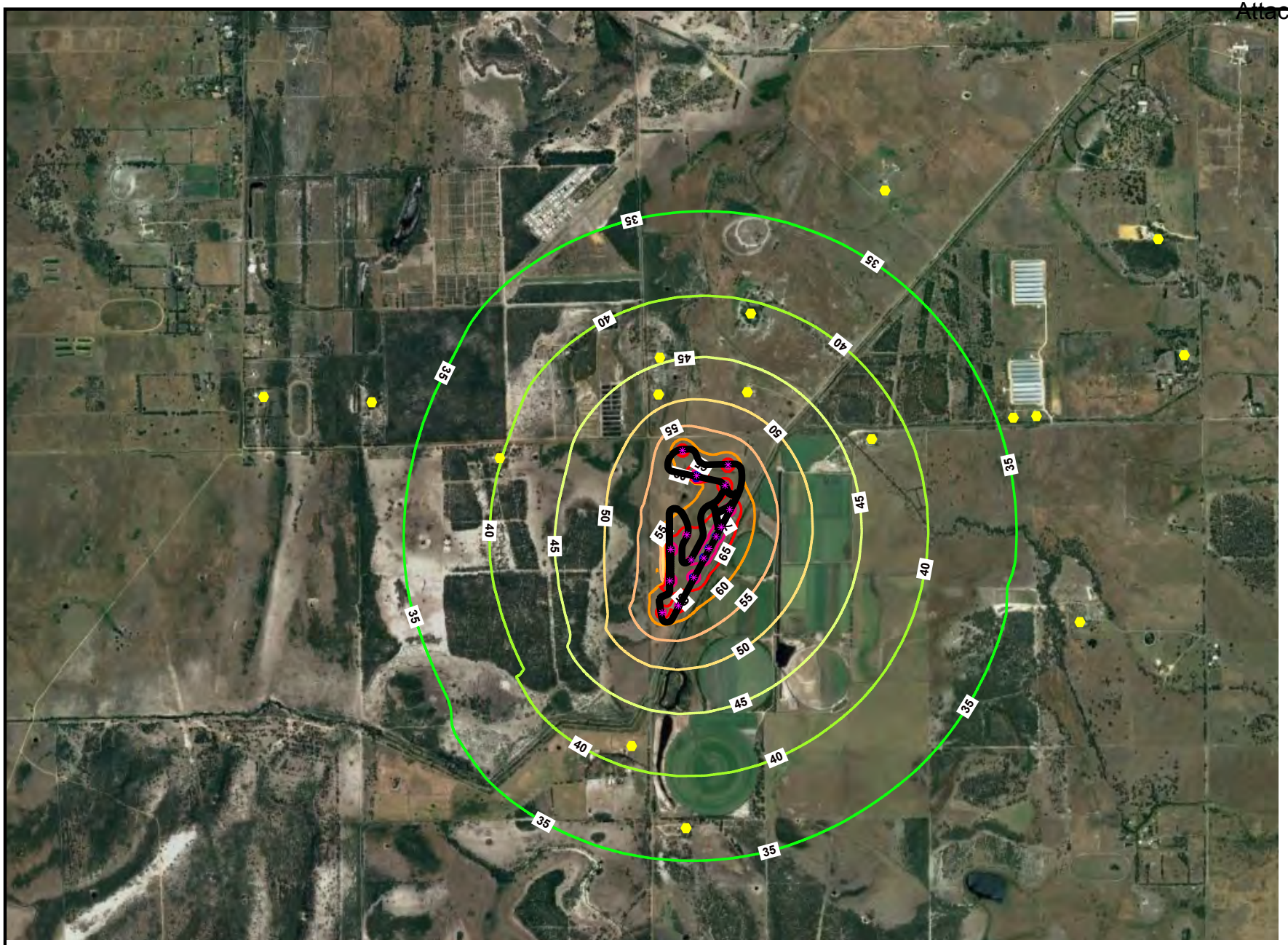
Figure 4-6



Legend

- Point source
- Sensitive Receiver

N

Length Scale

0 0.1 0.2 0.4 0.6 0.8 1 1.2 km

Keysbrook Motorsports Facility - Manufactured Car Event Day
L_{Amax} Predicted Noise Levels - Assumes 20 Cars Racing and Wind from All Directions

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5 DISCUSSION

The noise from Motorsport Facilities is addressed in *regulation 16A* through a process of the approval of a noise management plan. Once approved, the assigned levels under *regulation 7* of the Regulations no longer apply, providing the facility is operated in accordance with the approved plan.

As detailed in *Section 2* of this assessment, the CEO may approve a management plan for a motorsports venue providing it:

(a) contains a map (current at the time of the application) showing the motor sport venue, including the area where motor vehicles are raced or prepared for racing and car parks used by competitors in races at and visitors to the venue; and

(b) contains a description of the types of racing activities that can reasonably be expected to be conducted at the venue and classes of vehicles that can reasonably be expected to race at the venue; and

(c) sets out limitations on the racing activities to be conducted and the times during which racing activities may be conducted; and

(d) contains details of reasonable and practicable measures to be implemented to control noise emissions from the venue during the conduct of a racing activity at the venue; and

(e) contains details of when and the manner in which notice of racing activities at the venue is to be published or distributed to members of the public; and

(f) specifies the persons who will be responsible for implementing the approved noise management plan and sets out each person's responsibilities; and

(g) contains a complaint response procedure.

While the preparation of a noise management plan is outside the scope of this assessment, the predicted maximum noise levels for each event type is provided in *Figures 4-1 to 4-6* and a description of the type and duration of events is provided in *Table 5-1.* The control of noise emissions will be addressed through compliance with vehicle noise limits that are set by the various racing bodies.

In addition to the above, the operators of the facility will commit to installing permanent noise monitoring equipment on-site, for the ongoing compliance monitoring and recording.

Table 5-1 Proposed Schedule of Events

Track Use	Vehicle Type (Equivalent)	Frequency Days/Year	Duration
Race Karts	125cc Rotax Karts	20	9am-6pm
Hire Karts	Standard	Daily	9am-6pm
Manufacture Days	Various (non-modified)	74	9am-6pm
Driver Training	Various (non-modified)	74	9am-6pm
Amateur Events (State)	Formula Ford / GT3 Sports Cars	10	2-3 days (over weekend)
Amateur Events (National)	Formula Ford / GT3 Sports Cars	5	2-3 days (over weekend)
Amateur Events (test days)	Formula Ford / GT3 Sports Cars	55	Weekdays (9am-6pm)
Bikes (racing)	Superbikes / Street bikes	18	2-3 days (over weekend)
Bikes (track/test days)	Superbikes / Street bikes	55	Weekdays (9am-6pm)

Appendix A

Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)
The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting
An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

Sound Power Level (L_w)
Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

Sound Pressure Level (L_p)
The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

L_{ASlow}
This is the noise level in decibels, obtained using the A frequency weighting and the S time weighting as specified in AS1259.1-1990. Unless assessing modulation, all measurements use the slow time weighting characteristic.

L_{AFast}
This is the noise level in decibels, obtained using the A frequency weighting and the F time weighting as specified in AS1259.1-1990. This is used when assessing the presence of modulation only.

L_{APeak}
This is the maximum reading in decibels using the A frequency weighting and P time weighting AS1259.1-1990.

L_{Amax}
An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

L_{A1}
An L_{A1} level is the A-weighted noise level which is exceeded for one percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L_{A10}
An L_{A10} level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "*intrusive*" noise level.

L_{Aeq}
The equivalent steady state A-weighted sound level ("equal energy") in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the "average" noise level.

L_{A90}
An L_{A90} level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the "*background*" noise level.

One-Third-Octave Band
Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

L_{Amax} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded at any time.

L_{A1} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period.

L_{A10} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period.

Tonal Noise
A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between -

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

Modulating Noise
A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

(a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;

(b) is present for at least 10% of the representative.

Impulsive Noise
An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between $L_{A\ peak}$ and $L_{A\ Max\ slow}$ is more than 15 dB when determined for a single representative event;

Major Road
Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

Secondary / Minor Road
Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

Influencing Factor (IF)

$$= \frac{1}{10}(\%\ \text{Type}\ A_{100} + \%\ \text{Type}\ A_{450}) + \frac{1}{20}(\%\ \text{Type}\ B_{100} + \%\ \text{Type}\ B_{450})$$

where:

$\%\ \text{Type}\ A_{100}$ = the percentage of industrial land within a100m radius of the premises receiving the noise

$\%\ \text{Type}\ A_{450}$ = the percentage of industrial land within a 450m radius of the premises receiving the noise

$\%\ \text{Type}\ B_{100}$ = the percentage of commercial land within a100m radius of the premises receiving the noise

$\%\ \text{Type}\ B_{450}$ = the percentage of commercial land within a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

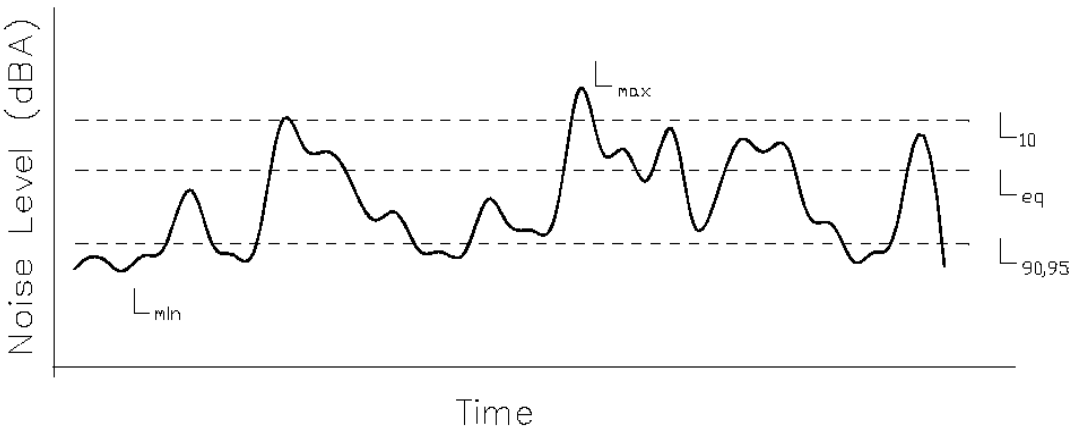
= 2 for each major road within 450m

= 6 for each major road within 100m

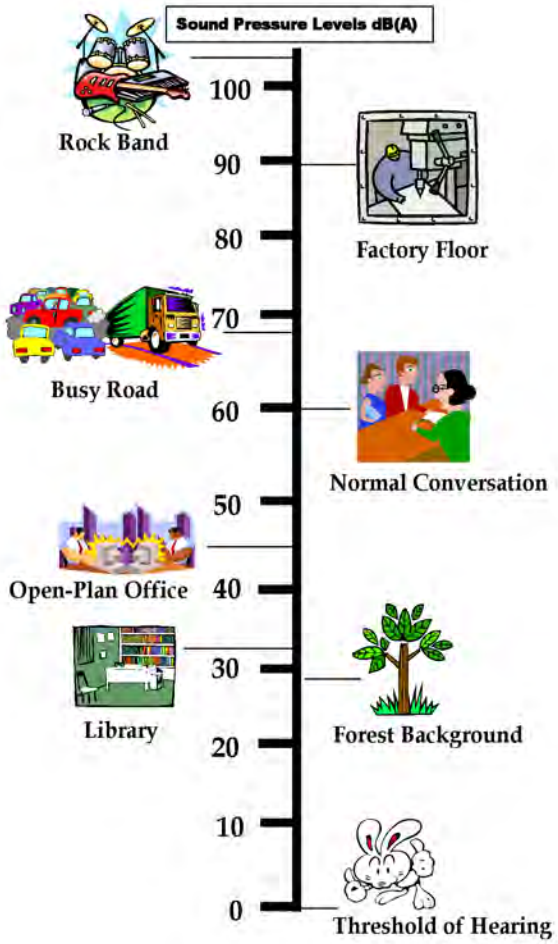
Representative Assessment Period
Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Background Noise
Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

Chart of Noise Level Descriptors



Typical Noise Levels



Appendix C
Feedback Form

Noise Management Plan Appendix C – Noise Feedback Form

KEYSBROOK MOTORSPORT FACILITY NOISE FEEDBACK FORM

Submitted by: .....

Address of Submitter: .....

Phone no. of Submitter: .....

Email of Submitter: .....(optional)

Please return after any event for which you have recorded feedback or at the end of a month to:

Email: TBC

Post: TBC

Date of Event / Observation	Time of Event / Observation	Description of Observation: *ie.* • *Frequency of event;* • *Duration of event;* • *Vehicle noise;* • *Other noise;* • *Etc.*

Appendix D
Non-Compliant Vehicle Form

Noise Management Plan Appendix D – Non-Compliant Vehicle Form

KEYSBROOK MOTORSPORT FACILITY NON-COMPLIANT VEHICLE FORM

Vehicle No./Registration:	**Driver:**
……	**……**
You are advised that the noise level of your vehicle has been recorded at: …….. dB(A) This recorded reading is higher than the allowable maximum of 95dB(A) at 30m from the exhaust as specified within the Keysbrook Motorsport Facility Noise Management Plan (Date…….. Revision No. ……..). Prior to your next scheduled time on this track, you are required to ensure that the exhaust system is upgraded to the extent that the exhaust noise level will not exceed the maximum allowable limit. Should another reading in excess of the limit be recorded at this meeting/event, your vehicle will be removed from the remainder of the event.	
This notice is issued by: Track Supervisor or Delegated Officer	
Timed at: ……	Date: ……
Meeting/Event: ……	

SIGNED IN RECEIPT OF NOTICE: _____

Appendix E
Notification Letter Template

Noise Management Plan Appendix E – Example Notification Letter –

Notification of Upcoming Race Events at the Keysbrook Motorsport Facility

Date

Dear Resident,

RE: PROPOSED EVENT / SCHEDULE OF EVENTS AT THE KEYSBROOK MOTORSPORT FACILITY

We wish to notify you of a new upcoming event / modification to the schedule of events planned for the Keysbrook Motorsport Facility located at 732 Punrak Road, Keysbrook.

The following event(s) is/are scheduled to take place:

- (insert name of event, date, time)
- (insert name of event, date, time)
- (insert name of event, date, time)

We are taking this opportunity to inform residents within a 1km radius of the Keysbrook Motorsport Facility of this/these events. Should this event be of interest to you, we would welcome your attendance at the venue.

We would like to thank you in advance for your cooperation and we apologise for any inconvenience this may cause. If you would like further information please contact us on ####-###-###.

Yours sincerely